SRINIVAS INSTITUTE OF MANAGEMENT STUDIES

Mangalore - 575001

COMPUTER APPLICATION IN MANAGEMENT

compiled by

Dr. P. S. Aithal

Third Semester MBA Programme 2016

of Mangalore University

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CHAPTER 1 : INFORMATION TECHNOLOGY

of

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SYLLABUS

1. **Information Technology :**
   Application of information technology, uses of information technology, impact of information technology on business.
2. **Electronic Commerce :**
   Infrastructure for e-commerce, communication networks for ecommerce, payment systems in e-commerce, impact of e-commerce on Business. Ecommerce in Indian Business Context, Business Models for e-commerce.
3. **Information Systems for Mobile Commerce :**
   Legal and Ethical Issues in E commerce and M commerce.
4. **Information System Resources :**
   Computer basics *(H/w* & *S/w)* DBMS, Communication Systems, internet and office automation.
5. **Word processing with MS word :**
   Starting MS word - MS Environment - working with word documents - working with text - working with tables - checking spelling and grammar - printing document - creating mailing lists- mail and merge.
6. **Concept of spread sheet and MS Excel :**
   Starting MS Excel - MS Excel Environment - working with Excel - workbook. Preparation of charts and graph with excel – working with workbook. Working with functions - Summery statistics, correlations, regression, t-test, z-test, Chi square test, Macros. Sort and filter commands. Introduction to SQL.
7. **Making presentation with MS Power point :**
   Starting MS Power point - MS Power point Environment - working with power point - working with different views – designing presentations - printing in power point.
8. **Data communication :**
   Computer networking basics - LAN Technology and networking Topology - WAN Technology. Networking Devices.
9. **Information System Management :**
   Information Concepts - , its nature and functions, planning issues and the MIS organizing issues and the MIS - control issues and the MIS - Decision Support Systems - electronic Commerce - types - advantages and disadvantages - Electronic data interchange - How EDI works - EDI benefits and limitations.
10. **Use of MIS at various levels of Management :**
    A framework for information system for each level of Management and Operations. Types of Information systems – Operating Support Systems, Management support systems, Expert System.

Contents of Chapter 1

Chapter 1
Information Technology :

1.1 Introduction to Information Technology :

Information technology (**IT**) is the application of computers and telecommunications equipment to store, retrieve, transmit and manipulate data,[1] often in the context of a business or other enterprise. The term is commonly used as a synonym for computers and computer networks, but it also encompasses other information distribution technologies such as television and telephones. Several industries are associated with information technology, including computer hardware, software, electronics, semiconductors, internet, telecom equipment, e-commerce and computer services.

Humans have been storing, retrieving, manipulating and communicating information since the Sumerians in Mesopotamia developed writing in about 3000 BC, but the term *information technology* in its modern sense first appeared in a 1958 article published in the *Harvard Business Review*; authors Harold J. Leavitt and Thomas L. Whisler commented that "the new technology does not yet have a single established name. We shall call it **information technology** (IT)." Their definition consists of three categories: techniques for processing, the application of statistical and mathematical methods to decision-making, and the simulation of higher-order thinking through computer programs.
Based on the storage and processing technologies employed, it is possible to distinguish four distinct phases of IT development: pre-mechanical (3000 BC – 1450 AD), mechanical (1450–1840), electromechanical (1840–1940) and electronic (1940–present).

1.2 History of IT :

Devices have been used to aid computation for thousands of years, probably initially in the form of a tally stick. The Antikythera mechanism, dating from about the beginning of the first century BC, is generally considered to be the earliest known mechanical analog computer, and the earliest known geared mechanism. Comparable geared devices did not emerge in Europe until the 16th century, and it was not until 1645 that the first mechanical calculator capable of performing the four basic arithmetical operations was developed.
Electronic computers, using either relays or valves, began to appear in the early 1940s. The electromechanical computer Zuse Z3, completed in 1941, was the world's first programmable computer, and by modern standards one of the first machines that could be considered a complete computing machine. Colossus, developed during the Second World War to decrypt German messages was the first electronic digital computer. Although it was programmable, it was not general-purpose, being designed to perform only a single task. It also lacked the ability to store its program in memory; programming was carried out using plugs and switches to alter the internal wiring. The first recognizably modern electronic digital stored-program computer was the Manchester Small-Scale Experimental Machine (SSEM), which ran its first program on 21 June 1948.
The development of transistors in the late 1940s at Bell Laboratories allowed a new generation of computers to be designed with greatly reduced power consumption. The first commercially available stored-program computer, the Ferranti Mark I, contained 4050 valves and had a power

consumption of 25 kilowatts. By comparison the first transistorised computer, developed at the University of Manchester and operational by November 1953, consumed only 150 watts in its final version.

Summary of the History :

June 30, 1945: John Von Neumann published the *First Draft of a Report on the EDVAC*, the first documented discussion of the stored program concept and the blueprint for computer architecture to this day.

May 22, 1973: Bob Metcalfe "banged out the memo inventing Ethernet" at Xerox, Palo Alto Research Center (PARC).

March 1989: Tim Berners-Lee circulated "Information management: A proposal" at CERN in which he outlined a global hypertext system.

Data Storage :

Early electronic computers such as Colossus made use of punched tape, a long strip of paper on which data was represented by a series of holes, a technology now obsolete. Electronic data storage, which is used in modern computers, dates from World War II, when a form of delay line memory was developed to remove the clutter from radar signals, the first practical application of which was the mercury delay line. The first random-access digital storage device was the Williams tube, based on a standard cathode ray tube, but the information stored in it and delay line memory was volatile in that it had to be continuously refreshed, and thus was lost once power was removed. The earliest form of non-volatile computer storage was the magnetic drum, invented in 1932 and used in the Ferranti Mark 1, the world's first commercially available general-purpose electronic computer.

IBM introduced the first hard disk drive in 1956, as a component of their 305 RAMAC computer system. Most digital data today is still stored magnetically on hard disks, or optically on media such as CD-ROMs. Until 2002 most information was stored on analog devices, but that year digital storage capacity exceeded analog for the first time. As of 2007 almost 94% of the data stored worldwide was held digitally: 52% on hard disks, 28% on optical devices and 11% on digital magnetic tape. It has been estimated that the worldwide capacity to store information on electronic devices grew from less than 3 exabytes (EB) in 1986 to 295 exabytes in 2007, doubling roughly every 3 years. [Note : 1 EB = 1000^6 bytes = 10^{18} bytes].

Databases :

Database management systems emerged in the 1960s to address the problem of storing and retrieving large amounts of data accurately and quickly. One of the earliest such systems was IBM's Information Management System (IMS), which is still widely deployed more than 40 years later. IMS stores data hierarchically, but in the 1970s Ted Codd proposed an alternative relational storage model based on set theory and predicate logic and the familiar concepts of tables, rows and columns. The first commercially available relational database management system (RDBMS) was available from Oracle in 1980.

All database management systems consist of a number of components that together allow the data they store to be accessed simultaneously by many users while maintaining its integrity. A characteristic of all databases is that the structure of the data they contain is defined and stored separately from the data itself, in a database schema.

The extensible markup language (XML) has become a popular format for data representation in recent years. Although XML data can be stored in normal file systems, it is commonly held in relational databases to take advantage of their "robust implementation verified by years of

both theoretical and practical effort". As an evolution of the Standard Generalized Markup Language (SGML), XML's text-based structure offers the advantage of being both machine and human-readable.

Data Retrieval :
The relational database model introduced a programming-language independent Structured Query Language (SQL), based on relational algebra. The terms "data" and "information" are not synonymous. Anything stored is data, but it only becomes information when it is organized and presented meaningfully. Most of the world's digital data is unstructured, and stored in a variety of different physical formats even within a single organization. Data warehouses began to be developed in the 1980s to integrate these disparate stores. They typically contain data extracted from various sources, including external sources such as the Internet, organized in such a way as to facilitate decision support systems (DSS).

Data Transmission :
Data transmission has three aspects: transmission, propagation, and reception. It can be broadly categorized as broadcasting, in which information is transmitted unidirectionally downstream, or telecommunications, with bidirectional upstream and downstream channels. XML has been increasingly employed as a means of data interchange since the early 2000s, particularly for machine-oriented interactions such as those involved in web-oriented protocols such as SOAP, describing "data-in-transit rather than ... data-at-rest". One of the challenges of such usage is converting data from relational databases into XML Document Object Model (DOM) structures.

Data Manipulation :
Hilbert and Lopez identify the exponential pace of technological change (a kind of Moore's law): machines' application-specific capacity to compute information per capita roughly doubled every 14 months between 1986 and 2007; the per capita capacity of the world's general-purpose computers doubled every 18 months during the same two decades; the global telecommunication capacity per capita doubled every 34 months; the world's storage capacity per capita required roughly 40 months to double (every 3 years); and per capita broadcast information has doubled every 12.3 years. Massive amounts of data are stored worldwide every day, but unless it can be analysed and presented effectively it essentially resides in what have been called data tombs: "data archives that are seldom visited". To address that issue, the field of data mining – "the process of discovering interesting patterns and knowledge from large amounts of data" – emerged in the late 1980s

In a business context, the Information Technology Association of America has defined information technology as "the study, design, development, application, implementation, support or management of computer-based information systems". The responsibilities of those working in the field include network administration, software development and installation, and the planning and management of an organization's technology life cycle, by which hardware and software are maintained, upgraded and replaced. The business value of information technology lies in the automation of business processes, provision of information for decision making, connecting businesses with their customers, and the provision of productivity tools to increase efficiency.

Worldwide IT spending forecast (billions of U.S. dollars) :

Category	2014 spending	2015 spending
Devices	685	725
Data center systems	140	144
Enterprise	321	344
IT services	967	1,007
Telecom services	1,635	1,668
Total	3,749	3,888

Another way of looking at the evolution of IT is to focus on the specific contributions of technological inventions and advances to the industry's key growth driver: digitization and the resulting growth in the amount of digital data created, shared, and consumed.
The industry was born with the first giant calculators digitally processing and manipulating numbers and then expanded to digitize other, mostly transaction-oriented activities, such as airline reservations. But until the 1980s, all computer-related activities revolved around interactions between a person and a computer. That did not change when the first PCs arrived on the scene.

Table 2 : Basic Functions of Information Technology

Input	Collecting data using various electronic devices
Communication	Access and movement of data from place to place
Processing	Transforming data from one form to another
Storage	Retaining data for future reference
Retrieval	Ability to recall data when needed
Output	Ability to transform data into a usable format specified by the user

The PC was simply a mainframe on your desk. Of course it unleashed a wonderful stream of personal productivity applications that in turn contributed greatly to the growth of enterprise data and the start of digitizing leisure-related, home-based activities. But I would argue that the major quantitative and qualitative leap occurred only when work PCs were connected to each other via Local Area Networks (LANs)—where Ethernet became the standard—and then long-distance via Wide Area Networks (WANs). With the PC, you could digitally create the memo you previously typed on a typewriter, but to distribute it, you still had to print it and make paper copies. Computer networks (and their "killer app," email) made the entire process digital, ensuring the proliferation of the message, drastically increasing the amount of data created, stored, moved, and consumed.

Connecting people in a vast and distributed network of computers not only increased the amount of data generated but also led to numerous new ways of getting value out of it, unleashing many new enterprise applications and a new passion for "data mining." This in turn changed the nature of competition and gave rise to new "horizontal" players, focused on one IT component as opposed to the vertically integrated, "end-to-end solution" business model that has dominated the industry until then. Intel in semiconductors, Microsoft in operating systems, Oracle in databases, Cisco in networking, Dell in PCs (or rather, build-to-order PCs), and EMC in storage have made the 1990s the decade in which "best-of-breed" was what many IT buyers believed in, assembling their IT infrastructures from components sold by focused, specialized IT vendors.
The next phase in the evolution of the industry, the next quantitative and qualitative leap in the amount of data generated and how we use networked computers, came with the invention of the World Wide Web (commonly mislabeled as "the Internet"). It led to the proliferation of new applications which were no longer limited to enterprise-related activities but digitized almost any activity in our lives. Most important, it provided us with tools that greatly facilitated the creation and sharing of information by anyone with access to the Internet (the open and almost free wide area network only few people cared or knew about before the invention of the World Wide Web). The work memo I typed on a typewriter which became a digital document sent across the enterprise and beyond now became my life journal which I could *discuss* with others, including people on the other side of the globe I have never met. While computer networks took IT from the accounting department to all corners of the enterprise, the World Wide Web took IT to all corners of the globe, connecting millions of people. Interactive conversations and sharing of information among these millions replaced and augmented broadcasting and drastically increased (again) the amount of data created, stored, moved, and consumed. And just as in the previous phase, a bunch of new players emerged, all of them born on the Web, all of them regarding "IT" not as specific function responsible for running the infrastructure but as the essence of their business, data and its analysis becoming their competitive edge.

We are already experiencing—a new phase in the evolution of IT and a new quantitative and qualitative leap in the growth of data. The cloud—a new way to deliver IT, big data—a new attitude towards data and its potential value, and The Internet of Things—connecting billions of monitoring and measurement devices quantifying everything, combine to sketch for us the future of IT.

1.3 Evolution of IT Management

Computers are not new to park and recreation organization management. To better understand how to manage IT today, it is necessary to look at the three previous eras of IT management: data processing (DP),management information systems (MIS), and information services (IS). These models of IT organization may still be part of existing IT services, because the park and recreation managers were trained and systems designed during the time period when they emerged.

(1) The Data Processing Era
In the 1960s and 1970s, computer functions were organized into a special division called *data processing*, staffed by personnel skilled in the use of computers. These divisions usually serviced the entire organization that is , the municipality of which parks and recreation was a part. The

traditional data processing model has three main components. (see compendium 14-2 for scenario of data processing model):

1. Data entry : day-to-day production data entry
2. Operations: day-to-day maintenance, routine report generation, backup, etc., and
3. Applications: software development, maintenance, and support.

The *data processing model was efficient because:*

1. The computers were centralized and operated by technical staff;
2. The applications were designed and tightly programmed to capture the requirements of the business units; and
3. Data entry was done by skilled operators.

This model required a pool of technically skilled IT workers. Essentially, for a cost, an automation introduced to get more accurate and timely information. A typical data processing task for park and recreation agencies would be recreation activity registration. The process would be as follows:

- blank registrations forms are distributed;
- completed registration forms are received by the recreation business unit;
- forms are batched, by day or center, and taken to data processing;
- forms are entered and an "edit report" is created with each batch;
- the recreation business unit would reconcile the batch with the edit report;
- data processing is advised of any changes to the batch, and if needed another edit report is created and the batch is reconciled again; and
- once the batch is verified , a computer operator enters the data into a finance program and a periodic report is issued to the recreation business unit.

In simple terms, registrations are dropped off at data processing Monday through Thursday, all verification is done by Friday noon, and a weekly report is run Friday and distributed on Monday.

This model is a centralized method of managing IT. All the resource for computing were centralized in one budget. In some governmental units, including universities, this division was part of the finance department. The computers were large mainframes hidden in a restricted area, out of sight. Some business units (usually the finance office) had terminals connected to the mainframe. All letters and memos were done by typewriter and distributed through inter/intra-office mail and the postal service. The computing resources were focused on processing data.

As IT matured, more business units wanted to be involved. Since the IT budget was not unlimited, projects were prioritized. Business units that did not have the budget for IT projects or were not considered high priority did not get project done. Executives became very frustrated and created a business need for smaller, cost-effective computers. Computers scaled down to meet the needs of a single department.

(2) Management Information Systems Era

In the 1980s, smaller and less expensive computers helped managers place terminals on their desks to monitor daily business. The shift to managers having direct access to information

changed the emphasis of computing. The computer functions were referred to as management information Systems (MIS). (see compendium 14-3 scenario for an MIS model.)
There was a major shift from manual record-keeping systems to electronic data entry. Instead of having a data entry division with skilled computers personnel, the park and recreation operation could do its own entry, directly into the mini or mainframe computers; however, MIS specialists were employed, and there may have been an MIS division or unit. The major effect on the workface was that now managers, supervisors, secretaries, and other staff had to have basic computer skills to do their jobs.
The success of departments getting mini-computers (departmental computers) changed the governments' control of computing from centralized management to decentralized. This meant park and recreation departments began hiring IT professionals to operate the computers and write programs. They reported to someone within park and recreation, usually the finance office. During this time, it was common practice for mayors and city managers to put the responsibility of managing information in the hands of the department directors. A by-product of that decision was that each department began looking for a computer solution that supported their business. The computing department for the city lacked the resource to assist in the acquisition process. The end result was departments having better control of information, but the city as a whole not being able to share electronic information easily.
The 1990s ushered in personal computers(PCs) on a mass scale. Staff enjoyed the freedom of immediate access to computer functions without depending on the MIS division in larger organizations or the MIS expert in smaller ones. Networking desktop units together further increased the value of the PC investment. During the early 1990s, the traditional mainframe operation continued and a new computer unit was developed that supported the PC users at the desktop with simple off-the-shelf computer applications(e-mail, word processing, spreadsheets, and small databases)was referred to as office automation. During this time, three computer environments that coexisted:

- Mainframe computing: large general applications(e.g.,accounting);
- Departmental computing: organization-specific database(e.g., facility scheduling);and
- Personal computing: office automation (e.g.,word processing).

The park and recreation executive during this time was not equipped to manage electronic information. There was little or no technology included in leisure service degree programs. There were a number of software vendors that specialized in park and recreation solutions and provided consulting. However, executives became frustrated with the perceived cost of technology and lack of measurable results. Part of the problem was IT professionals who became park and recreation staffed ceased or slowed their IT training and learning . As the environment became more complex, the IT staff was less equipped to manage, leading to rising consulting costs.

(3) Information Services Era
Around the year 2000, business and government began to view computer functions as one information resource that has many components, each of which uses technological advance. The Y2K scare revealed vulnerabilities in information system management. The world waited in anticipation for computers to crash and send countries into anarchy. As it turned out, it was a non-event, only because companies and government used IS leadership to identity, plan, and implement solutions for all agencies and departments. The principal components(mainframe

computer operations, network infrastructure, serves, desktop support, and telecommunications)are now referred to as information services(IS). The major shift in government during this time was the emergence of the understanding that information has strategic decision-making value. Many cities began to ask the chief information officer(CIO)to join/advise the cabinet. One of the outcomes was the introduction of standards as a part of managing technology costs, including standards for personal computers, e-mail, word processing and other purchases.

City leaders are now required to take a leadership role in managing information. During this time of change, park and recreation executives responded differently. Some identified IS(the operation of minicomputers, writing software, etc.) as a non-core service, and responded by soliciting the IS, departments or contractors for direct support. Other directors elected to stay with d distributed approach, noting that some IS departments may not have proper resources.

Telecommunications became another service inherited by IS managers. Telephony has a similar infrastructure to computer networks, as well as a data component. Office installations usually require a voice connection and a data connection. Under the control of IS, these con be coordinated.

The Internet is now a sophisticated place to do business. City leaders depend on IS to provide protection from unwanted attacks and inappropriate use by staff. This level of complexity has caused leisure service managers to think twice about having full responsibility for the computer function. The term "enterprise" was introduced and refers to all users within government connected to the some network. IS was asked to manage the enterprise and provide and enforce standards for using services.

(4) Information Technology Era

Looking forward to the year 2020, the park and recreationmani1ger is going to have many choices about how to manage information. Managers of today have had technology courses in college and most likely own a home computer. The marketplace is flooded with all sorts of communication, entertainment, and information devices that all have the same core attributes as a basic computer. This is referred to as technology. Hence, this is the information technology era. It is a place where there is existing infrastructure to connect various technologies to meet or exceed business needs.

The focus of IT is to assist departments in becoming technology savvy, that is efficient and focused on customer needs. This is done by building on the legacy of each era of IT management:

- data processing-the business process is key, systems must enhance the process;
- MIS -business units are responsible for information, not IT people;
- IS-standards enhance organization, information is strategic; and
- IT – many technologies, using the right technology for the right job.

What is IT? It is the study, design, development and support of computer-based information systems. With the creation of the Internet, a new basic function has been added to IT, and that is

security, protecting information. It is important to understand the various eras of IT management because not all departments have achieved the same technological maturity. This is because there has been significant investment in technology. Until there isa real business need to change; IT, park and recreation departments should get the most out of their investment. This means staff members should adapt to the current environment, and plan for the future.

1.4. Information Technology at Present :

Every day, people use computers in new ways. Computers and other electronic devices are becoming increasingly affordable. They continue to be more powerful as information-processing tools as well as easier to use. Humans are continually becoming dependant on IT-enabled devices for carrying out simple tasks like remembering a phone number to complex ones like flying a fighter plane. Information Technology has applications in almost all aspects of our life. Some of the important ones are:

Science and Engineering : Scientific progress in fields like biotechnology is almost entirely dependent on the use of computers and other microprocessor-controlled devices. Using supercomputers, meteorologists predict future weather by using a combination of observations of weather conditions from many sources, a mathematical representation of the behavior of the atmosphere, and geographic data. Computer-aided design (CAD) and computer-aided manufacturing (CAM) programs have led to improved products in many fields, especially where designs tend to be very detailed. Computer programs make it possible for engineers to analyze designs of complex structures such as power plants and space stations.

Business & **Commerce** : One of the first and largest applications of computers is keeping and managing business and financial records. Most large companies keep the employment records of all their workers in large databases that are managed by computer programs. Similar programs and databases are used in business functions like billing customers; tracking payments received and payments to be made; and tracking supplies needed and items produced, stored, shipped, and sold. In fact, practically all the information companies need to do business involves the use of computers and Information Technology. Almost all the financial transactions in the world are done electronically. Newer technologies like m-commerce have enabled almost everybody to carry out routine financial transactions on the move.

On a smaller scale, many businesses have replaced cash registers with point-of-sale (POS) terminals. These POS terminals not only print a sales receipt for the customer but also send information to a computer database when each item is sold to maintain an inventory of items on hand and items to be ordered. Computers have also become very important in modern factories. Computer-controlled robots now do tasks that are hot, heavy, or hazardous. Robots are also used to do routine, repetitive tasks in which boredom or fatigue can lead to poor quality work.

With today's sophisticated hardware, software, and communications technologies, it is often difficult to classify a system as belonging uniquely to one specific application program. Organizations increasingly are consolidating their information needs into a single, integrated information system. Management Information System (MIS), with the Chief Information Officer (CIO) at its head, is a whole, new branch of enterprise management.

Education: The advent of Information Technology has changed the meaning of the term “literate”, with computer literacy being almost as important as basic literacy in many cases. Computer education is an essential course at the primary level in most schools across the world. With more information getting digitized every day, and the internet making it accessible to

anyone across the world, students are increasingly relying on electronic sources of information rather than physical libraries for their needs. Instructional methodology has also undergone a sea change with use of images, animations, videos, presentations and e-learning to complement traditional techniques.

Governance : The concept of e-governance is one of the most novel applications of Information Technology whereby it is changing the lives of millions across the globe. Computerization of Government activities makes it easier to supervise and audit, and makes the administration more responsive to the needs of society. It also bridges the divide between the Government and the people. Technologies like touch-screen kiosks help disseminate information on land records, photo identity cards, pending bills etc. and enable even illiterate people to take more informed decisions. India is leading the world in the effective use of IT for elections.

Medicine : Information Technology plays an important role in medicine. For example, a scanner takes a series of pictures of the body by means of computerized axial tomography (CAT) or magnetic resonance imaging (MRI). A computer then combines the pictures to produce detailed three-dimensional images of the body's organs. In addition, the MRI produces images that show changes in body chemistry and blood flow. Most critical life support equipment are programmed to respond to changes in the patient’s status in split-seconds, thereby reducing the response time and risk of human error. Newer concepts like robotic surgery enable specialists to perform surgeries from remote locations. Genomic studies greatly depend on supercomputing power to develop technologies for the future.

Entertainment : IT has changed the lifestyle of most people. The convergence of various technologies has created various options for entertainment like games, streaming music and video, digital television broadcasts, satellite radio, animated movies etc. which can be accessed with the help of mobile phones, PDAs, notebook computers or on television either with a cable connection or wirelessly using newer-generation WiFi, CDMA or GPRS technologies.

Information Technology plays a vital role in most of our daily activities. There is hardly anyone who has not been affected or influenced by IT. With each passing day, newer applications of IT are being developed which increase our interaction with and dependence on IT-enabled devices. Therefore, understanding this technology and using it creatively is imperative to human progress.

1.5 Future of IT :

Information technology tools like computers will still be useful in the future and these computers will change their functionality with a main goal of improving the way we do business or transfer information. Institutions like Banks, Schools, Shopping Malls, Government agencies will all have to use new information technology tools to serve their users basing on the needs and expectations of their users.

Future information technology will change the face of business. Already we have seen how current information Technology has shaped the e-commerce world. Now with services like **Google Wallet** and **Squareup**, buyers can easily turn their mobile phones as payment gateways, the introduction of these new e-commerce payment gateways have shaped our e-commerce world and more technologies will merge as consumer demands increase with time. In brief let’s look at some examples of some information technology tools which will shape our future and simplify our lives.

(1) Google Wallet: Google wallets will enable you use any smart phone to purchase products online. It supports all credit and debit cards. The good thing about Google wallet is that it will enable you store all your cards online so that they're with you wherever you go.

(2) Squareup : Also squareup technology will enable you make online transactions using your mobile phone. As a user you will only pay 2.75% per swipe, and their will be no additional fees and next day deposits. This is a great tool for business, it is flexible and affordable. Square works with Android and iOS smart phones.

More technologies will emerge as the world develops , because our demands will change with time. So it is up-to us to be literate and learn how to take advantage of future Information Technology.

1.6 India & IT :

Information Technology has two subsets, namely IT services and BPO (business process outsourcing). This sector has been a major contributor to the growth of the economy of our country. It is evident in the fact that the contribution of this sector to India's GDP has grown from 1.2% in 1998 to 7.5% in 2012. This industry has emerged as an asset to Indian economy, in recent years. With the advancement in technology, this industry has made itself compatible, with newest innovations. In late 90's, this industry was not very common in India, but with the increase in technology and innovation in India and owing to the fact that it was supported by global factors, this industry has boomed.

India has become one of the major IT jobs capitals of the world generating 2.5 million jobs. The youngsters are attracted to this industry because it has a bright future and offers high perks. Moreover, cities like Bangalore, Chennai, Kolkata, Mumbai etc. have emerged as the major IT capitals in India. Bangalore, the silicon valley of India is the major exporter of the IT services in India. Different IT parks have emerged in India and it is still growing, at a high rate. When we talk about careers in these IT sectors, the top companies are HCL, Tata consultancy services, Wipro, Infosys, and Cognizant.

When it comes to employment, this sector has made a major contribution, in India. Many freshers who have completed their engineering are employed in this sector. The industry is growing faster than any other industry in India and it sustains the potential to make this country, a global IT superpower.

If we look at the future aspect of this industry, we can be sure that the IT boom is not going to subside any time soon. Today, India has a booming IT sector, with millions of qualified engineers, to fuel its growing needs. IT has spread its root from Bangalore to other cities of India and is connecting India with the world. India always has an advantage of dedicated workforce, who can interact in English. This provides them an advantage over China, but China is also taking measures, to reduce this void.

India is quite weak at initiating product development. However, the situation will change in coming years. Innovation is the key to development in this field. As research and development go hand in hand, it is very important for India to improve skills and research, which will provide a further impetus to the IT sector.

Business Case 1 :

California Pizza controls costs with IT

California Pizza Kitchen (CPK) started out in 1985 as a venture by two former federal prosecutors who wanted to do something different. They decided to sell "designer pizza" in which the pizza dough is a "canvas" for exotic food toppings such as Thai chicken, shrimp pesto, Peking duck, or southwestern burritos. By offering stylish entrees costing less than $10 in a sit-down setting, CPK mushroomed into a national chain of 70 restaurants in only nine years, with PepsiCo buying half-ownership in 1992.

Success did not come easily to this Los Angeles-headquartered chain. The restaurant business is a high-risk industry with many factors that are beyond their control-like :swelling competition, fickle customer tastes, and rising real estate costs. Thus, restaurants need to tightly control food and labor costs to remain profitable-without affecting the quality of their food or service.

CPK company is poised for another take-off. It hopes to expand to 700 restaurants by using information systems to control food costs and make employees more productive. Since diners are turned away by high prices, the only way to control costs is through inventory and portion control -keeping precise track of the amount of ingredients used in each menu item and stocking only as much of these ingredients as each restaurant actually needs.

All California Pizza Kitchen restaurants installed point-of-sale (POS) devices, which capture data about each item sold at the time the sale takes place. The sales data and inventory reports prepared by restaurant managers are transmitted from each restaurant to the company's central computer, where the information is consolidated and analyzed. An application called Inventory Express "remembers" ordering patterns, such as the amount of lettuce a restaurant needs each week, and also compares the amount of each item used to what each restaurant actually sold. If, for example, a restaurant sold 100 Thai shrimp pizzas in one week, it should have used a

predetermined amount of shrimp, such as 40 pounds, based on portion measurements established by CPK management.
Using more shrimp would indicate a problem with over portioning or waste. Restaurants with out-of-line portions would be told to take corrective action. The POS-derived data is used for other purposes besides portion control. CPK's restaurant operations group uses the data to determine peak sales at each location so that they can schedule employee work shifts. The data tell food and beverage specialists how well each item sells. CPK found that it should get rid of its egg-salad pizza, for instance, when the item registered poor sales. California Pizza now has pilot projects to move to more state-of-the art information system technology. Waiters and waitresses are experimenting with hand-held point-of-sale devices, which management hopes will boost productivity by reducing the amount of time employees spend with customers.
The devices use radio frequencies to transmit orders to a computer in the back of the restaurant, eliminating the need for employees to run back and forth to a stationary POS device to place orders. CPK can also use its information systems to calculate the relative costs of different markets so it can determine if it has a lower profit margin on Hawaiian pizza in Maryland, than in Waikiki. (Pineapple should be less expensive in Hawaii than in the northeastern United States.) CPK's corporate accounting department can use the aggregated sales data to tally revenue and can manage the accounts payable and accounts receivable processes by combining that data with financial data residing on a central CPK computer.

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Readings 1 :

Data, Information, & Systems

We use the words *data*, *information*, and *system* almost daily. Understanding what these terms mean, both generally and in the business context, is necessary if you are to use information effectively in your career.

Data vs. Information

The terms *data* and *information* do not mean the same thing. Data is the plural of the Latin *datum*, literally a given," or fact, which may take the form of a number, a statement, or a picture. Data are the raw materials in the production of information. Information, on the other hand, is data that have meaning within a context. Information can be raw data or data manipulated through tabulation, addition, subtraction, division, or any other operation that leads to greater understanding of a situation.

Data Manipulation

Here's a simple example that demonstrates the difference between data and information. Assume that you work for a car manufacturer. Last year, the company introduced a new vehicle to the market. Because management realizes that keeping a loyal customer base requires continuous improvement of products and services, it periodically surveys large samples of buyers. It sends questionnaires that include 30 questions in several categories, including demographic data (such as gender, age, and annual income); complaints about different performance areas (such as ease of handling, braking, and the quality of the sound system); features that satisfy buyers most; and courtesy of the dealer's personnel.

Reading through all these data would be extremely time consuming and not very helpful. However, if the data are manipulated, they may provide highly useful infonnation. For example, by categorizing complaints by topic and totaling the number. of complaints for each type of complaint and each car, the company may be able to pinpoint a car's weakness. The company can then pass the resulting information along to the appropriate engineering or manufacturing unit.

Also, the company may already have sufficient data on dealers who sold - cars to the customers surveyed, the car models they sold, and the financing method for each purchase. But with the survey results, the company can generate new information to improve its marketing. For instance, by calculating the average age and income of current buyers and categorizing them by the car they purchased, marketing executives can better target advertising to groups most likely to purchase each car. If the majority of buyers of a particular type of car do not ask for financing, the company may wish to drop this service option for that car and divert more loan money to finance purchases of other cars. In this way, the company generates useful information from data.

Generating Information In the examples just cited, calculating totals and averages of different complaints or purchasers' ages reveals trends associated with customers. These calculations are processes. A process is *any* manipulation of data, usually with the goal of producing information. Some processes, however, produce yet another set of interim data (see Figure 1.1). Hence, while data are raw material, information is output. Just as raw materials are processed in manufacturing to create final useful products, so raw data is processed in information systems to create final useful information.

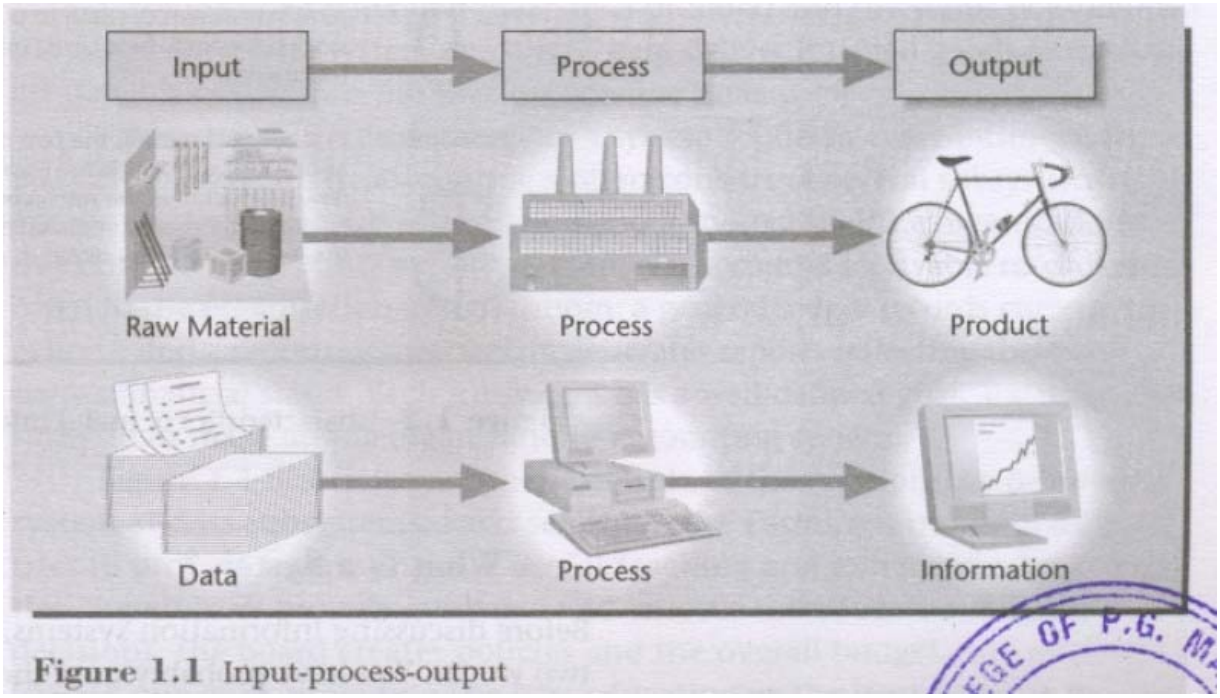

Figure 1.1 Input-process-output

Sometimes, data in one context is considered information in another context. For example, if an organization needs to know the age of every person attending a basketball game, then a list of

that data is actually information. But if that same organization wants to know the average price of tickets each age group purchases, the list of ages is only data, which the organization must process to generate information.

Information in Context

Information is an extremely important resource for both individuals and organizations, but not all information is useful. Consider the following story. Two people who took a tour in a hot-air balloon encountered unexpected wind that soon blew them off course. When they managed to lower their balloon, they shouted to a farmer on the ground, "Where are we?" "You are right above a corn field!" he answered. The balloonists looked at each other, and one groaned, "Some information! Highly accurate and totally useless!" To be useful, information must be relevant, complete, accurate, and current. And in ' business, information must also be obtained economically, that is, cost effec- . tively. Figure 1.2 lists characteristics of useful information.

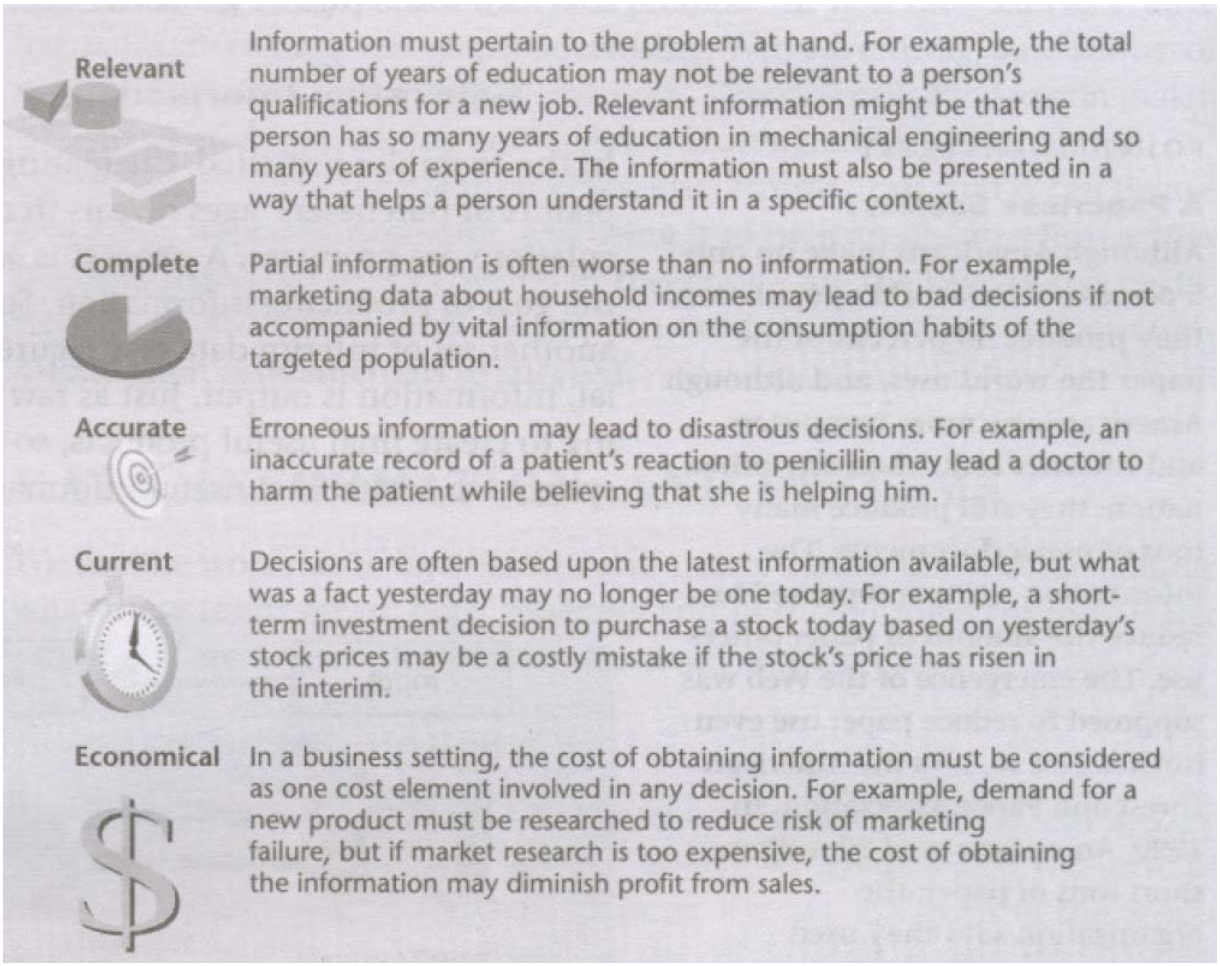

Fig. 1.2 : Characteristics of useful information

What Is a System?

Before discussing information systems, we need to explore the meaning of the two words. You have probably used the word *system* many times. Simply put, a system is an array of components

that work together to achieve a common goal, or multiple goals, by accepting input, processing it, and producing output in an organized manner. Consider the following examples:

. A sound system consists of many electronic and mechanical parts, such as a laser head, an amplifier, an equalizer, and so on. This system uses input in the form of electrical power and sound recorded on tape or CD, and processes the input to reproduce music and other sounds. The components work together to achieve this goal.

. Consider the times you have heard the phrase lito beat the system. Here, the term *system* refers to an organization of human beings-a government agency, a commercial company, or any other bureaucracy. Organizations, too, are systems; they consist of components-people organized into departments and divisions-that work together to achieve common goals.

Systems and Subsystems Needless to say, not every system has a single goal. Often, a system consists of several subsystems-components of a larger system-with subgoals, all contributing to meeting the main goal. Subsystems can receive input from, and transfer output to, other systems or subsystems.
Consider the different departments of a manufacturing business. The marketing department tries to promote sales of the organization's products; the engineering department tries to design new products and improve existing ones; the finance department tries to plan a clear budget and earn interest on every unused penny at the end of the day. Each department is a subsystem with its own goal, which is a subgoal of a larger system (the company), whose goal is to maximize profit.

Now consider the goals of a manufacturing organization's information system, which stores and processes operational data and produces information about all aspects of company operations. The purpose of its inventory control subsystem is to let managers know what quantities of which items are available; the purpose of its production control subsystem is to track the status of manufactured parts; and the assembly control subsystem presents the bill of material (a list of all parts that make up a product) and the status of assembled products. The entire system's goal is to help deliver finished goods at the lowest possible cost within the shortest possible time.

Figure 1.3 shows an example of a system found in every business: an accounting system. An accounting system consists of several subsystems: accounts payable records information about money that the organization owes to other organizations and individuals; accounts receivable records sums owed to the organization and by whom; a general ledger records current transactions; and a reporting mechanism generates reports reflecting the company's financial status. Each subsystem has a well-defined goal. Together, the subsystems make up the organization's accounting system.

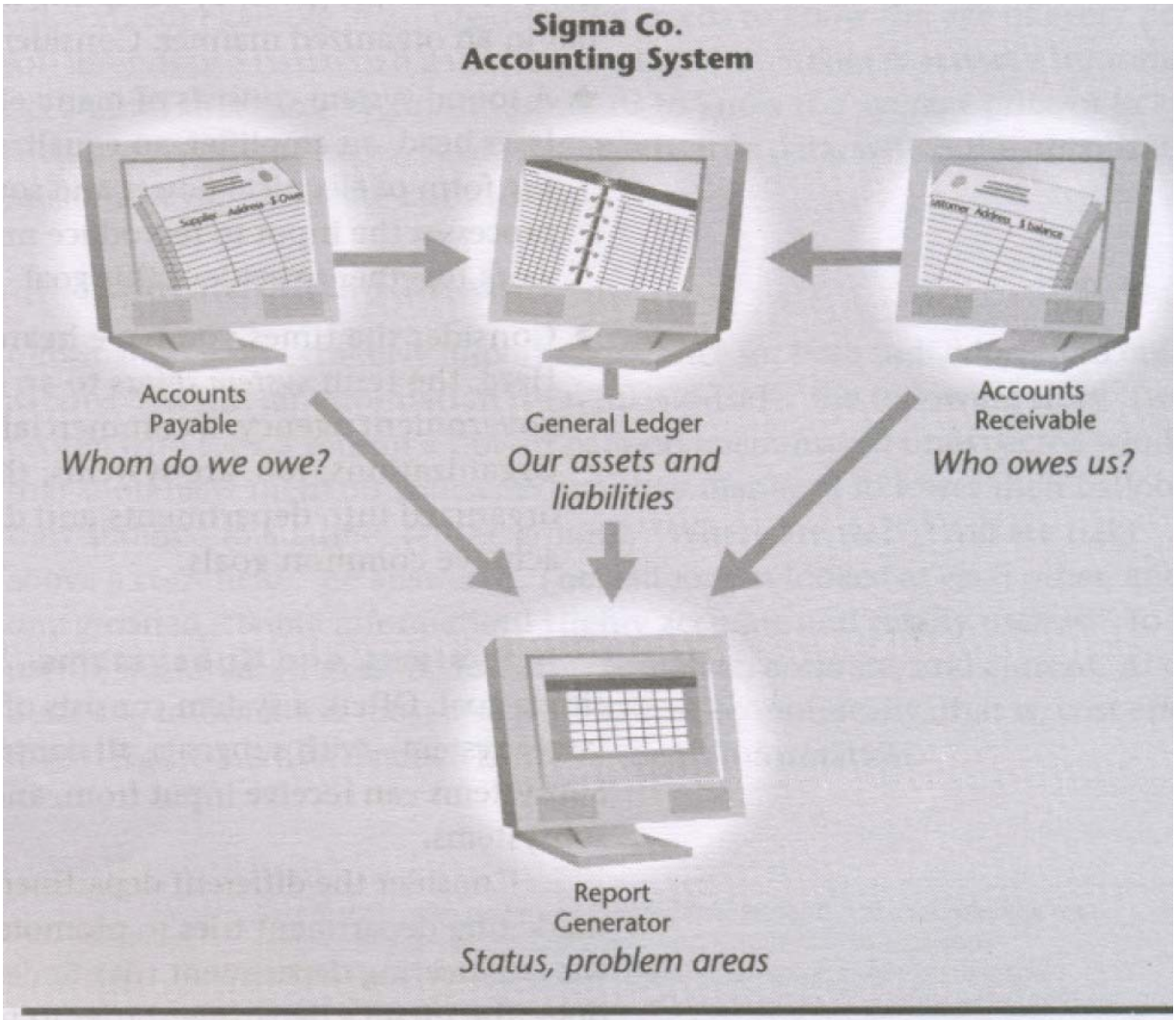

Figure 1.3 Several subsystems make up this corporate accounting system.

Figure 1.4 illustrates another example of the relationship between a system and its subsystems. Each school in the Farmington school district tries to provide interesting and useful teaching and extracurricular activities. Supervisors provide guidance and enforce the education board's decisions, the board creates policies and the overall budget, and all work toward one goal: providing the best education at the least expense to local taxpayers.

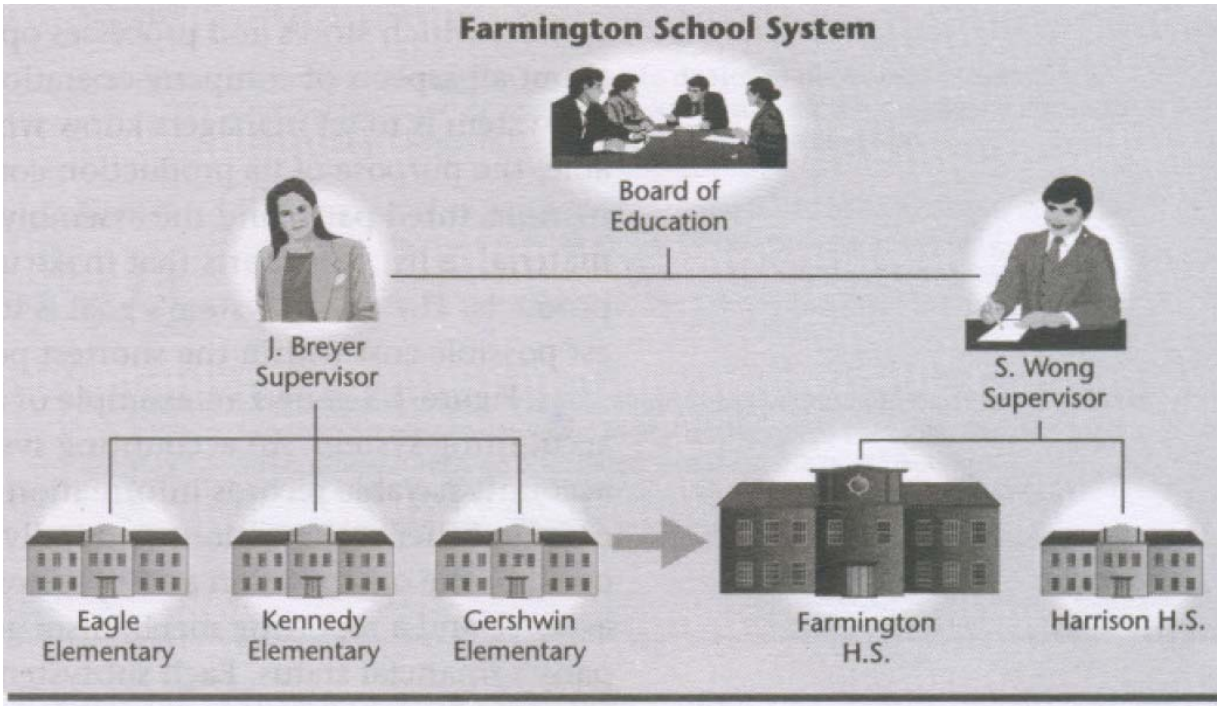

Figure 1.4 Farmington High School is one subsystem within the Farmington school system.

Closed vs. Open Systems:
Systems are dosed or open, depending upon the nature of information that flows within an organization. A closed system stands alone, with no connection to another system: nothing flows in from another system, nothing flows out to another system. An open system interfaces and interacts with other systems. For example, an accounting system that records accounts receivable, accounts payable, and cash flow is open if it receives its payroll figures from the payroll system. Subsystems, by definition, are always open, because as components of a bigger system, they must receive information from, and give information to, other subsystems.

Information and with an understanding of the words *Information* and *system*, the definition of an information system is almost intuitive: an information system (IS) is all components that work together to process data and produce information. Almost all business information systems consist of many subsystems with subgoals, all contributing to the organization's main goal.

Information and Managers
Thinking of an organization in terms of its suborganizations or subsystems called systems thinking-is a powerful management approach because it creates a framework for both excellent problem solving and excellent decision making. To solve problems, managers need to isolate them, which they do by recognizing the subsystems in which the problems occur and solving the problems within those subsystems' constraints and strengths. Systems thinking can also help keep managers focused on the overall goals and operations of a business. It encourages them to consider the entire system, not only their specific subsystem, when solving problems and making

decisions. A satisfactory solution for one subsystem may be inadequate for the business as a whole. For example, when the sales department creates a Web site to take online customer orders, it automates a formerly labor-intensive activity of the sales subsystem. This saves cost. With systems thinking, improving the sales process could also improve other company processes. Without systems thinking, managers from other departments aren't involved in the decision, so they don't benefit. In the case of the sales department, if other managers are involved in planning for automated Internet ordering, they could suggest that sales data recorded on the database connected to the Web also be accessible to other departments, such as shipping and manufacturing. The shipping department could use the records to expedite packaging and shipping, thanks to the information. that appears on a computer monitor rather than a piece of paper. The manufacturing units could use the order records for resource planning such as laborers and inventory. Figuratively, by applying systems thinking, effective managers view their areas of responsibility as puzzle pieces. Each piece is important and should fit well with adjacent pieces, but the entire picture should always be kept in view.

One of an information system's most important contributions to the sound workings of an organization is the automation of information exchange among business subsystems (such as departments and divisions). Consider the earlier example: customer orders taken via a Web site could be routed to the manufacturing and shipping units and processed by their own information systems for their specific purposes. In fact, such information exchanges make up a major portion of all interactions among business subsystems.

In the information map of a modern business-that is, in the description of data and information flow within an organization-is a network of information subsystems that exchange information with each other and with the world outside the system. In an ideal organization, no human would need to retrieve information from one IS and transfer it to another. The organization would capture only new raw data, usually from its operations or from outside the organization. Then data captured at any point in the system would automatically become available to any other subsystem that needs it. Thus, systems thinking is served well by information technology (IT), a term that refers to all technologies that collectively facilitate construction and maintenance of information systems. The Benefits of Human-Computer Synergy It is important to remember that computers can only carry out instructions that humans give them. Computers can process data accurately at far greater speeds than people can, yet they are limited in many respects-most importantly they lack common sense. However, combining the strengths of these machines with human strengths creates synergy. Some people call synergy the 2 + 2 =5 rule. Synergy (from the Greek "work together") occurs when combined resources produce output that exceeds the sum of the outputs of the same resources employed separately. A computer works quickly and accurately; humans work relatively slowly and make mistakes.

A computer cannot make independent decisions, however, or formulate steps for solving problems. Thus, a human-computer combination allows the results of human thought to be translated into efficient processing of large amounts of data. Figure 1.5 presents qualities of humans and computers that result in synergy. It is important to notice not only the potential benefits of synergy but also what computers should not be expected to do independently.

What Are Information Systems?

In an organization, an information system consists of data, hardware, software, telecommunications, people, and procedures as summarized in Figure 1.6. Generally defined, the term *information system* does not have to include electronic equipment. However, "information system" has become synonymous with "computer-based information system," a system with a computer at its center to which peripheral equipment is connected. That is how we use, the term in this book. In a computer-based information system, computers collect, store, and process data into information, according to instructions people
provide via computer programs.

Data	Input that the system takes to produce information.
Hardware	A computer and its peripheral equipment: input, output, and storage devices. Hardware also includes data communication equipment.
Software	Sets of instructions that tell the computer how to take data in, how to process it, how to display information, and how to sto data and information.
Telecommunications	Hardware and software that facilitate fast transmission and reception of text, pictures, sound, and animation in the form electronic data.
People	Information systems professionals and users who analyze organizational information needs, design and construct information systems, write computer programs, operate the hardware, and maintain software.
Procedures	Rules for achieving optimal and secure operations in data processing. Procedures include priorities in dispensing software applications and security measures.

Figure **1.4** Components of an information system

Several trends have made the use of IS’s very important in business:
. Computers' power has grown tremendously while their prices have dropped.
. Computer programs' variety and ingenuity have increased. . Quick and reliable communication lines and access to the Internet and . World Wide Web have become widely available and affordable.
. The fast growth of the Internet has opened opportunities and encouraged competition in global markets.
. An increasing ratio of the workforce is computer literate.

In this environment, organizations quickly lag behind if they do not take advantage of this progress and use information systems and skills to meet their goals.

Remember that in a broad sense an information system consists of physical and nonphysical components working together. A computer alone is not an information system. A computer combined with software may constitute an information system, but only if the program is designed to produce information that helps an organization or person achieve a specific goal. For instance, the purpose of a computerized climate control system is to regulate temperature and humidity in a room; it produces no information and therefore is not an information system. However, today most types of hardware and software produce some kind of information.

The Four Stages of Processing

All information systems operate in the same basic fashion whether they include a computer or not. However, the computer provides a convenient means to execute the four main operations of an information system :

. Entering data into the IS (input)
. Changing and manipulating the data in the IS (data processing)
. Getting information out of the IS (output)
. Storing data and information (storage).

A computer-based IS also uses a logical process to decide which data to capture and how to process them.

Input and Transaction Recording : The first step in producing information is collecting and introducing data, known as input, into the IS. Most data an organization uses as input to its IS are generated and collected within the organization. These data result from transactions undertaken in the course of business. A transaction is a business event: a sale, a purchase, the hiring of a new employee, and the like. These transactions can be recorded on paper and later entered into a computer system, or they may be directly recorded through terminals of transaction processing systems (TPSs), such as cash registers and order entry terminals. A TPS is any system that records' transactions. Often, the same system also processes the transactions, summarizing and routing information to other systems; therefore, these systems are' transaction *processing* systems, not just transaction *recording* systems.

An input device is a tool used to enter data into an IS. Input devices include the keyboard (currently the most widely used input device), infrared devices that sense bar codes, and voice recognition systems. Chapter 4, "Information Technology in Business: Hardware," describes other means to input data. The trend has been to shorten the time and ease the effort of input by using devices that allow visual or auditory data entry. The computer's greatest contribution to ISs is efficient processing of data, which is essential to a robust IS. The computer's speed and accuracy let organizations process millions of pieces of data in several seconds; in the past, such quantities of data could not have been processed quickly enough to be meaningful. For example, managers of a national retail chain can receive up-to-date information on inventory levels of every item the chain carries and order accordingly; in the past, obtaining such information would take days. These astronomic gains in the speed and affordability of computing have made information the essential ingredient for an organization's success. Output is the information an IS produces and displays in the format most useful to an organization. The most widely used output device is the video display, or video monitor, which displays output visually. Often, information is printed on paper, which makes it a hard copy. However, computers can communicate output

through speakers in the form of music or speech and can also transmit it to another computer or electronic device in computer-coded form, for later interpretation.

One of the greatest benefits of using computers is their ability to store vast amounts of data and information. Computers store information on both devices that are internal to the machine and those that are external. The computer's internal memory stores data and programs while processing them. For longer storage periods, the computer transmits data to external storage devices such as magnetic and optical discs and tapes, in a form that lets the computer retrieve and process them. Technically, storing a library of millions of volumes on optical discs is not inconceivable.

Essential tools for the input, processing, and output of most companies' ISs, computers also introduce another component to information systems: the need to translate instructions from natural-or human-languages into computer languages. Computer programs, which are lists of instructions that computers understand, give computers directions on how to interpret and manipulate data, and in what form (visual, aural, or otherwise) to provide information to the organization. Thousands of programming languages are in use today;

Computer Equipment for Information Systems

The four basic components of the computer system within an IS:

. Input devices introduce data into the IS.

. The computer processes data through the IS.

. Output devices display information.

. Storage devices store data and information.

In addition to communication that takes place between computer components, communication occurs between computers over great distances (called telecommunications). Communications technology lets users not only access multiple input, output, and storage devices with a single computer but access data and resources of more than one-computer! as well. This way, a computer's power may be augmented with the power of an entire computer network.

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Readings 2 :

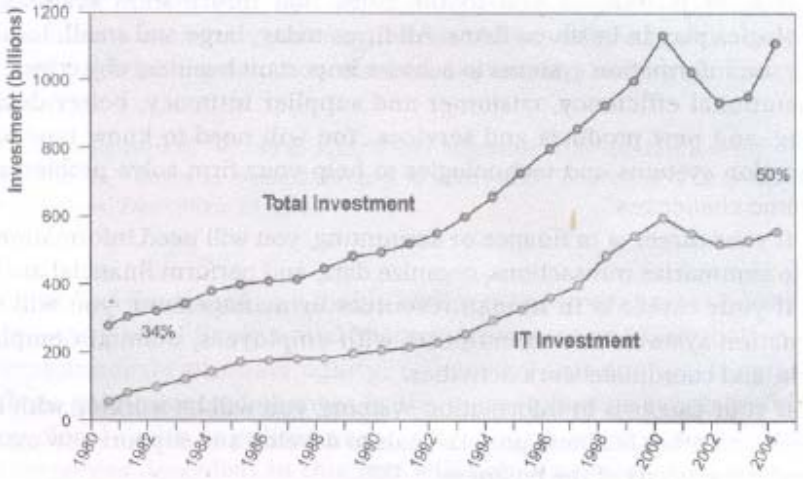
The Role of Information Systems in Today's Business

It's not business as usual in America anymore, or the rest of the global economy. In 2006, American businesses will spend $1.8 trillion on information systems hardware, software, and telecommunications equipment. In addition, they will spend another $1.7 trillion on business and management consulting and services, much of which involves redesigning firms' business operations to take advantage of these new technologies. Figure 1-1 shows that between 1980 and 2004, private business investment in information technology consisting of hardware, software, and communications equipment grew from34 percent to 50 percent of all invested capital.

As managers, most of you will work for firms that are intensively using information systems and making large investments in information technology. You will certainly want to know how to invest this money wisely. If you make wise choices, your firm can outperform competitors. If

you make poor choices, you will be wasting valuable capital. This book is dedicated to helping you make wise decisions about information technology and information systems.

FIGURE 1-1 INFORMATION TECHNOLOGY CAPITAL INVESTMENT



Information technology capital investment, defined as hardware, software, and communications equipment, grew from 34% to 50% between 1980 and 2004.

HOW INFORMATION SYSTEMS ARE TRANSFORMING BUSINESS

You can see the results of the massive spending on information technology and systems around you everyday by observing how people conduct business. More wireless cell phone accounts were opened in 2005 than telephone land lines installed. Cell phones, BlackBerrys, handhelds, e-mail, online conferencing,

and international teleconferencing over the Internet have all become essential tools of business. In 2005, more than 40 million businesses had dot-com Internet sites registered. Five million Americans purchase something every day on the Internet and another 19 million research a product.
In 2005, FedEx moved nearly 100 million packages in the United States, mostly overnight, and the United Parcel Service (UPS) moved more than 380 million packages as businesses sought to sense and respond to rapidly changing customer demand, reduce inventories to the lowest possible levels, and achieve higher levels of operational efficiency, especially in their supply chains. The responsiveness of this new /lFedEx" economy has led many experts to believe the era of massive recessions and booms of the typical business cycle is over, replaced by much smaller contractions and expansions, and strong long-term growth.

There's been a massive shift in media markets. As newspaper readership continues to decline, more than 35 million people receive their news online. Thirty-two million Americans now read blogs, and eight million write blogs, creating an explosion of new writers and new forms of customer feedback that did not exist five years ago. E-commerce and Internet advertising are booming: Google's online ad revenues surpassed $6 billion in 2005, and Internet advertising continues to grow at more than 30 percent a year, reaching more than $11 billion in revenues in

2005. New federal security and accounting laws, requiring many businesses to keep e-mail messages for five years, coupled with existing occupational and health laws requiring firms to store employee chemical exposure data for up to 60 years, are spurring the growth of digital information now estimated to be 5 exabytes annually, equivalent to 37,000 new Libraries of Congress.

GLOBALIZATION OPPORTUNITIES

A growing percentage of the American economy-and other advanced industrial economies in Europe and Asia-depend on imports and exports. Foreign trade, both exports and imports, accounts for more than 25 percent of the goods and services produced in the United States, and even more in countries such as Japan and Germany. The emergence of the Internet into a full-blown international communications system has drastically reduced the costs of operating on a global scale. Customers now can shop in a worldwide marketplace, obtaining price and quality information reliably 24 hours a day. Firms can achieve extraordinary cost reductions by finding low-cost suppliers and managing production facilities in other countries. Digital content firms that produce Hollywood movies are able to sell millions more copies of DVDs of popular films by using foreign markets. Internet service firms, such as Google and eBay, are able to replicate their business models and services in multiple countries without having to redesign their expensive fixed-cost information systems infrastructure.

THE EMERGING DIGITAL FIRM

All of the changes we have just described, coupled with equally significant organizational redesign, have created the conditions for a fully digital firm. A digital firm can be defined along several dimensions. A digital firm is one in which nearly all of the organization's *significant business relationships* with customers, suppliers, and employees are digitally enabled and mediated. *Core business processes* are accomplished through digital networks spanning the entire organization or linking multiple organizations. Business processes refer to the set of logically related tasks and behaviors that organizations develop over time to produce specific business results and the unique manner in which these activities are organized and coordinated.

Developing a new product, generating and fulfilling an order, creating a marketing plan, and hiring an employee are examples of business processes, and the ways organizations accomplish their business processes can be a source of competitive strength. *Key corporate* assets-intellectual property, core competencies, and financial and *human assets-are* managed through digital means. In a digital firm, any piece of information required to support key business decisions is available at any time and anywhere in the firm.

Digital firms sense and respond to their environments far more rapidly than traditional firms, giving them more flexibility to survive in turbulent times. Digital £inns offer extraordinary opportunities for more flexible global organization and management. In digital firms, both *time shifting* and *space shifting* are the norm. Time shifting refers to business being conducted continuously, 24x7, rather than in narrow "work day" time bands of 9 a.m. to 5 p.m. Space shifting means that work takes place in a global workshop, as well as within national boundaries. Work is accomplished physically wherever in the world it is best accomplished.

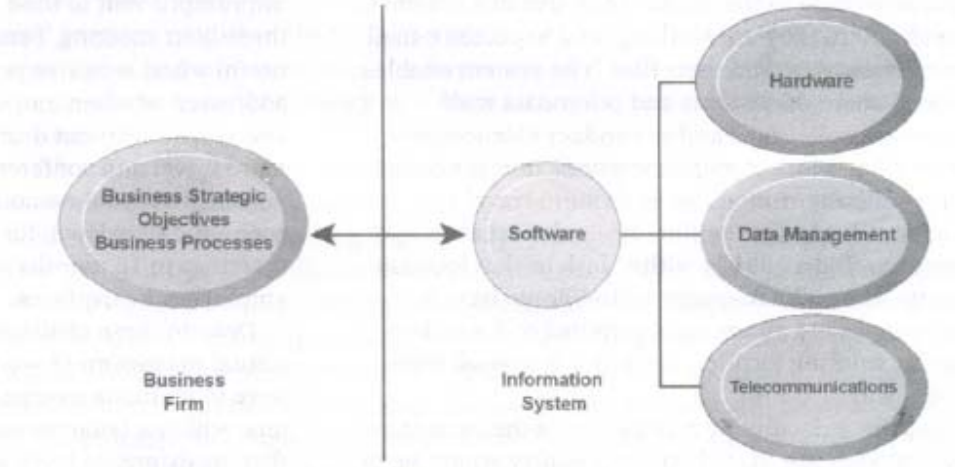
Toyota Motor Company, illustrates some of these features. Electronically integrating key business processes in vehicle ordering and inventory management has made this company much more agile and adaptive to customer demands and changes in its supplier and dealer network. A few firms, such as Cisco Systems or Dell Computers, are close to becoming digital firms, using the Internet to drive every aspect of their business. Most other companies are not fully digital, but they are moving toward close digital integration with suppliers, customers, and employees.

Accenture is a global consulting services and outsourcing firm with over 129,000 employees serving clients in 48 different countries. It has no operational headquarters and no formal branches, encouraging its employees to work on site with its clients. Managers use e-mail, phones, the Web, and other information technologies to manage virtually, often while they are traveling themselves. As you read this case, try to identify the problems facing this company, how information systems are helping it solve them, and the management, organization, and technology issues it must address.

Operational Excellence

Businesses continuously seek to improve the efficiency of their operations in order to achieve higher profitability. Information systems and technologies are some of the most important tools available to managers for achieving higher levels of efficiency and productivity in business operations, especially when coupled with changes in business practices and management behavior. Wal-Mart, the largest retailer on Earth, exemplifies the power of information systems coupled with brilliant business practices and supportive management to achieve world-class operational efficiency. In 2005, Wal-Mart attained more than $285 billion in sales-nearly one-tenth of retail sales in the United States-in large part because of its Retail Link system., which digitally links its suppliers to every one of Wal-Mart's 5,289 stores worldwide. As soon as a customer purchases an item, the supplier monitoring the item knows to ship a replacement to the achieved a competitive advantage. Doing things better than your competitors, charging less for superior products, and responding to customers and suppliers in real time all add up to higher sales and higher profits that your competitors cannot match.

FIGURE 1-2 THE INTERDEPENDENCE BETWEEN ORGANIZATIONS AND INFORMATION SYSTEMS



There is a growing interdependence between a firm's information systems and its business capabilities. Changes in strategy, rules, and business processes increasingly require changes in hardware, software, databases, and telecommunications. Often, what the organization would like to do depends on what its systems will permit it to do.

Perhaps no other U.S. company exemplifies all of these attributes leading to competitive advantage more than Dell Computer. In a period when PC prices have been falling at 25 percent a year, forcing most manufacturers into losses, Dell Computer has shown consistent profitability during its life span of 25 years. Although recently its margins have fallen as competitors improve their own business processes, Dell remains the most efficient producer of PCs in the world. A large part of Dell's operational efficiency results from "mass customization," staying close to the customer by using a Web-based order entry model that can build and ship a customized PC to any of its millions of consumers in only a few days, even overnight if the customer is really in a hurry. Dell has used its
commanding position to introduce many new products and services, especially to corporate customers, such as a custom Dell Web page for corporate accounts.

Survival

Business firms also invest in information systems and technologies because they are necessities of doing business. Sometimes these "necessities" are driven by industry-level changes. For instance, after Citibank introduced the first automatic teller machines (ATMs) in the New York region in 1977 to attract customers through higher service levels, its competitors rushed to provide ATMs to their customers to keep up with Citibank. Today, virtually all banks in the United States have regional ATMs and link to national and international ATM networks, such as CIRRUS. Providing ATM services to retail banking customers is simply a requirement of being in and surviving in the Retail banking business.

There are many federal and state statutes and regulations that create a legal duty for companies and their employees to retain records, including digital records. For instance, the Thxic Substances Control Act (1976), which regulates the exposure of U.S. workers to more than 75,000 toxic chemicals, requires firms to retain records on employee exposure for 30 years. The Sarbanes-Oxley Act(2002), which was intended to improve the accountability of public firms

and their auditors, requires certified public accounting firms that audit public companies to retain audit working papers and records, including all e-mails, for five years. Many other pieces of federal and state legislation in healthcare, financial services, education, and privacy protection impose significant information retention and reporting requirements on U.S. businesses. Firms turn to information systems and technologies to provide the capability to respond to these requirements.

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Readings 3 : How to Analyze a Case Study

Hands-on Guide: How to Analyze a Case Study

A case study helps students learn by immersing them in a real-world business scenario where they can act as problem-solvers and decision-makers. The case presents facts about a particular organization. Students are asked to analyze the case by focusing on the most important facts and using this information to determine the opportunities and problems facing that organization. Students are then asked to identify alternative courses of action to deal with the problems they identify.

A case study analysis must not merely summarize the case. It should identify key issues and problems, outline and assess alternative courses of action, and draw appropriate conclusions. The case study analysis can be broken down into the following steps:

1. Identify the most important facts surrounding the case.
2. Identify the key issue or issues.
3. Specify alternative courses of action.
4. Evaluate each course of action.
5. Recommend the best course of action.

Let's look at what each step involves.

1. ***Identify the most important facts surrounding the case.*** Read the case several times to become familiar with the information it contains. Pay attention to the information in any accompanying exhibits, tables, or figures. Many case scenarios, as in real life, present a great deal of detailed information. Some of these facts are more relevant that others for problem identification. One can assume the facts and figures in the case are true, but statements, judgments, or decisions made by individuals should be questioned. Underline and then list the most important facts and figures that would help you define the central problem or issue. If key facts and numbers are not available, you can make assumptions, but these assumptions should be reasonable given the situation. The "correctness" of your conclusions may depend on the assumptions you make.
2. ***Identify the key issue or issues.*** Use the facts provided by the case to identify the key issue or issues facing the company you are studying. Many cases present multiple issues or problems. Identify the most important and separate them from more trivial issues. State the major problem or challenge facing the company. You should be able to describe the problem or challenge in one or two sentences. You should be able to explain how this problem affects the strategy or performance of the organization.

You will need to explain why the problem occurred. Does the problem or challenge facing the company come from a changing environment, new opportunities, a declining market share, or inefficient internal or external business processes? In the case of information systems-related problems, you need to pay special attention to the role of technology as well as the behavior of the organization and its management.

Information system problems in the business world typically present a combination of management, technology, and organizational issues. When identifying the key issue or problem, ask what kind of problem it is: Is it a management problem, a technology problem, an organizational problem, or a combination of these? What management, organizational and technology factors contributed to the problem?

- To determine if a problem stems from management factors, consider whether managers are exerting appropriate leadership over the organization and monitoring organizational performance. Consider also the nature of management decision-making: Do managers have sufficient information for performing this role, or do they fail to take advantage of the information that is available?
- To determine if a problem stems from technology factors, examine any issues arising from the organization's information technology infrastructure: its hardware, software, networks and telecommunications infrastructure, and the management of data in databases or traditional files. Consider also the whether the appropriate management and organizational assets are in place to use this technology effectively.
- To determine the role of organizational factors, examine any issues arising from the organization's structure, culture, business processes, work groups, divisions among interest groups, relationships with other organizations, as well as the impact of changes in the organization's external environment-changes in government regulations, economic conditions, or the actions of competitors, customers, and suppliers.

You will have to decide which of these factors-or a combination of factors-- is most important in explaining why the problem occurred.

3. Specify alternative courses of action. List the courses of action the company can take to solve its problem or meet the challenge it faces. For information system-related problems, do these alternatives require a new information system or the modification of an existing system? Are new technologies, business processes, organizational structures, or management behavior required? What changes to organizational processes would be required by each alternative? What management policy would be required to implement each alternative?

Remember, there is a difference between what an organization "should do" and what that organization actually "can do." Some solutions are too expensive or operationally difficult to implement, and you should avoid solutions that are beyond the organization's resources. Identify the constraints that will limit the solutions available. Is each alternative executable given these constraints?

4. Evaluate each course of action. Evaluate each alternative using the facts and issues you identified earlier, given the conditions and information available. Identify the costs and benefits of each alternative. Ask yourself "What would be the likely outcome of this course of action? State the risks as well as the rewards associated with each course of action. Is your recommendation feasible from a technical, operational, and financial standpoint? Be sure to state any assumptions on which you have based your decision.

5. Recommend the best course of action. State your choice for the best course of action and provide a detailed explanation of why you made this selection. You may also want to provide an explanation of why other alternatives were not selected. Your final recommendation should flow logically from the rest of your case analysis and should clearly specify what assumptions were used to shape your conclusion. There is often no single "right" answer, and each option is likely to have risks as well as rewards.

1.7 Application of Information Technology :

Information technology is an essential partner in management of your business, regardless of the kind of enterprise you operate. Whether you need computers for storage, transfer, retrieval or transmission of information, you can manage your business with greater accuracy and efficiency with the assistance of information technology and computer applications. The Small Business Administration suggests it's time to get connected using internet.

(1) Storage

You may already use a computer for data storage for your business. Inventory, sales, receivables and payables stored in Excel, Open Office or a similar program keeps these figures at your fingertips. Accounting software stores your payroll information, tax records and specialized data for your business. Once you're acquainted with a program, you won't know how you functioned without it. You can eliminate much of the physical storage at the office by using information technology to scan and store old personnel and payroll files, tax files or client files. You may need less square footage with information technology.

(2) Marketing

Large and small businesses are on a level playing field on the Internet. You can have a Web presence, take orders, buy merchandise, sell excess or even operate some businesses entirely online. A marketing tool that uses information technology is the Quick Response or QR Code that looks like a bar code but is square. A scan advertises your website address and includes any text you choose. You can use your business management skills to direct employees or contractors to do your Internet marketing, or you can choose to learn a new set of skills in information technology.

(3) Information

Whether you learned business management by the book or by practical experience, you'll need updates all of your life. The Internet is a wealth of information to keep you current with trends, techniques, software and human resources. You can draw on online databases and websites to locate potential employees, compare insurance proposals, tackle employee issues or check out the competition. Managing your business with information gleaned from the Internet keeps you knowledgeable and on the cutting edge.

(4) Communication

Communication by email is faster and costs less than sending a paper letter in the mail. You can transform your business to the 21st century with the use of email for communication with clients or customers. Information technology allows you to organize email file folders by client or by type of communication, such as orders or billing. You can drag and drop your email files to closed folders as your company completes projects. Your communication files become closed files, placed in storage on CD or on a hard drive with a duplicate copy or backup automated by a program or service.

1.8 Business Benefits of Information Technology :

Information technology, also known as IT, is a comprehensive term that includes all types of technology used to exchange, store, use or create information. Commonly used information technology equipment includes computers, servers, peripheral devices, Internet connectivity equipment and phone systems. From basic computer terminals to IP-based telephony systems, information technology is an integral part of most modern business operations.

(1) Communication

Rapid communications can help increase productivity, allow for better business decision-making and ease a company's expansion into new territories or countries. Email servers, routers, internal company billboards and chat services can serve as the backbone of a company's communications. These electronically based communication systems are used to disseminate routine and critical business information in a quick and efficient manner. IT equipment can be used to send business status reports to executives, to update employees on critical business projects and to connect with business partners and customers.

(2) Efficiency

Streamlined work flow systems, shared storage and collaborative work spaces can increase efficiency in a business and allow employees to process a greater level of work in a shorter period of time. Information technology systems can be used to automate routine tasks, to make data analysis easier and to store data in a manner that can easily be retrieved for future use. Technology can also be used to answer customer questions through email, in a real-time chat session or through a telephone routing system that connects a customer to an available customer service agent.

(3) Competitive Advantage

Adoption of information technology resources allows companies to maintain a competitive advantage over their rivals. Companies using a first-movers strategy can use information technology to create new products, distance their products from the existing market or enhance their customer services. Companies that follow a low-cost product strategy can look to information technology solutions to reduce their costs through increased productivity and reduced need for employee overhead. Businesses can also build-in information technology to their products that makes it difficult for customers to switch platforms or products.

(4) Economic Efficiencies

Companies can harness information technology resources to lower their costs. Using IT infrastructure, redundant tasks can be centralized at one location. For example, a large company could centralize their payroll function at one location to lower employee costs. Economic efficiencies can also be realized by migrating high-cost functions into an online environment. Companies can offer email support for customers that may have a lower cost than a live customer support call. Cost savings could also be found through outsourcing opportunities, remote work options and lower-cost communication options.

Business Case 2 :

Smart Systems & Smart working made Toyota No. 1.

Toyota Motor Corporation is about to surpass GM as the world's largest auto maker, selling over 9 million vehicles in 2006. It is also considered the world's best auto maker. The quality and reliability of Toyota vehicles are the gold standard *of* the industry, even among its lower-priced models. Customer loyalty is so high that Toyota can make sales without heavy discounting.

Toyota stands head and shoulders above fierce competition because it has been so skillful at combining quality with efficiency. One key to Toyota's success is its vaunted Toyota production System, which is based on lean production-eliminating waste while optimizing value. Toyota has based its business processes and information systems on the principles *of* just-in-time delivery, quality, and continuous improvement. By organizing its business processes and information

systems around these principles, Toyota delivers value to the customer at a competitive price. As Ludo Vandervelden, vice president *of* Finance and Accounting, Information Systems, and Vehicle Logistics *for* Toyota Motor Europe points out, *"you* can achieve cost reductions and, at the same time, make your customers happy through implementation *of* smarter business processes."

Toyota Motor Europe and other Toyota divisions around the world use information systems to support these business processes. Vehicle production is based on actual customer orders rather than "best guesses" *of* what to stock in dealer showrooms, so the company only builds cars that customers want, when they want them, without additional delays or quality problems.

Toyota Motor Europe uses a vehicle orders management system based on Oracle E-Business Suite software to reduce the time it takes between placing a customer order and delivering the vehicle to the customer. The software integrates easily with the company's existing systems and also with those of Toyota's independent dealerships and national marketing and sales companies, which run their own separate information systems based on a variety of technologies.

This system encompasses several business processes. It starts with the customer selecting a car and various options, such as tinted windows or a navigation system. The dealer uses the system to configure a car with all *of* the selected options in front of the customer and then locates the best available car and options in the Toyota supply chain, including vehicles scheduled for production in the future. The dealer then uses the system to place the order through national distributors, who consolidate the order with those of their other retailers and place an order through Toyota Motors Europe.

Toyota Motor Europe consolidates orders from the national distributors and places an order with Toyota's factories. Each car is then shipped and invoiced from the factory to headquarters to national distributors to retailers, triggering all related accounting processes at each step. National distributors can use the system to monitor their orders and those *of* different dealers and even "swap" cars with various retailers.

The vehicle order management system has helped Toyota reduce production time and the cost of maintaining materials and finished cars in inventory, while increasing customer service and satisfaction. According to Vandervelden, "with improved information transparency, we would be able to better readjust...our allocation of available product to markets that would be in high demand...and to reduce stock."

Toyota has flourished in a highly competitive environment because it has created a set of finely tuned business processes and information systems that simultaneously promote agility, efficiency, and quality. It can respond instantly to customers and changes in the marketplace as events unfold, while working closely with suppliers and retailers.

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Video Case 1 : PeopleSoft: A Collaborative Global Workforce
Area : Global E-Business How Businesses Use Information Systems

Case Summary: The PeopleSoft human resources management system is designed to provide best practices in Internet-based HR management. The system includes four enterprise applications and seven collaborative self-service applications, all accessible through a single portal. PeopleSoft uses its own system to manage its HR and expects a nearly 200% return-on-investment within 5 years. The system eliminates the need to install any special software on the client side. Employees can access their human resources files simply by using their Web browser. The efficacy of the portal enables HR managers to devote more time to business activities such as recruiting, retention, and strategic development rather than spending time answering queries about benefits and vacation time. IT departments have only to worry about the server, and PeopleSoft's single database architecture fortifies the accuracy of data.

1. What design features of the PeopleSoft system bring the most value to HR managers? Where is the value for employees?
2. How does the enterprise as a whole benefit from the software?
3. Describe the role of Compass in the PeopleSoft system and how it provides value to adopters of the software.
4. Analyze Peoplesoft's decision to modify the traditional client/server model.
5. Do you think PeopleSoft presents a good argument for adopting its software? Why or why not?

Readings 4 :

UPS Competes globally with IT

United Parcel Service, the world's largest air and ground package distribution company, started out in 1907 in a closet-sized basement office. Jim Casey and Claude Ryan-two teenagers from Seattle with two bicycles and one phone-promised the "best service and lowest rates." UPS has used this formula successfully for nearly 90 years. UPS still lives up to that promise today, delivering close to 3 billion parcels and documents each year to any address in the United States and to more than 185 countries and territories. The company not only excels at traditional package delivery but is competing against Federal Express in the overnight delivery business as well. Critical to the firm's success has been its investment in advanced information technology. Between 1992 and 1996, UPS expects to invest $1.8 billion in information technology that will keep it a worldwide market leader. Technology has helped UPS boost customer service while keeping costs low and streamlining its overall operations. Using a hand held computer called a Delivery Information Acquisition Device (DIAD), UPS drivers automatically capture customers' signatures along with pickup, delivery, and timecard information. The drivers then place the DIAD into their truck's vehicle adapter, an information transmitting device that is connected to the cellular telephone network. Package tracking information is then transmitted to UPS's computer network for storage and processing in UPS's main computer in Mahwah, New Jersey. From there, the information can be accessed worldwide to provide proof of delivery to the customer. The system can also generate a printed response to queries for the customer.

Through Total Track, its automated package-tracking system, UPS can monitor packages throughout the delivery process. At various points along the route from sender to receiver, a bar code device scans shipping information on the package label; the information is then fed into the central computer.

Customer service representatives can check the status of any package from desktop computers linked to the central computer and are able to respond immediately to inquiries from customers.

UPS customers can also access this information directly from their own microcomputers, using special package tracking software supplied by UPS. UPS's Inventory Express, launched in 1991, warehouses customers' products and ships them overnight to any destination the customer requests. Customers using this service can transmit electronic shipping orders to UPS by 1:00 A.M. and expect delivery by 10:30 that same morning.

In 1988, UPS moved aggressively into overseas markets and set up its own global communications network, UPS net, as the information processing pipeline for worldwide operations. UPS net extends the system's capabilities internationally by providing access to information for billing and delivery confirmation, tracking international shipments, and expediting customs clearance. UPS uses its network to transmit documentation electronically on each shipment directly to customs officials prior to the arrival of shipments.

The customs officials clear the shipment or flag it for inspection. UPS is enhancing its information system capabilities so that it can guarantee that a particular package or group of packages will arrive at its destination at a specified time. If requested by the customer, UPS will be able to intercept a package prior to delivery and have it returned or rerouted. Eventually UPS may even use its systems to transmit electronic messages directly between customers.

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Readings 5 :

Perspectives on Information Systems

Information technology (IT) consists of all the hardware and software that a firm needs to use in order to achieve its business objectives. This includes not only computers, printers, handheld personal digital assistants, and, yes, even iPods (where they are used for a business purpose) but also software, such as the Windows or Linux operating systems, the Microsoft Office desktop productivity suite, and the many thousands of computer programs that can be found in a typical large firm. "Information systems" are more complex and can be best understood by looking at them from both a technology and a business perspective.

WHAT IS AN INFORMATION SYSTEM?

An information system can be defined technically as a set of interrelated components that collect (or retrieve), process, store, and distribute information to support decision making and control in an organization. In addition to supporting decision making, coordination, and control, information systems may also help managers and workers analyze problems, visualize complex subjects, and create new products. . Information systems contain information about significant people, places, and things within the organization or in the environment surrounding it. By information we mean data that have been shaped into a form that is meaningful and useful to human beings. Data, in contrast, are streams of raw facts representing events occurring in organizations or the physical environment before they have been organized and arranged into a form that people can effectively understand and use.

A brief example contrasting information and data illustrates the difference between them. Supermarket checkout counters scan millions of pieces of data, such as bar codes, that describe the product. Such pieces of data can be totaled and analyzed to provide meaningful information, such as the total number of bottles of dish detergent sold at a particular store, which brands of

dish detergent were selling the most rapidly at that store or sales territory, or the total amount spent on that brand of dish detergent at that store or sales region.

Three activities in an information system produce the information that organizations need to make decisions, control operations, analyze problems, and create new products or services. These activities are input, processing, and output **Input** captures or collects raw data from within the organization or from its external environment. **Processing** converts this raw input into a meaningful form. **Output** transfers the processed information to the people who will use it or to the activities for which it will be used. Information systems also require **feedback,** which is output that is returned to appropriate members of the organization to help them evaluate or correct the input stage.
In Toyota's vehicle orders management system, the raw input consists of customer order data including the dealer identification number, model, color, and optional features of each car ordered. Toyota's computers store this data and process it to locate the models with options specified by the customer that are either in inventory or under production, to place orders to national distributors, to consolidate the orders, and then to transmit them to factories. Toyota's production systems then tell its factories how many vehicles to manufacture for each model, color, and option package, how much to bill for each vehicle, and where to ship the vehicles. The output consists of shipping instructions, invoices, and production reports. The system provides meaningful information, such as which models, colors, and options are selling in which locations, the most popular models and colors, and which dealers sell the most cars. Although computer-based information systems use computer technology to process raw data into meaningful information, there is a sharp distinction between a computer and a computer program on the one hand, and an information system on the other. Electronic computers and related software programs are the technical foundation, the tools and materials, of modern information systems. Computers provide the equipment for storing and processing information. Computer programs, or software, are sets of operating instructions that direct and control computer processing. Knowing how computers and computer programs work is important in designing solutions to organizational problems, but computers are only part of an information system.

A house is an appropriate analogy. Houses are built with hammers, nails, and wood, but these do not make a house. The architecture, design, setting, landscaping, and all of the decisions that lead to the creation of these features are part of the house and are crucial for solving the problem of putting a roof over one's head. Computers and programs are the hammer, nails, and lumber of computer-based information systems, but alone they cannot produce the information a particular organization needs. To understand information systems, you must understand the problems they are designed to solve, their architectural and design elements, and the organizational processes that lead to these solutions.

DIMENSIONS OF INFORMATION SYSTEMS
Th fully understand information systems, you must understand the broader organization, management, and information technology dimensions of systems (see Figure 1-5) and their power to provide solutions to challenges and problems in the business environment. We refer to this broader understanding of information systems, which encompasses an understanding of the management and organizational dimensions of systems as well as the technical dimensions of systems, as information systems literacy. Information systems literacy includes a behavioral as

well as a technical approach to studying information systems. Computer literacy, in contrast, focuses primarily on knowledge of information technology. The field of management information systems (MIS) tries to achieve this broader information systems literacy. MIS deals with behavioral issues as well as technical issues surrounding the development, use, and impact of information systems used by managers and employees in the firm. Let's examine each of the dimensions of information systems-organizations, management, and information technology.

Organizations

Information systems are an integral part of organizations. Indeed, for some companies, such as credit reporting firms, without an information system, there would be no business. The key elements of an organization are its people, structure, business processes, politics, and culture. Organizations have a structure that is composed of different levels and specialties. Their structures reveal a clear-cut division of labor. Authority and responsibility. in a business firm is organized as a hierarchy, or a pyramid
structure, of rising authority and responsibility. The upper levels of the hierarchy consist of managerial, professional, and technical employees, whereas the lower levels consist of operational personnel. Senior management makes long-range strategic decisions about products and services as well as ensures financial performance of the firm. Middle management carries out the programs and plans of senior management and operational management is responsible for monitoring the daily activities of the business. Knowledge workers, such as engineers, scientists, or architects, design products or services and create new knowledge for the firm, whereas data workers, such as secretaries or clerks, assist with paperwork at all levels of the firm. Production or service workers actually produce the product and deliver the service. Experts are employed and trained for different business functions. The major business functions, or specialized tasks performed by business organizations, consist of sales and marketing, manufacturing and production, finance and accounting, and human resources.

An organization coordinates work through its hierarchy and through its business processes, which we defined earlier in this chapter. Most organizations' business processes include formal rules that have been developed over a long time for accomplishing tasks. These rules guide employees in a variety of procedures, from writing an invoice to responding to customer complaints. Some of these business processes have been written down, but others are informal work practices, such as a requirement to return telephone calls from co-workers or customers, that are not formally documented. Information systems automate many business processes. For instance, how a customer receives credit or how a customer is billed is often determined by an information system that incorporates a set of formal business processes.

Each organization has a unique culture, or fundamental set of assumptions, values, and ways of doing things, that has been accepted by most of its members. You can see organizational culture at work by looking around your university or college. Some bedrock assumptions of university life are that professors know more than students, the reasons students attend college is to learn, and that classes follow a regular schedule.

Parts of an organization's culture can always be found embedded in its information systems. For instance, UPS's concern with placing service to the customer first is an aspect of its organizational, culture that can be found in the company's package tracking systems. Different levels and specialties in an organization create different interests and points of view. These views

often conflict over how the company should be run and how resources and rewards should be distributed. Conflict is the basis for organizational politics. Information systems come out of this cauldron of differing perspectives, conflicts, compromises, and agreements that are a natural part of all organizations.

Management

Management's job is to make sense out of the many situations faced by organizations, make decisions, and formulate action plans to solve organizational problems. Managers perceive business challenges in the environment; they set the organizational strategy for responding to those challenges; and they allocate the human and financial resources to coordinate the work and achieve success. Throughout, they must exercise responsible leadership.

But managers must do more than manage what already exists. They must also create new products and services and even re-create the organization from time to time. A substantial part of management responsibility is creative work driven by new knowledge and information. Information technology can playa powerful role in helping managers design and deliver new products and services and redirecting and redesigning their organizations.

Technology

Information technology is one of many tools managers use to cope with change. Computer hardware is the physical equipment used for input, processing, and output activities in an information system. It consists of the following: computers of various sizes and shapes; various input, output, and storage devices; and telecommunications devices that link computers together. Computer software consists of the detailed, preprogrammed instructions that control and coordinate the computer hardware components in an information system. Data management technology consists of the software governing the organization of data on physical storage media. Networking and telecommunications technology, consisting of both physical devices and software, links the various pieces of hardware and transfers data from one physical location to another. Computers and communications equipment can be connected in networks for sharing voice, data, images, sound, and video. A network links two or more computers to share
data or resources, such as a printer. The world's largest and most widely used network is the Internet. The Internet is a global "network of networks" that uses universal standards to connect millions of different networks with more than 350 million host computers in over 200 countries around the world. The Internet has created a new "universal" technology platform on which to build new products, services, strategies, and business models. This same technology platform has internal uses, providing the connectivity to link different systems and networks within the firm. Internal corporate networks based on Internet technology are called intranets. Private intranets extended to authorized users outside the organization are called extranets, and firms use such networks to coordinate their activities with other firms : most business firms today, using Internet technology is both a business necessity and a competitive advantage.

The World Wide Web is a service provided by the Internet that uses universally accepted standards for storing, retrieving, formatting, and displaying information in a page format on the Internet. Web pages contain text, graphics, animations, sound, and video and are linked to other Web pages. By clicking on highlighted words or buttons on a Web page, you can link to related pages to find additional information and links to other locations on the Web. The Web can serve

as the foundation for new kinds of information systems such as UPS's Web-based package tracking system described in the following Interactive Session.

An of these technologies, along with the people required to run and manage them, represent resources that can be shared throughout the organization and constitute the firm's information technology (IT) infrastructure. The IT infrastructure provides the foundation, or *platform*, on which the firm can build its specific information systems. Each organization must carefully design and manage its information technology infrastructure so that it has the set of technology services it needs for the work it wants to accomplish with information systems.

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Readings 6 :

Ten IT-enabled business trends for the decade ahead

As technological change accelerates and adoption rates soar, ten pivotal trends loom large on the top-management agenda.

May 2013 | by Jacques Bughin, Michael Chui, and James Manyika

Three years ago, we described ten information technology–enabled business trends that were profoundly altering the business landscape.[1] The pace of technology change, innovation, and business adoption since then has been stunning. Consider that the world's stock of data is now doubling every 20 months; the number of Internet-connected devices has reached 12 billion; and payments by mobile phone are hurtling toward the $1 trillion mark. The dramatic pace at which two trends have been advancing is transforming them into 21st-century business "antes": competitive necessities for most if not all companies. *Big data* and *advanced analytics* have swiftly moved from the frontier of our trends to a set of capabilities that need to be deeply embedded across functions and operations, enabling managers to have a better basis for understanding markets and making business decisions. Meanwhile, social technologies are becoming a powerful *social matrix*—a key piece of organizational infrastructure that links and engages employees, customers, and suppliers as never before.

Implicit in our earlier work, and explicit in this update, is a focus on information and communication technologies. Other forms of technology are changing, too, of course, and as we've been updating this list, we've also been conducting new research on the most disruptive technologies of *all* types. Four of the trends described here reflect IT disruptions elaborated in that separate but related research, which encompasses fields as wide-ranging as genomics and energy and materials science. The *Internet of All Things*, the linking of physical objects with embedded sensors, is being exploited at breakneck pace, simultaneously creating massive network effects and opportunities. "The cloud," with its ability to deliver digital power at low cost and in small increments, is not only changing the profile of corporate IT departments but also helping to spawn a range of new business models by shifting the economics of "rent versus buy" trade-offs for companies and consumers. The result is an acceleration of a trend we identified in 2010: the delivery of *anything as a service*. The creeping *automation of knowledge work*, which affects the fastest-growing employee segment worldwide, promises a new phase of corporate productivity. Finally, up to *three billion new consumers*, mostly in emerging markets, could soon become fully digital players, thanks chiefly to mobile technologies. Our research suggests that the collective economic impact (in the applications that we examined) of information technologies underlying these four trends could range from $10 trillion to $20 trillion annually in 2025.

The next three trends will be most familiar to digital marketers, but their relevance is expanding across the enterprise, starting with customer-experience, product, and channel management. The *integration of digital and physical experiences* is creating new ways for businesses to interact with customers, by using digital information to augment individual experiences with products and services. Consumer demand is rising for *products that are free, intuitive, and radically user oriented.* And the rapid *evolution of IT-enabled commerce* is reducing entry barriers and opening new revenue streams to a range of individuals and companies.

Finally, consider the extent to which *government, education, and health care*—which often seem outside the purview of business leaders—could benefit from adopting digital technologies at the same level as many industries have. Productivity gains could help address the imperative (created by aging populations) to do more with less, while technological innovation could improve the quality and reach of many services. The embrace of digital technologies by these sectors is thus a trend of immense importance to business, which indirectly finances many services and would benefit greatly from the rising skills and improved health of citizens everywhere.

1. Joining the social matrix

Social technologies are much more than a consumer phenomenon: they connect many organizations internally and increasingly reach outside their borders. The social matrix also extends beyond the cocreation of products and the organizational networks. Now it has become the environment in which more and more business is conducted. Many organizations rely on distributed problem solving, tapping the brain power of customers and experts from within and outside the company for breakthrough thinking. Pharmaceutical player Boehringer Ingelheim sponsored a competition on Kaggle (a platform for data-analysis contests) to predict the likelihood that a new drug molecule would cause genetic mutations. The winning team, from among nearly 9,000 competitors, combined experience in insurance, physics, and neuroscience, and its analysis beat existing predictive methods by more than 25 percent.

In other research, we have described how searching for information, reading and responding to e-mails, and collaborating with colleagues take up about 60 percent of typical knowledge workers' time—and how they could become up to 25 percent more productive through the use of social technologies. Global IT-services supplier Atos has pledged to become a "zero e-mail" company by 2014, aiming to boost employee productivity by replacing internal e-mail with a collaborative social-networking platform.

Companies also are becoming more porous, able to reach across units speedily and to assemble teams with specialized knowledge. Kraft Foods, for example, has invested in a more powerful social-technology platform that supports microblogging, content tagging, and the creation and maintenance of communities of practice (such as pricing experts). Benefits include accelerated knowledge sharing, shorter product-development cycles, and faster competitive response times. Companies still have ample running room, though: just 10 percent of the executives we surveyed last year said their organizations were realizing substantial value from the use of social technologies to connect all stakeholders: customers, employees, and business partners.

Social features, meanwhile, can become part of any digital communication or transaction—embedded in products, markets, and business systems. Users can "like" things and may soon be able to register what they "want," facilitating new levels of commercial engagement. Department-store chain Macy's has used Facebook likes to decide on colors for upcoming apparel lines, while Wal-Mart Stores chooses its weekly toy specials through input from user panels. In broadcasting, Europe's RTL Group is using social media to create viewer feedback

loops for popular shows such as the *X Factor*. A steady stream of reactions from avid fans allows RTL to fine-tune episode plots.

Indeed, our research suggests that when social perceptions and user experiences (both individual and collective) matter in product selection and satisfaction, the potential impact of social technologies on revenue streams can be pronounced. We are starting to see these effects in sectors ranging from automobiles to retailing as innovative companies mine social experiences to shape their products and services.

2. Competing with 'big data' and advanced analytics

Three years ago, we described new opportunities to experiment with and segment consumer markets using big data. As with the social matrix, we now see data and analytics as part of a new foundation for competitiveness. Global data volumes—surging from social Web sites, sensors, smartphones, and more—are doubling faster than every two years. The power of analytics is rising while costs are falling. Data visualization, wireless communications, and cloud infrastructure are extending the power and reach of information.

With abundant data from multiple touch points and new analytic tools, companies are getting better and better at customizing products and services through the creation of ever-finer consumer microsegments. US-based Acxiom offers clients, from banks to auto companies, profiles of 500 million customers—each profile enriched by more than 1,500 data points gleaned from the analysis of up to 50 trillion transactions. Companies are learning to test and experiment using this type of data. They are borrowing from the pioneering efforts of companies such as Amazon.com or Google, continuously using what's known as A/B testing not only to improve Web-site designs and experiences but also to raise real-world corporate performance. Many advanced marketing organizations are assembling data from real-time monitoring of blogs, news reports, and Tweets to detect subtle shifts in sentiment that can affect product and pricing strategy.

Advanced analytic software allows machines to identify patterns hidden in massive data flows or documents. This machine "intelligence" means that a wider range of knowledge tasks may be automated at lower cost (see the fifth trend, below, for details). And as companies collect more data from operations, they may gain additional new revenue streams by selling sanitized information on spending patterns or physical activities to third parties ranging from economic forecasters to health-care companies.

Despite the widespread recognition of big data's potential, organizational and technological complexities, as well as the desire for perfection, often slow progress. Gaps between leaders and laggards are opening up as the former find new ways to test, learn, organize, and compete. For companies trying to keep pace, developing a big-data plan is becoming a critical new priority—one whose importance our colleagues likened, in a recent article, to the birth of strategic planning 40 years ago.

Planning must extend beyond data strategy to encompass needed changes in organization and culture, the design of analytic and visualization tools frontline managers can use effectively, and the recruitment of scarce data scientists (which may require creative approaches, such as partnering with universities). Decisions about where corporate capabilities should reside, how external data will be merged with propriety information, and how to instill a culture of data-driven experimentation are becoming major leadership issues.

3. Deploying the Internet of *All* Things

Tiny sensors and actuators, proliferating at astounding rates, are expected to explode in number over the next decade, potentially linking over 50 billion physical entities as costs plummet and networks become more pervasive. What we described as nascent three years ago is fast becoming ubiquitous, which gives managers unimagined possibilities to fine-tune processes and manage operations.

Through FedEx's SenseAware program, for example, customers place a small device the size of a mobile phone into packages. The device includes a global positioning system, as well as sensors to monitor temperature, light, humidity, barometric pressure, and more—critical to some biological products and sensitive electronics. The customer knows continuously not only where a product is but also whether ambient conditions have changed. These new data-rich renditions of radio-frequency-identification (RFID) tags have major implications for companies managing complex supply chains.

Companies are starting to use such technologies to run—not just monitor—complex operations, so that systems make autonomous decisions based on data the sensors report. Smart networks now use sensors to monitor vehicle flows and reprogram traffic signals accordingly or to confirm whether repairs have been made effectively in electric-power grids.

New technologies are leading to what's known as the "quantified self" movement, allowing people to become highly involved with their health care by using devices that monitor blood pressure and activity—even sleep patterns. Leading-edge ingestible sensors take this approach further, relaying information via smartphones to physicians, thereby providing new opportunities to manage health and disease.

4. Offering anything as a service

The buying and selling of services derived from physical products is a business-model shift that's gaining steam. An attraction for buyers is the opportunity to replace big blocks of capital investment with more flexible and granular operating expenditures. A prominent example of this shift is the embrace of cloud-based IT services. Cosmetics maker Revlon, for example, now operates more than 500 of its IT applications in a private cloud built and operated by its IT team. It saved $70 million over two years, and when an entire factory, including a data center in Venezuela, was destroyed by a fire, the company was able to shift operations to New Jersey in under two hours. Moves like this, which suggest that cloud-delivered IT can be reliable and resilient, create new possibilities for the provision of mission-critical IT through internal or external assets and suppliers.

This model is spreading beyond IT as a range of companies test ways to monetize underused assets by transforming them into services, benefitting corporate buyers that can sidestep owning them. Companies with trucking fleets, for instance, are creating new B2B businesses renting out idle vehicles by the day or the hour. And a growing number of companies with excess office space are finding that they can generate revenue by offering space for short-term uses. The *Los Angeles Times* has rented space to film crews, for example. Cloud-based online services are feeding the trend both by facilitating remote-work patterns that free up space and by connecting that space with organizations which need it.

Other companies are seizing opportunities in consumer markets. Online services now allow rentals of everything from designer clothing and handbags to college textbooks. Home Depot rents out products from household tools to trucks. IT that can track usage and bill for services is what makes these models possible.

While we and others have written about the importance of cloud-based IT services for some time, the potential impact of this trend is in its early stages. Companies have much to discover about the efficiencies and flexibility possible through reenvisioning their assets, whether that entails shifting from capital ownership to "expensed" services or assembling assets to play in this arena, as Amazon.com has done by offering server capacity to a range of businesses. Moreover, an understanding of what's most amenable to being delivered as a service is still evolving—as are the attitudes and appetites of buyers. Thus, much of the disruption lies ahead.

5. Automating knowledge work

Physical labor and transactional tasks have been widely automated over the last three decades. Now advances in data analytics, low-cost computer power, machine learning, and interfaces that "understand" humans are moving the automation frontier rapidly toward the world's more than 200 million knowledge workers.

Powerful productivity-enhancing technologies already are taking root. Developments in how machines process language and understand context are allowing computers to search for information and find patterns of meaning at superhuman speed. At Clearwell Systems, a Silicon Valley company that analyzes legal documents for pretrial discovery, machines recently scanned more than a half million documents and pinpointed the 0.5 percent of them that were relevant for an upcoming trial. What would have taken a large team of lawyers several weeks took only three days. Machines also are becoming adept at structuring basic content for reports, automatically generating marketing and financial materials by scanning documents and data.

Signaling a new milepost in the quest for artificial intelligence, IBM's Jeopardy-winning computer Watson has turned its attention to cancer research. Watson "trained" for the work by reading more than 600,000 medical-evidence reports, 1.5 million patient records, and 2.0 million pages of clinical-trial reports and medical-journal articles. Now it is the backbone of a decision-support application for oncologists at Memorial Sloan-Kettering Cancer Center, in New York.

At information-intensive companies, the culture and structure of the organization could change if machines start occupying positions along the knowledge-work value chain. Now is the time to begin planning for an era when the employee base might consist both of low-cost Watsons and of higher-priced workers with the judgment and technical skills to manage the new knowledge "workforce." At the same time, business and government leaders will be jointly responsible for mitigating the destabilization caused by the displacement of knowledge workers and their reallocation to new roles. Retraining workers, redesigning education, and redefining the nature of work will all be important elements of this effort.

6. Engaging the next three billion digital citizens :

As incomes rise in developing nations, their citizens are becoming wired, connected by mobile computing devices, particularly smartphones that will only increase in power and versatility. Although several emerging markets have experienced double-digit growth in Internet adoption, enormous growth potential remains: India's digital penetration is only 10 percent and China's is around 40 percent. Rising levels of connectivity will stimulate financial inclusion, local entrepreneurship, and enormous opportunities for business.

As Internet-enabled smartphones and other mobile devices move rapidly down the cost curve, they will enable vast new applications and sources of value. A harbinger of the value to come is the success of mobile-payment services across a number of developing economies. Dutch–Bangla Bank Limited (DBBL), in Bangladesh, for example, garnered over a million mobile-payment subscribers in ten months. Standard Bank of South Africa reduced its origination costs for new customers by 80 percent using mobile devices.

Another source of value is local matching services that connect supply with demand. Kenya's Google-backed iHub project uses technology services to identify and finance entrepreneurs. Technology also helps multinationals adapt products and business models to local conditions. In India, Unilever provides mobile devices to rural distributors, including traditional mom-and-pop stores. The devices relay information (such as stock levels and pricing) back to the company, so Unilever can improve its demand forecasts, inventory management, and marketing strategy—raising sales in rural stores by a third.

7. Charting experiences where digital meets physical

The borders of the digital and physical world have been blurring for many years as consumers learned to shop in virtual stores and to meet in virtual spaces. In those cases, the online world mirrors experiences of the physical world. Increasingly, we're seeing an inversion as real-life activities, from shopping to factory work, become rich with digital information and as the mobile Internet and advances in natural user interfaces give the physical world digital characteristics.

Today's clever apps use smartphone technology to sense our locations and those of our friends or even allow us to point to foreign street signs for quick translations. Augmented reality will go further with next-generation wearable devices such as Google Glass, which deploys cameras and wireless connections to project information, on demand, through eyeglasses. Other wearable technologies are also gathering steam, from "intelligent textiles" to wristwatch computers that can not only display e-mails and texts but also run mobile apps. Technologies pioneered in game consoles allow us to use physical movements and gestures to interact with digital devices.

Companies are applying these technologies to experiences that have remained resolutely physical, creating a new domain of customer interaction. Food retailers Tesco and Delhaize have deployed life-size store displays at South Korean and Belgian subway stations, respectively. The screens allow commuters waiting for trains to use smartphones to order groceries, which are then shipped to their homes or available for pickup at a physical store location. Other retailers are using similar displays in their physical stores so consumers can easily order out-of-stock products. Macy's has installed "magic mirrors" in store dressing rooms: a 72-inch display that allows shoppers to "try on" clothes virtually to help them make their selection.

Businesses are also integrating the digital world into physical work activities, thereby boosting their productivity and effectiveness. Boeing uses virtual-reality glasses so that factory workers assembling its 747 aircraft need to consult manuals less frequently. Annotated pop-ups point to drilling locations and display proper wire connections.

Executives need to examine their businesses to find areas where immersive experiences or interactive touch points can stimulate engagement with "always on" customers. And they should reflect on the potential for interactive digital platforms to play roles in product design and marketing or in gathering customer feedback. These possibilities will grow in importance as customers and employees come to expect interaction between heightened digital and physical offerings.

8. 'Freeing' your business model through Internet-inspired personalization and simplification

After nearly two decades of shopping, reading, watching, seeking information, and interacting on the Internet, customers expect services to be free, personalized, and easy to use without instructions. This ethos presents a challenge for business, since customers expect instant results, as well as superb and transparent customer service, for all interactions—from Web sites to brick-and-mortar stores. Fail to deliver, and competitors' offerings are only an app download away.

A number of businesses have battled in the free-services arena against tough digital competitors such as Craigslist, peer-to-peer music services, and Wikipedia. In 2012, Electronic Arts lost 400,000 players when it began charging for its online *Star Wars*game. Players came back when the company designed a "freemium" offer: users paid only after the first 50 levels. Additional challenges to traditional pricing power appear each day with comparative price apps that allow consumers to "showroom" at physical stores and then buy online at lower prices.

Indeed, users will probably never pay for many valuable technology-enabled services, such as search—and the list seems to be growing rapidly. Providers of these "free" services will need to innovate with alternative business models. The most successful are likely to be multisided ones, which tap large profit pools that can be generated from information gathered by an adjacent free activity that's commercially relevant. A familiar example is Google's policy of offering its search services free of charge while garnering revenues at the other side of the platform by selling advertising or insights into customer behavior. In a world of free, the hunt is on for such monetization ideas. More and more companies, for example, are exploring opportunities to sell to third parties or to create new services based on sanitized information ("exhaust data").

Consumers, meanwhile, expect to be valued by companies and treated as individuals. In the online world, Spotify and Netflix analyze their customers' histories to create "for me" experiences when recommending music and movies. Services are becoming even more hassle free online: new Web and mobile apps are designed to be so easy to use that instructions are no longer needed. The demand for "quick and easy" is compelling companies to modify how they deliver real-world offerings—for example, by allowing customers to photograph checks and deposit them using smartphone apps.

A world of digitized instant gratification and low switching costs could force many businesses to seek innovative business models that provide more products and services free of charge or at lower cost. They'll also have to think about offering more personalization in their products and services: customization at a mass level. This approach could require changes to back-end systems, which are often designed for mass production. Businesses will need new ways to collect information that furthers personalization, to embed experimentation into product-development efforts, and to ensure that offerings are easy to use—and even fun.

9. Buying and selling as digital commerce leaps ahead

The rise of the mobile Internet and the evolution of core technologies that cut costs and vastly simplify the process of completing transactions online are reducing barriers to entry across a wide swath of economic activity. Amped-up technology platforms are enabling peer-to-peer commerce to replace activities traditionally carried out by companies and giving birth to new kinds of payment systems and monetization models.

Entry costs have fallen to the point where people who knit sweaters, for example, can tap into a global market of customers. Airbnb brokers deals between travelers and people with spare rooms to rent in their homes or apartments. It booked more than ten million overnight stays in 2012 and could soon be selling more room nights than major international hotel chains do. Similar marketplaces are springing up for bicycles, cars, labor, and more.

Mobile-payment networks, sometimes augmented with services that extend beyond pure transactions, are a second area of evolution for e-commerce as costs fall. Starbucks envisions extending its pioneering use of smartphones for payments to include instant photo verification of buyers. New mobile-commerce platforms that manage transactions can offer customers the option of paying with credit credentials they established for other merchants. The mobile-

payments provider Square offers customers using its service access to their sales data from any transaction and allows them to set up customer-loyalty programs easily.

This trend will become more striking over the next decade or so: 600 cities, most in emerging markets, will account for roughly two-thirds of the world's GDP growth. One likely consequence for fast-growing cities will be the rapid development of dense, digitally enabled commerce—new, highly evolved ecosystems combining devices, payment systems, digital and technology infrastructure, and logistics.

10. Transforming government, health care, and education

The private sector has a big stake in the successful transformation of government, health care, and education, which together account for a third of global GDP. They have lagged behind in productivity growth at least in part because they have been slow to adopt Web-based platforms, big-data analytics, and other IT innovations. Technology-enabled productivity growth could help reduce the cost burden while improving the quality of services and outcomes, as well as boosting long-term global-growth prospects.

Many governments are already using the Web to improve services and reduce waste. India has enrolled 380 million citizens in the world's largest biometric-identity program, Aadhaar, and plans to use the system to make over $50 billion in cash transfers to poor citizens, saving $6 billion in fraudulent payments. In 2011, the US government introduced a Cloud First policy, which laid out a vision to shift a quarter of the $80 billion in annual federal spending to the cloud from in-house data centers, thus saving 20 to 30 percent on the cost of the shifted work. Governments can also use IT to better engage citizens, as South Korea has done with its e-People site, which helps citizens send online civil petitions for policy changes or reports of corruption.

Technology also is opening new opportunities to contain rising health-care costs and improve access. In rural Bangladesh, 90 percent of births occur outside hospitals. A mobile-notification system alerts clinics to dispatch nurse–midwife teams, who are now present in 89 percent of births. In China, a public–private partnership created a cardiovascular-monitoring system that allows patients to self-administer electrocardiograms and transmit data to specialists in Beijing, who can suggest treatments by phone. At New York's Mount Sinai Hospital, a venture with General Electric uses smart tags to track the flow of hundreds of patients, treatments, and medical assets in real time. The hospital estimates it could potentially treat 10,000 more patients each year as a result and generate $120 million in savings and revenues over several years.

Finally, there's education, which represents 4.5 percent of global GDP. Technology is starting to change the equation. Using game technologies and immersive math courseware, DreamBox makes learning more fun, while algorithms adapt the learning experience to each student's needs. Brilliant.org allows talented mathematicians and physics students around the world to learn at their own pace. Global massive online open courses (MOOCs) offer university-level "classes" using social networks, videos, and community interactions.

Smartphones and tablets are entering classrooms en masse to deliver personalized content. India is running trials of the sub-$50 Aakash tablet to link more than 25,000 colleges in an e-learning program. Other technologies are improving teachers' skills and performance through online collaboration, access to best-in-class pedagogies, and better tracking of student achievement, which facilitates targeted interventions.

What does all this mean for busy senior executives—beyond the obvious that there's no escaping these trends, that they will continue to evolve, and that their implications, which will vary for different types of organizations, merit serious attention? We'd suggest that the era of pervasive

connectedness underlying these trends also implies a need for more focused attention on issues such as the following:

Transparent and innovative business models. Real-time information, instant price discovery, and quick problem resolution are becoming basic expectations of consumers, citizens, and business customers in the digital realm. Collectively, they will force many companies to rethink elements of their business models. Leaders will need to make their companies more transparent and elevate rapid responsiveness to the level of a core competency. Business models built on transparency and responsiveness will not only satisfy customers but also help companies become more nimble, innovative, and credible with all their stakeholders.

Talent. The rising economic and business impact of information technology means that competition will heat up for graduates in science, technology, engineering, and mathematics—the STEM fields, where job growth is likely to be about 1.7 times faster than it will be in other areas. As the automation of knowledge work gains momentum, and computers start handling a growing number of tasks now performed by knowledge workers, some midlevel ones will probably be displaced and people with higher-level skills will become more important. Providing new forms of training to upgrade knowledge workers' capabilities and rethinking the nature of public education will be critical priorities for business and government leaders.

Organization. The Internet's model and values, particularly connectivity and nonhierarchical interactions, have significant organizational implications. The flowering of many of these trends could imply decentralization, along with changing relationships among managers, employees, suppliers, and customers. These shifts aren't always comfortable for leaders, but they hold the potential for boosting innovation, loyalty, business reach, productivity, and marketing effectiveness, while reducing costs.

Privacy and security. Billions of people soon will be socializing, sharing information, and conducting transactions on the Internet. As businesses and governments use the Web to monitor assets, manage payments, and store data, they will be tracking moves individuals make on the Internet. Navigating the issues associated with generating economic utility while managing privacy will require organizations to examine trade-offs and address tensions in a clear, thoughtful way as rules of the road are established. Meanwhile, the value of the massive stores of digital information will only increase, giving criminals, terrorists, and even rogue states bigger incentives to breach firewalls and making the protection of data an imperative for top management. Keeping up with state-of-the-art encryption standards and security-management practices, for example, is moving from an arcane corner of data management to a core customer expectation, which, if not met, could severely damage a business's reputation.

In short, as these trends take hold, leaders must prepare for the disruption of long-standing commercial and social relationships, as well as the emergence of unforeseen business priorities. The difficulty of embracing those realities while addressing related risks and concerns may give some leaders pause. But it's worth keeping in mind that if the future traces past experience, these technology-enabled business trends will not only be a boon for consumers but also stimulate growth, innovation, and a new wave of pace-setting companies.

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1.9 Uses of Information Technology :

Write yourself using already acquired knowledge.

Business Case 3 : Pepsi Cola Co. –Web marketing Strategy

Would you shop for a soft drink online? Seems like a silly question. Of all the products for sales in the Universe, bottles and cans of sweet, carbonated liquid are probably the last things shoppers will want to buy on the Internet. Even frozen food has more potential. But soft drinks? They're cheap. They require no research to purchase. They are available on practically every street corner in the world. So why is Pepsi-Cola Co. trying so hard online? While many traditional advertisers have dabbled in the Net, Pepsi has a range of programs on the virtual air, from music sites to banner ads to Internet sweepstakes. Though only about 3 percent of its estimated $400 million soft drink ad budget goes online, that belies the emphasis the company places on the Web. "This medium is here to stay, and we buy that," says John Vail, director of digital media and marketing for Pepsi-Cola.

One reason: Despite the difficulties in measuring online ad performance, Pepsi has crafted deals that already show benefits. In a barter arrangement with Yahoo! Inc.) Pepsi plastered the portal's logo on 1.5 billion cans. In return, Yahoo took the cola company's already established loyalty program, Pepsi Stuff, to new heights. A co-branded web site, PepsiStuff.com let consumers collect points from bottle caps. The points were redeemable on the 'Web site for prizes-everything from electronic goods to concert tickets.

The results were considerable. Three million consumers logged on and registered at the PepsiStuff site, giving the cola company detailed consumer data that normally must be paid for in market research or gleaned from focus groups. Information that once took months to obtain could now be had in days. What's more, Vail was able to tweak the program while it was in progress, maintaining the right inventory of the most popular prizes. "Instead of lagtime data, we had real-time and we could react to it," says Vail. Sales volume rose 5 percent during the online promotion and the cost was about one-fifth what it had been 'as a mail-in project.

Pepsi has no intention of slowing its Internet rush. The 'Web is the medium of choice for Pepsi's prime demographic audience, those under 25. "They are going to where their customer hangs out and flashing their name," says Tom Pirko, a beverage consultant for Santa Barbara-based Bevmark Ic. "This is aimed at flipping the next generation. For Pepsi, the Internet is serious. It's not a toy." For consumer Shane Erstad, 29, that's good news. Intrigued by the prizes and the ability to collect the points online, he became devoted to Mountain Dew and a fan of the Pepsi Stuff site. Even now that the game has ended, he hasn't cut back. "I hope they repeat the promotion," he says. He can count on it, and much more. For Pepsi knows that its E-commerce marketing strategies are a work in progress. Pepsi's online marketing road has been long and bumpy.

On February 29, 1996, the company launched Pepsi World, a Web site of sponsored content designed to attract the youthful consumer. Sports and music news was mixed with online games and animation. A seven figure publicity budget backed the debut. But it quickly became clear

through focus groups and traffic numbers that Pepsi hadn't reached its target. Eyeballs were too fleeting, visitors too fickle. By the summer of 1997, Vail revamped the site to be less of a sports news digest and more of a vehicle to promote Pepsi-sponsored athletes, such as NASCAR driver Jeff Gordon.

Going forward, Pepsi plans to expand on its Web site-centric E-commerce marketing efforts. Although banner ads and other more traditional ad buys have had some success, it's the creation of engaging Pepsi Web sites that has given the brand the most traction online. For example, Vail would like to bring a virtual experience to many other Pepsi promotions, such as Choose Your Music, a current in-store create-your-own-CD promotion at participating music outlets.
"We're looking ahead to the next evolution," says Vail.

Case Study Questions
1. What are the major business benefits of Pepsi's online marketing efforts?
2. Do you approve of Pepsi's "Web-centric" E-commerce marketing strategy? Why or why not:
3. Visit www.pepsistuff.com or other Pepsi websites. What else could Pepsi do to improve its web-based marketing efforts? Explain.

Readings 7 :

Virtual Management at Accenture

Accenture is a global management consulting, technology services, and outsourcing company, with over 129,000 employees in 48 countries. It specializes in helping businesses and governments improve their performance. Its information systems and business processes are designed so that consultants can work from virtually any location. ... Accenture has no operational headquarters and no formal branches. Its chief financial officer lives in Silicon Valley, California, while the head of human resources is in Chicago and its chief technology officer is based in Germany. Accenture's thousands of management and technology consultants are constantly on the move, on site with clients or working temporarily in offices that the company leases in more than 100 locations around the world.

When a new consultant is hired, Accenture's system automatically sets up an e-mail account and instructions on where to pick up a laptop. Managers rely heavily on telephone and e-mail to keep up with their staff, and many of them are constantly in motion. Every day, Accenture employees log on to the company's internal Web site, which they can access from anywhere in the world. They use this system to record where they are working, and to access e-mail, phone messages, and their files. The system enables them to share documents and other data with Accenture colleagues and to conduct videoconferences when more face-to-face interaction is needed. If a consultant or manager is about to travel to London, Chicago, Beijing, he or she uses the system to find a cubicle with a desk in that location. Clients who call a manager whose home base is Los-Angeles are automatically routed to his or her current working location, even if it is several time zones away.

1b print a document, a person uses the Accenture internal Web site to click on the country where he or she is currently working. This action brings up a list of offices. After selecting an office, the employee selects a floor, which brings up a floor plan of the building and displays all of the available printers. When the employee clicks on a printer, it automatically prints the employee's

documents. Employees can't pop into co-workers' offices for informal meetings. Participants in a specific project may be working from many different locations and time zones around the world, so scheduling phone conferences may require a few to give up some sleep. For global phone conferences, the best time appears to be around 1 P.M. London time, which is 9 P.M.in Beijing, midnight in Australia, and 5 A.M. in California.

For executives who are constantly on the go, jet lag adds to the problem. Accenture outsources about 82 percent of the information technology it uses. It hires other companies to manage its network, computer centers, and help desk, as well as technologies used at specific locations. External vendors provide the support for Accenture's PCs and conference call technology.

Accenture also outsources other parts of its business, such as the management of employee travel. Its travel vendors are able to track employee movements. When a major client in Copenhagen asked to see Accenture's chief operating officer Steve Rohleder in person, Accenture was able to locate Rohleder just as his plane was landing in Nice, France, en route from New York to India. Rohleder was able to change planes and head directly to Copenhagen.
Some problems, however, require Accenture managers and clients to "be there in person." When London-based Adrian Lajtha, who heads Accenture's financial services group, learned that a project team in the United States felt bogged down, he made an impromptu visit to their work site and staged a three-hour meeting. Personal contact is especially useful when sensitive personnel matters must be addressed or when employees need extra motivation and encouragement during hard times. That means
more travel and conferences around the clock for Accenture virtual executives. During the last economic slowdown, for example, Lajtha held 280 meetings in 18 months with groups of the 12,000 employees he oversees.

Despite these challenges, Accenture believes virtual management works. The company doesn't have to maintain overhead costs for large headquarters, which it believes would amount to much more than its extensive travel expenses. Managers see many benefits to spending time in the field where clients are located. Managers meeting with lower-level employees who work with the clients obtain information that would not be available if they remained at headquarters. And their presence helps cement client relationships. Almost 85 percent of Accenture's one hundred largest accounts have been its clients for 10 years or more.

Business Case 4 :

Camelot Music, solving business problems with IT

Company: Camelot Music, based in North Canton,- Ohio., is a privately held mall-based retailer of music, CDs/cassettes, with *5,000* employees and 310 stores in the United States.

The problem: Remain competitive with larger retail.., ers, such as Best Buy and Circuit City, as well as smaller mall-based stores, by offering pricing schemes that vary by store and competitive situation, and discounts to frequent customers.

The solution: Use variable-pricing software and sophisticated methods to attract and retain customers.

The IT infrastructure: Richter Systems International's Automated Merchandising System runs on a Hewlett-Packard *9000* server. Camelot's data warehouse runs on an ICL Gold Rush Mega Server, Informix database, and Micro Strategies DSS software.

Costs of technology to solve business problem: Between *$750,000* and $1 million.

ROI/ paybacks: Objective is to increase sales by at least one-tenth of 1percent, which would garner a payback in a little more than two years.

To Charlie Marsh, CIO of Camelot Music, competitive pricing involves more than slashing a buck off a CD here and there. To vie effectively with retailing giants and other mall shops, Marsh uses information technology to tailor Camelot's pricing structure according to region, store, and competitive situation. Camelot also awards discounts to frequent customers.

One key to success with such variable pricing is an enterprise pricing structure, says Judy Hodges, applications and information access research manager for International
Data Corporation. The need for consistency is a major reason that Camelot Music picked Richter Automated Merchandising Systems (RAMS) software.

In the past, Camelot executives worried little about Best Buy, Circuit City, and other mass-market retailers, which sold few of the music CDs and cassettes that are Camelot's bread and butter. About three years ago however, the rules of the game changed. Best Buy began selling music recordings as a "loss leader," charging consumers $2 to $5 less than shops such as Camelot in order to attract consumers to
higher-ticket electronics products. The retailers' strategy "drove 10 points out of our margin," says Marsh.

With the big retailers changing the competitive field, Camelot, had to reinvent itself and after better pricing just to stay in the game. Basing pricing on whatever criteria is
appropriate--competition within or outside a mall, as well as no competition in same regions - was key.
"Camelot installed: RAMS, which runs on an HP *9000* '"Enterprise Server Camelot also operates a sophisticated customer marketing system, which runs on data warehousing
software. As part of ICL's Corema customer relationship marketing system, Camelot's "repeat performer" program encompasses 2.25 million names of frequent buyers, to whom Camelot issues $5 coupons good toward purchases on their next store visit. "It's like an airplane frequent flyer program, says Marsh.

Corema manages customer loyalty schemes, manages and monitors promotions, and supports sophisticated predictions of customer purchase patterns. Corema also enables Marsh to perform various market based analysis, including calculating the success of regional promotions by costs and margin percentage increases.

Payback from Corema, which Camelot deployed in 1997 after nine months of development, should be quick. If the frequent buyer program increases sales by one-tenth of 1 percent, the

system will pay for itself in two years. March excepts even more of a sales boost than that from 1,00,000 mailers he sent out last November to customers in Camelot's database.

In an earlier test, within 30 days of mailing a 10 percent discount coupon to about 6,000 customers more than 70 percent of those customers had returned to the store, and the average purchase per customer had almost doubled what is normally was. Within two months, more than 90 percent of customers had come back to the store, with the same purchase pattern.

Case Study Questions :

1. How could Camelot Music have used a system approach to solving their business problems?
2. Do you agree with Camelot's solutions to their business problems? Why or why not?
3. What else would you recommend that Camelot do to improve their business situation? How could information technology help?

Readings 8 :

Three Guiding Principles to Technology Acceptance :

By Brian P. Watson

Standardization, centralization and simplification are the three guiding principles to help managers and employees accept new technologies, the retiring CIO and CTO of the U.S. Postal Service says.

Bob Otto knows something about IT that delivers, having served as a programmer, security specialist and portfolio manager with the United States Postal Service before becoming CIO and CTO in January 2001. Prior to his Oct. 1 retirement, he spoke with senior writer Brian P. Watson about his experiences in IT management and what he sees in the future for CIOs. The following is an edited version of their conversation.

***CIO INSIGHT*: What are the biggest changes you've seen over the course of your career?**

OTTO: It's just so complex now. Lots of changes—things like wireless technologies, security, data breaches. All of this stuff factors in. If you think about in the 1960s and 1970s, most of us in IT had business problems, and people made decisions on technologies and tools from them. Nowadays you have to think about those same solutions with access from a Web page or handheld device, and it has to have load balancing that allows tens of thousands of users to access it, and it has to encrypt sensitive data like Social Security numbers.

How have you gotten your people to accept new technologies?

OTTO: I have three guiding principles—principles I've used since I was young. First, standardize everything. If you find a process you like, standardize it. Second, centralize everything you can. If you have services in five different places and you can centralize them, you will have reliability, predictability. Third, simplify. The computer has taken over your life, so I want it to be intuitive [for people to operate and manage]. I also test my own dog food. Everything we build has to pass the "Bob" factor. I put myself in the place of the lowest common denominator, of someone who might not have a high school degree. I look at how people could be intimidated by technology, and I don't want them to have a hard time.

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1.10 Impact of Information Technology on Business :

Businesses have been at the forefront of technology for ages. Whatever can speed up the production process will draw in more business. With the widespread use of computers, a new age of information technology (IT) has begun. To reap its benefits, businesses are rapidly changing their infrastructure. These days, almost every business is conducted over computers and communication devices, in order to organize large databases, personal schedules, and various other forms of essential information. Information technology is a comprehensive term that includes all types of technology used to exchange, store, use, or create information. Commonly used devices to support IT include computers, servers, peripheral devices, Internet connectivity equipment, and phone systems. Breakthrough in IT has resulted in better or automated solutions that have not only increased the productivity, but also involve lower operational costs, improved speed, ease of sharing and storing information, decrease in human error through automation, and increase III revenue. IT is rapidly permeating the business world, affecting how companies make and market their products, as well as how people communicate and accomplish their jobs. Specialized software shapes best-practices and industry standards, continually changing the face of business in almost every way. Let us see how the use of IT has revolutionized the way we do our business.

(1) Business Data Processing :

Business data processing (BDP) means performing operations in order to convert business data into useful information. IT enables businesses to store large amounts of information, summarize them, and analyse them, in order to understand the business in a better way. Once data is entered into a spreadsheet application, users can draw a variety of charts to interpret the data from different angles. For example, view the sales of a product in a particular region during the entire year, view the sales of a product in all the regions in a particular month, and the like.

Another example could be from banking. Banks store records of millions of users and keep complete information about their accounts, loans, fixed deposits, and so on. They keep sending statements and other promotional schemes to their customers from time to time.

Other areas in which IT has a major impact on BDP include:

(a) Accounting and Payroll :

Businesses can use software accounting packages, like Microsoft Money or QuickBooks to manage their accounts. No longer do they need to hire full-time or third-party accountants. These software packages enable business managers to generate informative reports and financial statements, in order to make effective business decisions. Accounting systems keep track of every rupee a company spends, along with every rupee of revenue.

The accounting software also stores payroll information, tax records, and other specialized data. Business without these software packages cannot be even imagined today. Besides increasing efficiency, IT also reduces time and space required to store a large number of files with hundreds of papers in it. Can you think of searching information from these files?

(b) Inventory Management :

Businesses can use software packages like Microsoft Excel or Open Office to store data, pertaining to inventory, sales, and receivables and payables. The inventory management system keeps track of products in the inventory and ensures that the business neither runs out of stock nor is in excess.

(c) Enhanced Productivity :

Technology tools help employees do their tasks quickly and efficiently in very less time, and that too without any error. Therefore, empowering employees with the right hardware and updated software keeps them working at their best.

(d) Easier Storage :

Information technology eliminates the need for double or triple entry systems and reduces paperwork to a considerably large extent. Details about contracts, quotations, customers, suppliers, dealers, retailers, and so on can all be stored in databases and accessed in minutes.

(e) Automation :

With technology, businesses can automate certain functions that have historically required the need to hire an employee. They can use software like Quicken and Quickbooks to perform frequent bookkeeping functions. Similarly, the sales function can be automated through contact management sites like Sales Force. Using automated software enables business managers to concentrate on strategy and cut down on labour expenses. Automation technology, such as assembly lines and computer-controlled machinery, enables industries and organizations to produce large volumes of goods in less time and at low cost.

(f) Economic Efficiencies :

Companies can harness IT resources to lower their costs. Using IT infrastructure, redundant tasks can be centralized at one location. For example, a large company could centralize their payroll function at one location to lower employee costs. Economic efficiencies can also be realized by migrating high-cost functions into an online environment. Companies can offer customers email support, which may have a lower cost than a live customer support call. Cost savings can also be made through outsourcing opportunities, remote work options, and lower-cost communication options.

(2) Enhanced Intra-organizational and Inter-organizational Communication

With IT, an organization can be benefitted from faster, efficient, effective, and low-cost communication systems, as explained in this section. Internet Marketing Today, all businesses are moving towards making their presence felt on the Internet. Whether big or small, all businesses have their websites to advertise their products, take orders, buy merchandise, and sell excess products. Many businesses such as Flipkart, Amazon, Snapdeal, OLX, and so on, operate only online. Some businesses are also doing Internet marketing on other social websites. For example, we all have seen advertisements of products on Facebook.

With enhanced communication, companies are able to build strong relationships within their value chains. As a result, with extensive use of technology, even a small business can compete with established and big business houses. Using advanced video and graphics editing software, business owners create professional marketing materials that reach out to millions of netizens worldwide. They use cost-efficient web marketing tools like Google AdWords to spread targeted marketing messages, either to a broad audience or to a selected group. Business owners also share expensive advertising space online through banner- and traffic-swaps.

Additionally, through email marketing, business managers are effectively reaching out to a large group of people with newsletters, coupons, or other means of business updates, and that too at very low costs. Going a step ahead, they have also started using mobile marketing to offer discounts to customers, through text messaging and by advertising their products and services. Undoubtedly, technology has freed small businesses from the restrictions of print advertisements

to reach out to their customers. IT has helped businesses minimize geographic communication barriers.

Technology has brought businesses closer to customers. Businesses use emails to reply to customers' queries, get their feedback, offer online chat to help them navigate through their websites, and use call centers to support their customers every moment.

(a) Stay Competitive :

To survive in the marketplace, every business is racing to get the technology tag. Using Internet and online surveys, business managers stay up-to-date with recent trends, techniques, software, and human resources. Managers communicate with their employees in different locations, resolve both employee and customer issues in almost no time, and keep track of their status as well as competitors' positions through different postings on the web. With better communication, business managers can manage their time better, freeing themselves from administrative minutiae and focusing on more productive activities, such as making vital contacts with suppliers and potential strategic partners. Business managers and entrepreneurs can hold face to face meetings online, from anywhere in the world. For example, IndusInd bank has started mobile face-to-face banking.

(b) Improved Sharing of Information :

With technology, any type of information-written or broadcast can be shared more quickly and with fewer resources. Besides sharing information about new products with customers, IT also helps send inventory orders, make payments, and invite quotations online. Information technology also enables companies to get into e-learning and other forms of online training to train their staff in a cost-effective manner.

(c) Customer Relationship Management :

A customer relationship management (CRM) system is used to track a customer throughout his experience or interaction with the business. Managers can view the information about how many times the customer has called to order a product or service, for help, with a technical question, or for any other conversation. All these details help to build strong relationships with customers, by providing them with customized and proactive responses.

(2) Telecommuting, Teleconferencing, and Videoconferencing :

Business houses are using telecommuting to help employees stay in touch with each other from different locations. Employees use email, online collaboration tools, and mobile computing devices to share digital documents, convey information through presentations, and create training videos for new joinees.

Teleconferencing over the phone and video brings together web cameras and audio and collaborative online meeting spaces to create an interactive environment, in which the participants can see each other, work together on documents, and recreate the in-person meeting experience, no matter where they are in the world. This enables businesses to reach global customers and partners.

(3) Outsourcing :

The term outsourcing implies hiring employees who work outside the company. These employees may even reside in some other country. These days, we frequently hear that people are working in business process outsourcing (BPO) or knowledge process outsourcing (KPO). In this section, we will discuss these two forms of outsourcing and understand the underlying difference between the two.

(a) Business Process Outsourcing

Business process outsourcing is the practice in which employees outside the company are hired to perform specific business tasks like payroll. Outsourcing is done as a cost-saving measure by big companies that want to focus on their key business area, rather than focusing on routine business tasks. The BPO service that is outsourced to another country is called offshore outsourcing, while the one outsourced to a neighboring country is called nearshore outsourcing. Similarly, the BPO service that is outsourced within the same country is called onshore outsourcing.

There are two main types of BPOs, which are front-office outsourcing and back-office outsourcing. While in back-office outsourcing, internal business functions such as payroll, billing, purchasing, accounting, and HR are outsourced, in front-office outsourcing, customer-related services such as marketing and technical support are out-sourced, as shown in Figure.

Figure : Services provided by BPO.

Advantages :

The main advantages of BPOs are as follows:

• Companies can focus on their specialized areas and specific competencies.

• Speed and efficiency of routine business tasks enhance when these jobs are outsourced to a third party.

• All the employees of the company can concentrate in designing and implementing the core business strategies to bolster competitive advantage and enhance value chain engagement.

• Companies in developed nations usually outsource their routine tasks to developing nations, where they have to pay very little for the same job, thereby helping to cut involved costs.

Risks :

There are, however, certain serious risks that exist while outsourcing business processes. These are as follows:

• Data privacy breaches can take place.
• There can be underestimated running costs.
• There can be overdependence on service providers.

(b) Knowledge Process Outsourcing :

Knowledge process outsourcing is another form of outsourcing, in which a company outsources core business activities competitively important or form an integral part of its value chain. It requires advanced analytical and technical skills, as well as a high degree of specialist expertise. The KPO services include all kinds of research and information gathering activities like intellectual property research for patent applications, equity research, business and market research, legal and medical services, training, consultancy, and research and development in fields such as pharmaceuticals, biotechnology, animation and design, web development, CAD/CAM applications, fraud analytics, project management, remote education, research and development, radiology, and medical transcript preparation, as shown in following figure.

Figure : Services provided by KPO.

A KPO extends the work of a BPO by adding more business complexities. It is always recommended that only a company that has a good knowledge of running a BPO must get into the KPO market.

Advantages :

The main advantages of KPOs are as follows:

• They reduce cost.
• They compensate for shortage of skilled employees.
• They offer low cost expertise.

• They offer employment for educated people in developing countries and benefits of their economies.
• They add value to the company's core competencies.

Risks :

There are, however, certain risks that involve in KPOs. These are as follows:
• Important data of the company is passed to a third party, which may lead to security breaches.
• The character and quality of the work of employees in another company, and may be in another country, cannot be assured.
• Establishing a KPO takes time, and thus, cannot provide immediate solutions to prevailing problems.
• There can be increased complexities, due to lack of communication, between the company and the KPO, possibly because of legal, language, and cultural barriers.
• Inferior quality of outputs, missed delivery times, and cultural differences can take place.
• Increased costs due to salary inflation, increased standard of living, and improved (stronger) currency of some developing countries like India may adversely affect the company.
• Political and economic instability as well as terrorist activities in the countries can affect the company.
• Losing out on key talent at home is a major threat to the company.

Business Case 5 : What Happened to Kmart?

On January 22, 2002, Kmart filed for bankruptcy protection. It was the largest retailer ever to do so and shocked many people. Kmart had made retail history when its founder, the Kresge "five and dime store" chain, invented the concept of the discount store. The first Kmart was established in Detroit in 1962, the same year Wal-Mart opened its first store in Rogers, Arkansas. By the end of 1963 Kmart had 63 stores converted from Kresge's. In the following years, however, Wal-Mart expanded quickly by following a strategy of everyday low prices. Wal-Mart used information technology (IT) to track sales in all its stores and to replenish its fastest selling products. Wal-Mart demonstrated its willingness to spend needed funds on IT by installing registers with bar-code scanners in each store during the late 1970s and early 1980s, which fed the sales data into the back-end store computers. The result was Wal-Mart sales data were always current and store managers knew what was selling well and what was not. In time many orders were routed straight from the Wal-Mart store to the appropriate supplier, and the delivery went from that supplier directly to the store. Wal-Mart recently developed an extranet to work closely with key suppliers on problems such as how to increase sales on specific products. Many analysts believe Wal-Mart has the most sophisticated supply chain systems in the industry.

By 1983, with its cutting edge information systems, Wal-Mart was already spending only two cents per dollar getting goods to its stores while Kmart was spending five cents. From that differential alone, Wal-Mart could sell the same product at a price 3 percent lower than Kmart, an important saving to many shoppers. In 1990 Wal-Mart passed Kmart as the largest discount chain with annual sales of $32.6 billion for Kmart's $32.3 billion. Wal-Mart was well on its way to becoming the world's largest retailer. In December 2001, Target, Kmart's other major competitor, passed Kmart as the second largest discount chain. Target had prospered by emphasizing its merchandising, distinguishing itself as a low-cost source of quality and style. Kmart, in contrast, used a promotions-driven business model, drumming up business by advertising "blue-light" specials using circulars inserted into local newspapers. In an attempt to

stay ahead ofWal-Mart, Kmart started investing $1 billion to modernize its information systems in 1987. According to David Carlson, then Kmart's CIa, the company developed capabilities to collect the necessary data, bUt it did not use them to forecast demand, relying instead on management's judgments.

Carlson notes that Kmart's suppliers promoted as many of their products as they could sell rather than helping Kmart to focus on the better selling items, as was Wal-Mart's approach. Beginning in 1984, Kmart began diversifying its businesses by acquiring Waldenbooks, rayless Drugstores, Sports Authority, and OfficeMax. It also opened its first Super Kmart Center, a much larger store that now included groceries. Kmart continued to lose ground to competitors while it gained the image of being old-fashioned, outdated, and frumpy. It had a reputation of being a run-down place to shop with an inferior selection of products. Many of its shelves were empty while its prices were too high. It was even considered to offer poor customer service and to not care about competition. By 1994, Kmart was on the verge of bankruptcy. It sold off its newer businesses to concentrate on its discount stores, and, in 1997, it inaugurated the very popular Martha Stewart product lines for the home. In 1999, Kmart began developing BlueLight.com, a Web site designed to sell a few items in order to draw customers to physical stores and to polish its image. In May 2000, watching its hemorrhaging continue, the company hired Charles Conaway, the former CVS drugstore chain president, as Kmart's chairman and CEO. Conaway pledged to turn the company around within two years, and said his goal was to make Kmart the primary destination for mothers looking for low-priced clothing, housewares, and packaged food for their families. He announced plans to restructure Kmart to increase the productivity of Kmart stores, inventories, and information systems. He closed 72 stores, reducing staff by 5,000. He even announced Kmart would spend about $1.4 billion for IT over two years versus only $263 million during the previous two years. However, in August 2001, Kmart announced a second quarter loss of $22 million, and Conaway blamed pricing pressure, particularly from Wal-Mart. Kmart reduced prices on 30,000 of its 70,000 items and cut down on advertising circulars. Consumer habits are hard to change and Kmart sales took a big hit.
Sales at Wal-Mart and Target grew in 2001, while those at Kmart continued to decline. Conaway said he had not found a formula to distinguish his company from his competitors. Since Conaway had taken over, Kmart had increased the percentage of items in stock to 86 percent, compared to 73 percent two to three years earlier. In a conference with Wall Street analysts, Conaway said Kmart was "doing a phenomenal job of reinventing" its supply chain, which would be visible to all in a year's time.

Despite Kmart's continuing falling sales and rising losses Conaway again mandated price cuts, this time on 50,000 products. When Fleming Companies, now Kmart's sole grocery supplier, suspended shipments to Kmart because of Kmart's failure to meet its weekly payment of $78 million, the company realized it could no longer meet all of its financial obligations. Kmart had to declare bankruptcy. Kmart had clearly exhibited many problems. For instance, former Kmart CIO Dave Carlson said he had tried to unify Kmart's two separate computers in its distribution system, but he was turned down because the project was considered to be too expensive. When Conaway was first hired, he wanted to find new ways to bring customers into the stores, and so he cut back on Kmart's primary method of Sunday circulars but offered no dear alternative strategy. In 2000, central planners were still allocating 60 percent of Kmart's goods to specific stores. Conaway tried to address this problem, but by December 2001, 40 percent of its goods

were still being allocated by central planning rather than by local stores. Also, Kmart continued to expand the variety of its products rather than focusing on fast selling items, as did Wal-Mart. Shipping was such a problem that in December 2000, being limited to only 900 trucks per day, Kmart was forced to choose between shipping toothpaste or Christmas trees. Warehousing was also an obvious problem since 15,000 truck-trailers were parked behind its stores holding excess inventory because they had no more storage space. Conaway did successfully eliminate this problem within a few months, thereby also reducing the "shrink" (stolen product) rate. Many analysts and observers, including Conaway, believed supply chain management was Kmart's most serious problem, particularly when compared to Wal-Mart. Kmart's promotions driven business model created sharp spikes and drops in demand for products and has been much more difficult to support with supply chain management systems than everyday low pricing models such as Wal-Mart's. Indications of supply chain troubles were everywhere. Outdated technology at the distribution centers resulted in supplies often sitting on pallets for 24 or more hours until they were recorded in the central tracking system. The shelves displaying popular products were often empty, and to reorder them from regional distribution centers, store merchandisers first had to hand sift through previous purchasing receipts. Kmart's inventory turnover rate was very low.

In the year 2000, Kmart's was an anemic 3.6; while Wal-Mart's was 7.3, and Target's was 6.3. Gary Buzek, the president of IHL Consulting Group, estimated that Kmart could add $1.9 billion in profit just by matching its competitors' turnover rates. Conaway moved ahead quickly. In July, he selected i2 Technologies of Dallas, Texas, to work with Kmart in a project to rebuild its supply-chain systems. i2 had been a highly successful vendor of supply-chain software, although principally for manufacturers, while Kmart's new software had to be designed for its retail business. The project was to improve Kmart's management of sales forecasting, inventory sourcing, logistics, and reporting. i2 planned to use the Kmart project to create templates for sale to the retail industry in general and then customize them specifically for Kmart. The project would also connect these new systems to appropriate in-store technology such as bar-code scanners at cash registers. It would also include micro merchandising, which enables individual stores to select their own merchandise according to the needs and demands of their local community. i2 claimed its software would track the ability of key suppliers to supply their products. It would also analyze Kmart's needs, and execute the required orders, schedule shipments, and record the delivery of products. i2 claimed its software would reduce excess inventory in stores and distribution centers, thus lowering costs, and enabling Kmart to lower prices. Sales would then grow and profits increase. Conaway stated Kmart's supply chain would become the best in the retail business, although Lora Cecere, a Gartner analyst, did question the ability of the project to succeed in such a giant, complex project.

Katrina Roche, i2's chief marketing officer, stated that "i2 excels at sales but its execution isn't always flawless." Supply chain management software for manufacturing still accounted for 90 percent of i2's business, and it had only recent and limited experience in the retail sector. One major roadblock was that manufacturers use a relatively small number of stock-keeping units (SKUs) that must be handled by supply chain management software. Unfortunately, Kmart had over 70,000 SKUs in its 2,100 stores, meaning the system must deal with 147 million possible pairings, and this number is increased by inserting many distribution centers and time periods involved. The i2 software was simply not designed to handle such huge data sets. Yet advanced planning software is fundamental to supply chain management, and the problem could only be

solved by Kmart purchasing more hardware; an expensive solution for a company facing Kmart's financial problems.

The i2 project was organized with a team of 500 working in an isolated location. It included over 100 personnel from Deloitte Consulting who were to customize i2's existing software, making it able to track the movement of goods to Kmart's more than 2,100 stores. Conaway announced that the first applications would go live in early 2001, followed by a "rapid, methodical rollout" of several dozen business releases with a total of93 distinct improvements, all by August 2002.

In February 2001, several suppliers, including Pharmavite Corp. of Northridge, California, and Bell Sports Corp. of Irving, Texas, said they were seeing improved inventory management in the last three months. Also, Kmart announced a $200 million program to purchase and install new point-of-sale terminal cash registers from IBM to improve customer service with faster checkout technologies.

In June 2001, Kmart began installing new warehouse management software called PkMS, from Manhattan Associates. Its goal was to move products-more quickly through Kmart's distribution centers to the stores, thereby cutting costs while getting the product on the shelves before it has been sold out. The software was installed at corporate headquarters and in all distribution centers. Using it, workers who pick, pack, and ship products to the stores use bar-code scanners to locate each item and to track the flow of the goods. A spokesperson said Kmart would save $15 million a year by increasing productivity and lowering labor costs. Management hoped it might also increase sales. The result was that Kmart could track 30 SKUs at the beginning of the third quarter (2001), 119,000 in late November, and 500,000 three months later. However, Buzek believed the information would be useless because management just didn't believe in the system. In September, the company announced a $148 million write-off of its previous warehouse management system because it was so extensively modified that it no longer could work well and cost too much to maintain. Observers and analysts claim the write-off included abandoning some of i2's software. Kmart also wrote off $65 million for two outdated distribution centers, replacing them with two newer ones purchased from Toys 'R" Us. In December 2001, word came out that the i2 project had fallen way behind. John West, i2's chief technology officer until late in 2001, said the software worked, but the project had stalled because of Kmart's "operational issues." One member of the i2 users group said, "If the data's not right, it's not that it doesn't work; it's just that you won't get the answer you want." Interestingly, when i2 had problems with Nike, it also blamed its customer and not itself. According to Karen Peterson, a Gartner analyst, Kmart originally did not understand the complex difficulties of the project. Another observer, Jim Dion, president of Chicago retail consulting firm Dionco Inc., said that with the project's difficulty in connecting its point-of-sale and inventory systems to its distribution systems, Kmart was still sending many of its orders on paper. Also in December, Kmart indicated it was now trying to modernize 800 of its stores at a cost of around $1 billion, and that money was competing with funds needed to modernize its supply chain. During the Christmas 2001 selling period Kmart moved less product off its shelves than it had in 2000.

When Kmart was forced to declare bankruptcy, it did indicate some plans for survival. Conaway announced that the company would use Chapter 11 bankruptcy protection to break store leases in 284 stores in 40 states and then close them. In June 2002, Kmart c4anged the name of its Web

site from Bluelight.com to Kmatt.com to attract a younger audience and help focus on Kmart stores and sales promotions. (Bluelight had never become a profitable Web business.) Kmart.com will also see an expanded variety of name brand products such as Pentax cameras and Disney apparel. Management believes Kmart.com also meshes better than Bluelight.com with the company's current "Stuff of Life" campaign, which is trying to position the chain as a family-friendly budget-minded store.

Emphasizing exclusive brands such as Martha, Stewart, Everyday, and Joe Boxer may help Kmart distinguish itself from its rivals. Conaway believes Kmart should be able to emerge from Chapter 11of Bankruptcy in 2003. The question is, will Kmart truly be able to bounce back? What will it take to keep going? The company still doesn't have a low enough cost structure to compete with Wal-Mart's low prices, nor does it have the trendy image of Target. What can Kmart do to become the shopping destination of choice?

1.11 Recent Trends in Information Technology :

According to the Information Technology Association of America, IT is defined as the study, design, development, application, implementation, support, or management of computer-based information systems.
Information technology has become so widespread in today's world that one can hardly think of life without computers and computing devices. It has come as a game changer in the business world and has resolved various economic and social issues. With organizations striving to bolster competitive advantage in a complex global environment, savvy business leaders are leveraging technology to accomplish their goals. The field of IT is ever growing and the most recent trends that have been influencing business all around the world include the following.

1. Business Developments :
Information technology plays a crucial role in various aspects of business development. A few cases where this is apparent are discussed here.
Analytics
These days, businesses are using a variety of analytical tools to store their data, view it in different forms (charts, tables, graphs, etc.), and analyse and interpret it to understand their business in a better way. This understanding helps business managers to take strategic decisions that enable their business to reach great heights. Additionally, advances in sensors, display technologies, and devices have enabled managers to apply new analytic, statistical, and computational modeling techniques, in order to visualize and process information, for moving with the innovation, improving productivity, enhancing customer experience, and getting the work done, at lower costs.
Mobile Applications and Socially-enabled Business Processes :
Mobile applications (mobile apps), which are software applications that run on smartphones, tablets, and other mobile devices, have become a huge success since its introduction. These apps are either available for free or can be downloaded at a minimal cost. The revenue collected is shared between the app distributor and the app developer. Each app provides a limited and isolated functionality. Businesses can make their apps such that they can be made easily accessible to their customers. For example, Pizza Hut can create an app to allow customers to place their order and an e-commerce website can create an app to display the products and their

related information. A bank can have an app to allow customers to check their account balance and pay their bills.

Besides mobile apps, social collaboration tools enable organizations to harness and prioritize multiple collaboration platforms to increase productivity, enhance collaboration, and connect with external stakeholders to reap benefits from relatively modest investments.

Besides these benefits, companies are also conducting threat assessments to know who wants to steal or damage their sensitive data. For this, they use monitoring strategies and tools to nullify any attempt made to breach their security.

Sensors and Cloud Computing

Business organizations are rapidly moving towards the use of sensors that will collect data and feed it to the cloud (discussed in the next section), where it will be used to derive useful information, which can then be used by customers for a better experience. Basically, the idea is to allow customers' mobile devices to proactively interact with data collected from sensors to get some useful information. For example, in a marketplace, sensors can be used to alert drivers of open parking spaces.

The trend is towards wearing devices that have sensors embedded in them. While doctors are using them to monitor physical activity of their patients, employers are tying employee health insurance premiums to measured activity generated from the wearable devices.

Three Dimensional Printing

Three dimensional (3-D) printing has revolutionized the manufacturing sector by using digital models and special material deposition devices to build physical objects, one layer at a time. They have enabled users to fabricate complex components from a variety of materials, including steel, aluminum, titanium, and different types of plastics. Companies are widely using 3-D printing technology to customize products at rapid rates and allow their engineers to map interesting concepts to legitimate production technology.

2. Artificial Intelligence :

Intelligence is the ability to think, take decisions, recognize patterns, adapt to changes, memorize, understand, interpret, and learn from experiences. Artificial intelligence (AI) attempts to create machines that have all these characteristics. It is a branch of computer science that works on making computers intelligent like humans. Research in this subject is being done for the last 50 years, and now the dream of having smart and intelligent machines has become a reality. Machines that mimic the human brain, understand speech, beat the human chess player champion, and the like have all been possible due to efforts put in the field of AI.

Artificial intelligence includes the following.

(1) Games Playing

Artificial intelligence has been successfully used to program computers to play games, such as chess and checkers. The intelligent computers are then made to play with human experts. We know that while playing games, a human expert utilizes a large amount of domain specific knowledge and procedures to make moves that can make him win the contest. The same domain knowledge is inculcated in the intelligent machine. The machine then explores every possible move and its consequence at a very fast speed to make the most rational move. We have also heard of Deep Blue's win over Garry Kasparov.

(2) Expert System

Expert system (Figure 1. I2) is a branch of Al that designs intelligent machines, which solve realworld problems by using deductive logic. They are specifically designed to solve problems of

a particular niche area. An expert system is built with total expertise in a specific domain of human thought and is programmed to use statistical analysis and data mining concepts. It is basically used to give expert ad\'lce to non-expert humans in situations in which either the human expert is nt)t available or IS too expensive to be consulted. There are three main components in an expert system.

Knowledge base consists of facts and rules collected from human experts, either through interviews or by observations. These rules are usually expressed using If-Then statements describing if a particular condition is true, then the following inference can be made or the following action can be taken. With the inference, a probability factor is also associated to tell the non-expert user that the inference is not a certainty but is valid with the specified probability. For example, a system for approving loan applications might infer that the person's loan plea may be rejected because there is a probability of 0.9 that the person will be unable to pay the debt.

An inference engine acts as a search engine in the knowledge base. It searches for facts and rules in the knowledge base, depending on the user's query.

User interface is an easy and intuitive-to-use component that allows users to submit their queries and get experts' advice. A good user interface enables the users to express their query in their own language.

In response to the user's query, the expert system displays the corresponding or action along with its probability factor and a sequence of rules which were used to deduce the inference. This will enable the non-experts to cross check the validity of the inference made by the expert system. This will even help the students as they can use it as a learning tool.

Applications

The applications of expert systems are as follows:

• Hearsay is used to analyse sensor data to infer situation descriptions.
• MYCIN is used to make observations and send alerts about system malfunctions.
• MYCIN is used to diagnose human illness and suggest a treatment.
• Preterm Birth Risk Assessment is used to predict the consequence of a given situation.
• Dendral is used to configure objects within specified constraints.
• REACTOR is used to monitor systems for any type of vulnerabilities.
• MACSYMS is used to provide incremental solutions for complex problems.
• SMH.PAL is used for diagnosing and assessing students with multiple disabilities.
• Expert system is used to plan the sequence of actions.
• It is used to make financial forecasts.
• It is used to schedule routes for delivery vehicles.
• It is used to analyse sonar data to detect submarines.
• It is used to analyse problems in the car engine.
• It is used to deduce locations where drilling for oil/water/gold can be done.

Limitations

The limitations of expert systems are as follows:

• Difficulty to attain expert's knowledge.
• Difficulty in accessing large knowledge databases.
• Difficulty in integrating knowledge from different experts

3. Cloud Computing :

Cloud computing is considered to be the next stage in the evolution of the Internet. Its use for providing computing power, infrastructure, storage, applications, business processes, and personal collaboration to users (based on their demands) over the Internet is on a constant rise.
The term cloud in cloud computing includes a set of hardware, networks, storage, services, and interfaces that together deliver aspects of computing as a service (refer Figure 1.13).
As naIve users, we are already using a form of cloud computing through our email accounts with a web-based email service like Hotmail, Yahoo! mail, or Gmail. When we run the email program, we log in to a web email account remotely, to check our emails. This is because the software and storage for our account is not present in our computer. It is rather present on the service provider's server (or computer cloud).
Let us consider a scenario to understand how cloud computing can prove beneficial to an organization. In an organization, each employee is given a computer that has all necessary software loaded in it. Whenever a new employee joins, new hardware and new software has to be purchased for the new hire. This costs a lot of money. In such a solution, cloud computing can be helpful. With cloud computing, employees will log into a web-based service that hosts all the software and use them, as and when required. All software, ranging from email to word processing to complex data analysis programs can be loaded on the web based service's cloud.

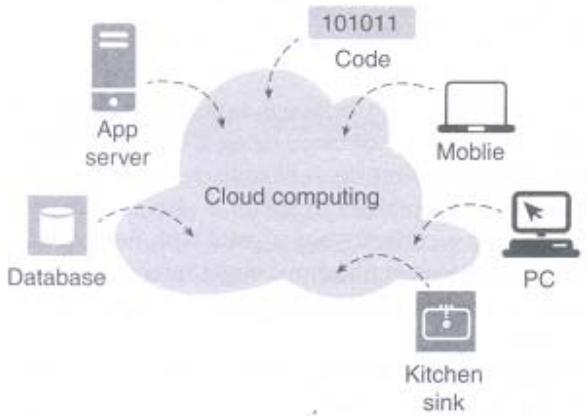

Fig. : Cloud computing.

In a cloud computing system, the workload of local computers is drastically reduced, as they are no longer required to run heavy applications (demanding a lot of the computers' resources). This reduces the local computers' demand for extra hardware and software resources. The local computers just need to run the cloud computing system's interface software, which is usually as simple as a web browser. All the complex software is handled by the network of computers that make up the cloud. Therefore, we can say that the entities in a cloud computing system include the following:
• The end users, who are completely unaware of the underlying technology.
• Business management that is responsible for the governance of data or services in the cloud.
• Cloud service providers, who provide a predictable, guaranteed, and secure service to all their constituents. They are also responsible for IT assets and maintenance.

Cloud Computing Concerns :
There are two main concerns about cloud computing-security and privacy. The concept of confidential data being handled by another company is a cause of worry for many users.

Corporate executives often hesitate to go for cloud computing systems, as they do not want to keep their company's information under lock and key. This concern is better shown in Figure.
We must not forget that cloud providers' companies live and die by their reputations. These companies are usually very big organizations that give due consideration to implementing reliable security measures, because if they don't do that they will lose all their clients. Therefore, it is in their interest to employ the most advanced techniques to provide data security and privacy. The companies offering cloud computing services usually take the following measures for coping with these issues :

(a) Authentication : It provides access to data and applications only to those users who provide the system with the correct user name and password.

(b) Authorization : It allows each user to access only the data and applications relevant to his job.

(c) Identity management : The cloud provider manages personal identity information to efficiently control access to computer resources, applications, data, and services offered by it.

(d) Detection and forensics : The cloud provider implements tools and techniques that can easily separate legitimate activities in the system from illegitimate ones.

(e) Encryption : The confidential data on the cloud can be stored in an encrypted form, so that even if an illegitimate user gets to access that data, he would not be able to interpret its right meaning. (For example, 'hello' can be stored as 'khoor', where every character is replaced with the third character in sequence).

4. Enterprise Computing :

These days, almost all technology products developed for business customers are marketed with the tag-the buzzword enterprise. The term enterprise computing refers to business-oriented IT that is critical to a company's operations. It includes all types of software, such as database management, CRM, accounting, payroll, human resources, analytics, and reporting, which are required to perform business operations. This means that enterprise computing is a collection of business software solutions to common problems, such as resource management and streamlining of processes. It marks a departure from finding single software solutions to specific business problems and is intended to offer integrated solutions to these problems.

Advantages

The advantages of enterprise computing are as follows:

• Is sold to an organization as an entire platform that can be applied broadly across the organization.

• The organization can customize the software within each area.

• Different software solutions implemented within the organization are standardized across the system.

• Provides proper abstractions for business concepts that remain constant across a business, so that they may be shared by all the different units within the company.

• Provides an appropriate window for each user, without duplicating the effort required to capture the rules of the business.

Expectations from Enterprise Computing

The expectations from enterprise computing are as follows:

• An enterprise solution must not use proprietary components, because with proprietary components it is difficult and, at times, impossible to integrate new technological advancements.

Moreover, the enterprise solution must be platform-independent and database-independent, which is not possible with proprietary components.

• It must support customization to support a personalized user experience. It must have user interfaces, which can display content tailored to the language and cultural norms .of the users interacting with the system. The interface must also enable users with disabilities to access software applications.

• It must allow sharing of data that is common to different applications. For example, the information about employees must be shared by accounting and human resource applications.

Managing Security :

The resources of an organization are generally accessed by a large number of users and in enterprise computing, sensitive data often traverses unprotected open networks (like the Internet). This makes it mandatory for every enterprise to design implement-relevant security mechanisms and infrastructure to meet the real threat. For this, the enterprise computing software solution must have some or all of the following characteristics.

Authentication : Users must prove that they are the legitimate users of the system. For example, they must have an access ID and password.

Access control for sensitive resources : This includes enforcing integrity, confidentiality, or constraints, by authorizing a particular user or a group of users to access the resource. All other users will be denied access. For example, in your computer lab, only the administrator can download a software on your computer and can access your computer in totality. With a student's login, you have limited access rights on the system.

Data integrity : This ensures that data that is sent over the Internet has not been tampered with by anybody. For example, if a customer has ordered 10 units of an item, it should be received by the company as 10 units only. It must not get modified to 100 units by another user with malicious intentions.

Data privacy : Data must be accessed only by users who are authorized to access it. For example, a tender quotation filled by a manager and sent to the CEO must be available only to the CEO. It should not be accessible to any third person inside or outside the organization.

Non-repudiation : Non-repudiation means that a user who performed some transaction cannot deny it later. For example, after a customer has placed an order, he cannot say that either he has not placed it or someone else has done it in his name.

Auditing : It means constantly evaluating the effectiveness of security policies and mechanisms.

5. Mobile Business :

Widespread use of wireless hand-held devices, such as cellular phones, tablets, personal digital assistants (PDAs), and laptops, to perform commercial transactions online, has led to the rise of what is called mobile commerce. Mobile commerce transactions are growing continuously and such transactions include sale and purchase of goods and services, online banking, bill payment, information delivery, and so on.

Mobile business has been made possible with wireless access protocol (WAP). Mobile devices are also exploiting Bluetooth technology to connect themselves with fax machines, printers, and other devices so that they can be used for sending/receiving and printing payment slips, inventory orders, or other details besides providing the basic phone capabilities.

Factors Leading to Growth of Mobile Commerce

The increasing adoption of electronic commerce, which includes selling and purchasing over the Internet (as in Flipkart, Snapdeal, Jabong, and the like), has opened the gateways for mobile commerce on a strong growth trajectory for years to come. Other factors include the following:

- Rapid increase in the use of mobile devices and, thus, for mobile applications
- Constant increase in the number of mobile users
- Availability of sound security mechanisms
- Technological advances that have brought down the costs of mobile devices and have made them affordable for a large group of people
- Faster content delivery of content over mobile devices
- Scalability and better computing power of mobile devices

Applications

Mobile commerce has been adopted in the following industries and more are ready to join the list:

- Financial service providers use it for accessing bank accounts and payment of bills, transferring money, and so on.
- Brokerage service providers use it to view stock quotes and perform online trading through mobile devices. They allow users to react to market developments in a timely fashion, irrespective of their physical locations.
- Telecommunication providers use it to enable customers to change their service plans, review accounts, pay bills, and so on.
- Retail stores and service providers using it to allow their customers to place their orders and pay for them on-the-fly.
- Information service providers use it to deliver financial news, sports, stock prices, traffic updates, and so on.
- General public use it to look for service providers, for example a restaurant nearby, get feedback and reviews about food, and the like.
- Tickets are being sent to mobile phones these days. Users can show their mobile phones to get their tickets checked. For example, Indian Railway Catering and Tourism Corporation (IRCTC) sends tickets to users through SMSes.
- Shopping vouchers, coupons, loyalty cards, discounts, and the like (refer Figure 1.16) are sent to users on their mobile phones. Users can present their mobile devices at the point of sale to avail their benefits.
- Besides other goods and services, users can purchase audio, video, games, ringtones, and wall papers on their Internet-enabled mobile devices.
- With mobile commerce, users can get information about local weather (the place where they have taken their mobile device).
- Location of people can be tracked and monitored through mobile devices. This helps investigating agencies to locate criminals.
- Mobile auctions, which bills the consumer's phone each time they place a bid, are also quite common these days.
- Mobile marketing, which refers to marketing done through mobile devices, is also very common. Business groups have found that they received better response from mobile marketing campaigns than from traditional campaigns. For example, a new mother, who is busy with her baby and other household work, can receive an advertisement of baby products on her mobile device. In just a few clicks, she can place an order for them.

6. Smart Card :

A smart card, shown in Figure 1.17, is a small plastic card about the size of a credit card that has a microcontroller embedded in it to store data. The microcontroller can be programmed to perform different applications. To be used, the smart card is supposed to be inserted into a slot and read by a special reader called the smart card reader. These days, contactless smart cards are also very commonly used. These can be read at a distance. Such smart cards are very helpful in toll booths.

Today, smart card-equipped systems are used throughout several key applications in areas of business such as health care, banking, entertainment, and transportation. They are also used in the following cases:

• People use mobile phones to dial numbers. The balance stored in the smart card gets deducted, depending on call rates and duration of the call.

• People use smart cards to prove their identity, when logging on to an Internet access provider or to an online bank.

• People in technologically-advanced and developed nations use them to pay for parking at parking meters.

• People use them to make payment in buses, trains, and even pay toll tax.

• Doctors ask patients to use smart cards that store their medical details.

• Customers use smart cards to make payments while shopping online. In such a case, the smart card acts as cybercash.

• People use smart cards to buy gasoline at gas stations.

• Students use smart cards in libraries to keep record of the books issued.

• Customers use them as loyalty cards in retail business. These cards track customers' transactions and offer incentives to regular customers.

• Stored value smart cards are not only convenient to use, but they are also safer than cash.

• People use them for accessing machine settings for sensitive laboratory equipment and dispensers for drugs, tools, library cards, health club equipment, and the like.

• Some use them to manage and control expenditures with a specified limit.

Smart cards ensure security of any transaction. They are more cost-effective and reliable than barcode readers. Smart cards, when implemented with biometrics, can be used to make sure that an individual's identification is foolproof in systems that require the highest degree of security and privacy.

Biometrics (such as fingerprint, retina of the eye, face, and the like) are measurable physical characteristics that can be used to recognize the identity of an individual. Smart cards can store textual information as well as a physical characteristic of an individual.

For example, during an enrollment process, the biometric template (like fingerprint) can be stored on the smart card chip. During an examination, this stored information can be used for verification, as only the authorized user with the same biometric matching would be allowed to appear for the examination. This is especially useful in case of an online examination.

Readings 9 : Management of Anticipated Breakthrough Technologies of 21st Century, International Journal of Research & Development in Technology and Management Science - Journal Article by P.S. Aithal

ABSTRACT

This review discuss strategic management of thirteen most anticipated possible technology breakthroughs of 21st century which are substantially affect the life style of living beings in the world like :

(1) Nanotechnology based human life comfort,
(2) High speed computation through optical computers,
(3) Embedded Intelligence,
(4) HIV Antivirus,
(5) Pseudo Senses - Sensation of existence through virtual reality and through artificial environment,
(6) Off Planet Production in micro-gravity,
(7) Protein Maps to know how many active genes are coding for proteins in living being,
(8) Customized Kids which are used for Customization of physical and mental ability of children,
(9) Development of Chameleon Chips which are reconfigurable photonic circuits using the idea of optical solitons,
(10) Flying cars through manipulation of gravitational force,
(11) Immortality through nano-bio-technology & stem cell research,
(12) Fractal Models for fragmented geometry shapes, and
(13) Space travel for everybody.

The paper also discuss the effect of these technology breakthroughs and possible changes in lifestyle of people in the society and its contribution in solving many basic problems of human beings on the earth by means of systematic management such breakthrough technologies

Readings 10 : How IT gives you Competitive Advantage

How Information Gives You Competitive Advantage

By Michael E. Porter & Victor E. Millar

FROM THE JULY 1985 ISSUE OF HARVARD BUSINESS REVIEW

The information revolution is sweeping through our economy. No company can escape its effects. Dramatic reductions in the cost of obtaining, processing, and transmitting information are changing the way we do business.

Most general managers know that the revolution is under way, and few dispute its importance. As more and more of their time and investment capital is absorbed in information technology and its effects, executives have a growing awareness that the technology can no longer be the exclusive territory of EDP or IS departments. As they see their rivals use information for competitive advantage, these executives recognize the need to become directly involved in the management of the new technology. In the face of rapid change, however, they don't know how.

This article aims to help general managers respond to the challenges of the information revolution. How will advances in information technology affect competition and the sources of competitive advantage? What strategies should a company pursue to exploit the technology? What are the implications of actions that competitors may already have taken? Of the many opportunities for investment in information technology, which are the most urgent?

To answer these questions, managers must first understand that information technology is more than just computers. Today, information technology must be conceived of broadly to encompass the information that businesses create and use as well as a wide spectrum of increasingly

convergent and linked technologies that process the information. In addition to computers, then, data recognition equipment, communications technologies, factory automation, and other hardware and services are involved.

The information revolution is affecting competition in three vital ways:

It changes industry structure and, in so doing, alters the rules of competition.

It creates competitive advantage by giving companies new ways to outperform their rivals.

It spawns whole new businesses, often from within a company's existing operations.

We discuss the reasons why information technology has acquired strategic significance and how it is affecting all businesses. We then describe how the new technology changes the nature of competition and how astute companies have exploited this. Finally, we outline a procedure managers can use to assess the role of information technology in their business and to help define investment priorities to turn the technology to their competitive advantage.

Strategic Significance

Information technology is changing the way companies operate. It is affecting the entire process by which companies create their products. Furthermore, it is reshaping the product itself: the entire package of physical goods, services, and information companies provide to create value for their buyers.

An important concept that highlights the role of information technology in competition is the "value chain."[1] This concept divides a company's activities into the technologically and economically distinct activities it performs to do business. We call these "value activities." The value a company creates is measured by the amount that buyers are willing to pay for a product or service. A business is profitable if the value it creates exceeds the cost of performing the value activities. To gain competitive advantage over its rivals, a company must either perform these activities at a lower cost or perform them in a way that leads to differentiation and a premium price (more value).

A company's value activities fall into nine generic categories (see Exhibit I). Primary activities are those involved in the physical creation of the product, its marketing and delivery to buyers, and its support and servicing after sale. Support activities provide the inputs and infrastructure that allow the primary activities to take place. Every activity employs purchased inputs, human resources, and a combination of technologies. Firm infrastructure, including such functions as general management, legal work, and accounting, supports the entire chain. Within each of these generic categories, a company will perform a number of discrete activities, depending on the particular business. Service, for example, frequently includes activities such as installation, repair, adjustment, upgrading, and parts inventory management.

EXHIBIT I

The value chain

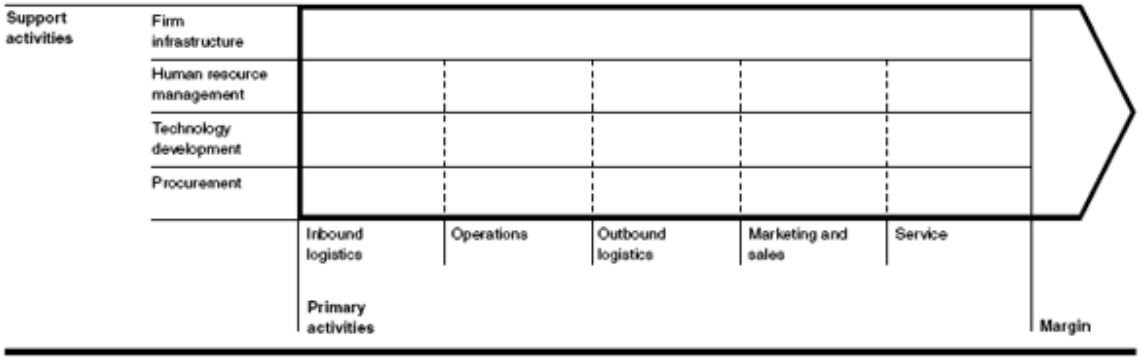

Exhibit I The value chain

A company's value chain is a system of interdependent activities, which are connected by linkages. Linkages exist when the way in which one activity is performed affects the cost or effectiveness of other activities. Linkages often create trade-offs in performing different activities that should be optimized. This optimization may require trade-offs. For example, a more costly product design and more expensive raw materials can reduce after-sale service costs. A company must resolve such trade-offs, in accordance with its strategy, to achieve competitive advantage.

Linkages also require activities to be coordinated. On-time delivery requires that operations, outbound logistics, and service activities (installation, for example) should function smoothly together. Good coordination allows on-time delivery without the need for costly inventory. Careful management of linkages is often a powerful source of competitive advantage because of the difficulty rivals have in perceiving them and in resolving trade-offs across organizational lines.

The value chain for a company in a particular industry is embedded in a larger stream of activities that we term the "value system" (see Exhibit II). The value system includes the value chains of suppliers, who provide inputs (such as raw materials, components, and purchased services) to the company's value chain. The company's product often passes through its channels' value chains on its way to the ultimate buyer. Finally, the product becomes a purchased input to the value chains of its buyers, who use it to perform one or more buyer activities.

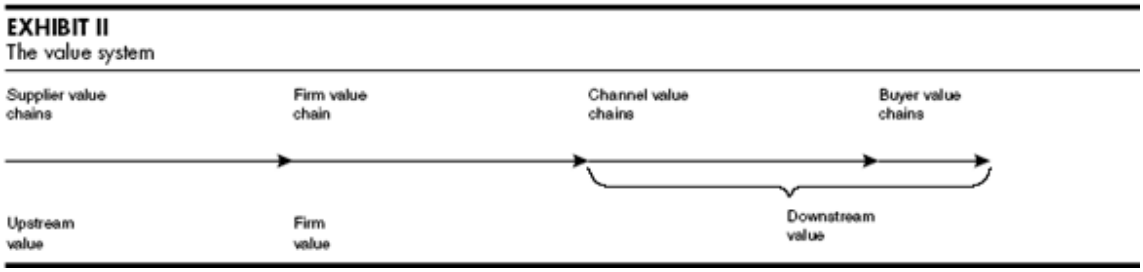

Exhibit II The value system

Linkages not only connect value activities inside a company but also create interdependencies between its value chain and those of its suppliers and channels. A company can create competitive advantage by optimizing or coordinating these links to the outside. For example, a candy manufacturer may save processing steps by persuading its suppliers to deliver chocolate in liquid form rather than in molded bars. Just-in-time deliveries by the supplier may have the same effect. But the opportunities for savings through coordinating with suppliers and channels go far beyond logistics and order processing. The company, suppliers, and channels can all benefit through better recognition and exploitation of such linkages.

Competitive advantage in either cost or differentiation is a function of a company's value chain. A company's cost position reflects the collective cost of performing all its value activities relative to rivals. Each value activity has cost drivers that determine the potential sources of a cost advantage. Similarly, a company's ability to differentiate itself reflects the contribution of each value activity toward fulfillment of buyer needs. Many of a company's activities—not just its physical product or service—contribute to differentiation. Buyer needs, in turn, depend not only on the impact of the company's product on the buyer but also on the company's other activities (for example, logistics or after-sale services).

In the search for competitive advantage, companies often differ in competitive scope—or the breadth of their activities. Competitive scope has four key dimensions: segment scope, vertical scope (degree of vertical integration), geographic scope, and industry scope (or the range of related industries in which the company competes).

Competitive scope is a powerful tool for creating competitive advantage. Broad scope can allow the company to exploit interrelationships between the value chains serving different industry segments, geographic areas, or related industries. For example, two business units may share one sales force to sell their products, or the units may coordinate the procurement of common components. Competing nationally or globally with a coordinated strategy can yield a competitive advantage over local or domestic rivals. By employing a broad vertical scope, a company can exploit the potential benefits of performing more activities internally rather than use outside suppliers.

By selecting a narrow scope, on the other hand, a company may be able to tailor the value chain to a particular target segment to achieve lower cost or differentiation. The competitive advantage of a narrow scope comes from customizing the value chain to best serve particular product varieties, buyers, or geographic regions. If the target segment has unusual needs, broad-scope competitors will not serve it well.

Transforming the value chain

Information technology is permeating the value chain at every point, transforming the way value activities are performed and the nature of the linkages among them. It also is affecting competitive scope and reshaping the way products meet buyer needs. These basic effects explain why information technology has acquired strategic significance and is different from the many other technologies businesses use.

Every value activity has both a physical and an information-processing component. The physical component includes all the physical tasks required to perform the activity. The information-processing component encompasses the steps required to capture, manipulate, and channel the data necessary to perform the activity.

Every value activity creates and uses information of some kind. A logistics activity, for example, uses information like scheduling promises, transportation rates, and production plans to ensure timely and cost-effective delivery. A service activity uses information about service requests to schedule calls and order parts, and generates information on product failures that a company can use to revise product designs and manufacturing methods.

An activity's physical and information-processing components may be simple or quite complex. Different activities require a different mix of the two components. For instance, metal stamping uses more physical processing than information processing; processing of insurance claims requires just the opposite balance.

For most of industrial history, technological progress principally affected the physical component of what businesses do. During the Industrial Revolution, companies achieved competitive advantage by substituting machines for human labor. Information processing at that time was mostly the result of human effort.

Now the pace of technological change is reversed. Information technology is advancing faster than technologies for physical processing. The costs of information storage, manipulation, and transmittal are falling rapidly and the boundaries of what is feasible in information processing are at the same time expanding. During the Industrial Revolution, the railroad cut the travel time from Boston, Massachusetts, to Concord, New Hampshire, from five days to four hours, a factor of 30. But the advances in information technology are even greater. The cost of computer power

relative to the cost of manual information processing is at least 8,000 times less expensive than the cost 30 years ago. Between 1958 and 1980 the time for one electronic operation fell by a factor of 80 million. Department of Defense studies show that the error rate in recording data through bar coding is 1 in 3,000,000, compared to 1 error in 300 manual data entries.

This technological transformation is expanding the limits of what companies can do faster than managers can explore the opportunities. The information revolution affects all nine categories of value activity, from allowing computer-aided design in technology development to incorporating automation in warehouses (see Exhibit III). The new technology substitutes machines for human effort in information processing. Paper ledgers and rules of thumb have given way to computers.

EXHIBIT III

Information Technology permeates the value chain

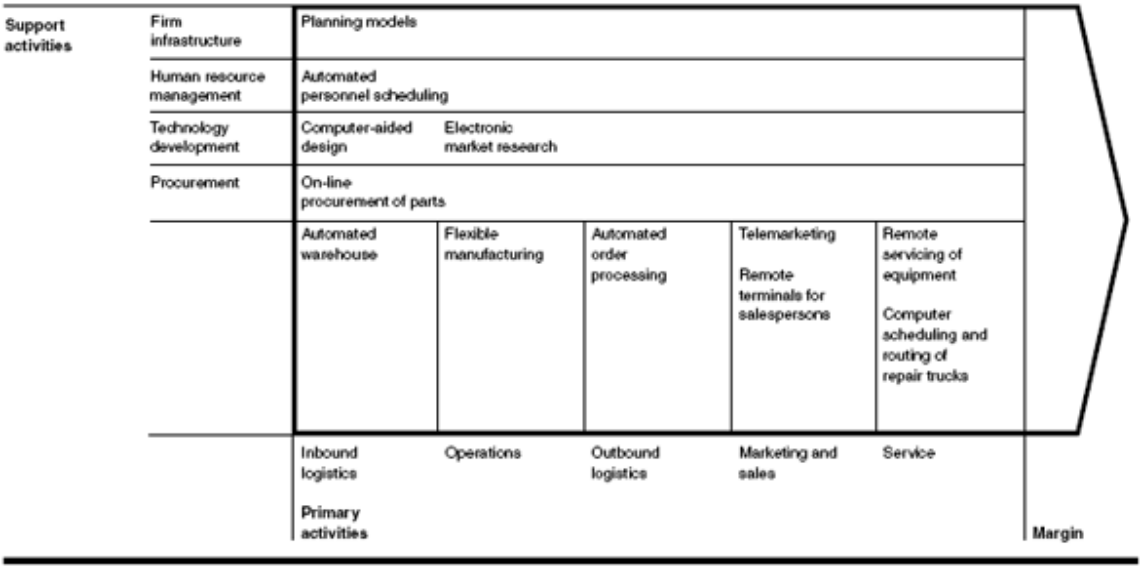

Exhibit III Information Technology permeates the value chain

Initially, companies used information technology mainly for accounting and record-keeping functions. In these applications, the computers automated repetitive clerical functions such as order processing. Today information technology is spreading throughout the value chain and is performing optimization and control functions as well as more judgmental executive functions. General Electric, for instance, uses a data base that includes the accumulated experience and (often intuitive) knowledge of its appliance service engineers to provide support to customers by phone.

Information technology is generating more data as a company performs its activities and is permitting it to collect or capture information that was not available before. Such technology also makes room for a more comprehensive analysis and use of the expanded data. The number of variables that a company can analyze or control has grown dramatically. Hunt-Wesson, for example, developed a computer model to aid it in studying distribution-center expansion and relocation issues. The model enabled the company to evaluate many more different variables, scenarios, and alternative strategies than had been possible before. Similarly, information technology helped Sulzer Brothers' engineers improve the design of diesel engines in ways that manual calculations could not.

Information technology is also transforming the physical processing component of activities. Computer-controlled machine tools are faster, more accurate, and more flexible in manufacturing than the older, manually operated machines. Schlumberger has developed an electronic device permitting engineers to measure the angle of a drill bit, the temperature of a rock, and other variables while drilling oil wells. The result: drilling time is reduced and some well-logging steps are eliminated. On the West Coast, some fishermen now use weather satellite data on ocean temperatures to identify promising fishing grounds. This practice greatly reduces the fishermen's steaming time and fuel costs.

Information technology not only affects how individual activities are performed but, through new information flows, it is also greatly enhancing a company's ability to exploit linkages between activities, both within and outside the company. The technology is creating new linkages between activities, and companies can now coordinate their actions more closely with those of their buyers and suppliers. For example, McKesson, the nation's largest drug distributor, provides its drugstore customers with terminals. The company makes it so easy for clients to order, receive, and prepare invoices that the customers, in return, are willing to place larger orders. At the same time, McKesson has streamlined its order processing.

Finally, the new technology has a powerful effect on competitive scope. Information systems allow companies to coordinate value activities in far-flung geographic locations. (For example, Boeing engineers work on designs on-line with foreign suppliers.) Information technology is also creating many new interrelationships among businesses, expanding the scope of industries in which a company must compete to achieve competitive advantage.

So pervasive is the impact of information technology that it confronts executives with a tough problem: too much information. This problem creates new uses of information technology to store and analyze the flood of information available to executives.

Transforming the product

Most products have always had both a physical and an information component. The latter, broadly defined, is everything that the buyer needs to know to obtain the product and use it to achieve the desired result. That is, a product includes information about its characteristics and how it should be used and supported. For example, convenient, accessible information on maintenance and service procedures is an important buyer criterion in consumer appliances.

Historically, a product's physical component has been more important than its information component. The new technology, however, makes it feasible to supply far more information along with the physical product. For example, General Electric's appliance service data base supports a consumer hotline that helps differentiate GE's service support from its rivals'. Similarly, some railroad and trucking companies offer up-to-the-minute information on the whereabouts of shippers' freight, which improves coordination between shippers and the railroad. The new technology is also making it increasingly possible to offer products with no physical component at all. Compustat's customers have access to corporate financial data filed with the Securities and Exchange Commission, and many companies have sprung up to perform energy use analyses of buildings.

Many products also process information in their normal functioning. A dishwasher, for example, requires a control system that directs the various components of the unit through the washing cycle and displays the process to the user. The new information technology is enhancing product performance and is making it easier to boost a product's information content. Electronic control of the automobile, for example, is becoming more visible in dashboard displays, talking dashboards, diagnostic messages, and the like.

There is an unmistakable trend toward expanding the information content in products. This component, combined with changes in companies' value chains, underscores the increasingly strategic role of information technology. There are no longer mature industries; rather, there are mature ways of doing business.

Direction & pace of change

Although a trend toward information intensity in companies and products is evident, the role and importance of the technology differs in each industry. Banking and insurance, for example, have always been information intensive. Such industries were naturally among the first and most enthusiastic users of data processing. On the other hand, physical processing will continue to dominate in industries that produce, say, cement, despite increased information processing in such businesses.

Exhibit IV, which relates information intensity in the value chain to information content in the product, illuminates the differences in the role and intensity of information among various industries. The banking and newspaper industries have a high information-technology content in both product and process. The oil-refining industry has a high use of information in the refining process but a relatively low information content in the product dimension.

EXHIBIT IV
Information intensity matrix

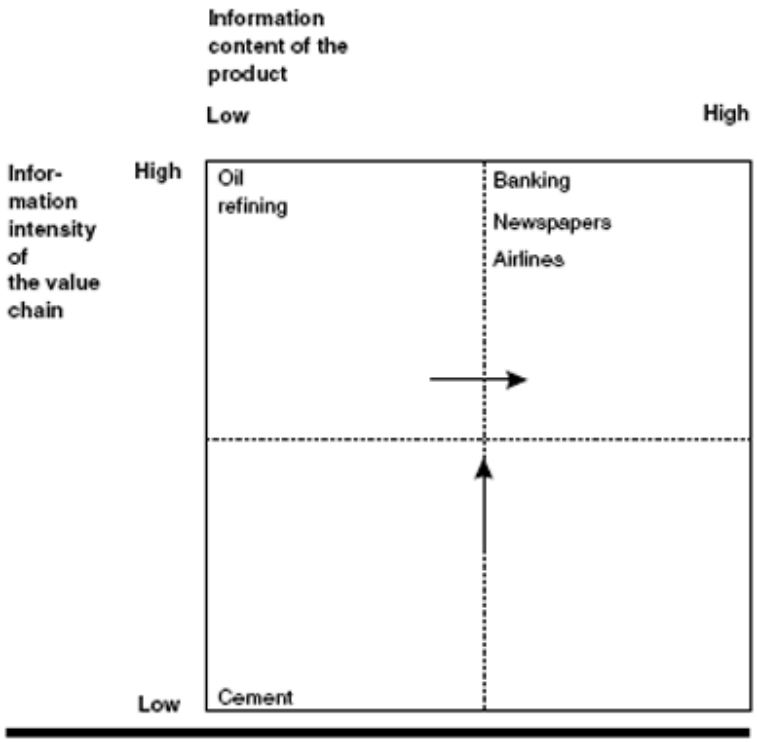

Exhibit IV Information intensity matrix

Because of the falling cost and growing capacity of the new technology, many industries seem to be moving toward a higher information content in both product and process. It should be emphasized that technology will continue to improve rapidly. The cost of hardware will continue to drop, and managers will continue to distribute the technology among even the lower levels of the company. The cost of developing software, now a key constraint, will fall as more packages

become available that are easily tailored to customers' circumstances. The applications of information technology that companies are using today are only a beginning.

Information technology is not only transforming products and processes but also the nature of competition itself. Despite the growing use of information technology, industries will always differ in their position in Exhibit IV and their pace of change.

Changing the Nature of Competition

After surveying a wide range of industries, we find that information technology is changing the rules of competition in three ways. First, advances in information technology are changing the industry structure. Second, information technology is an increasingly important lever that companies can use to create competitive advantage. A company's search for competitive advantage through information technology often also spreads to affect industry structure as competitors imitate the leader's strategic innovations. Finally, the information revolution is spawning completely new businesses. These three effects are critical for understanding the impact of information technology on a particular industry and for formulating effective strategic responses.

Changing industry structure

The structure of an industry is embodied in five competitive forces that collectively determine industry profitability: the power of buyers, the power of suppliers, the threat of new entrants, the threat of substitute products, and the rivalry among existing competitors (see Exhibit V). The collective strength of the five forces varies from industry to industry, as does average profitability. The strength of each of the five forces can also change, either improving or eroding the attractiveness of an industry.[5]

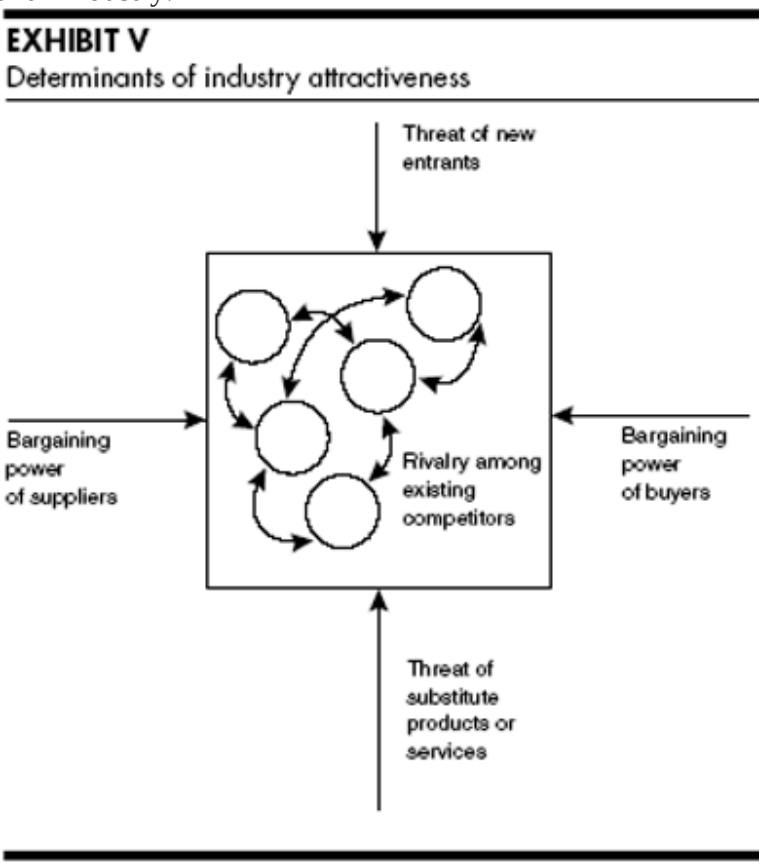

Exhibit V Determinants of industry attractiveness

Information technology can alter each of the five competitive forces and, hence, industry attractiveness as well. The technology is unfreezing the structure of many industries, creating the need and opportunity for change. For example:

- Information technology increases the power of buyers in industries assembling purchased components. Automated bills for materials and vendor quotation files make it easier for buyers to evaluate sources of materials and make-or-buy decisions.
- Information technologies requiring large investments in complex software have raised the barriers to entry. For example, banks competing in cash management services for corporate clients now need advanced software to give customers on-line account information. These banks may also need to invest in improved computer hardware and other facilities.
- Flexible computer-aided design and manufacturing systems have influenced the threat of substitution in many industries by making it quicker, easier, and cheaper to incorporate enhanced features into products.
- The automation of order processing and customer billing has increased rivalry in many distribution industries. The new technology raises fixed costs at the same time as it displaces people. As a result, distributors must often fight harder for incremental volume.

Industries such as airlines, financial services, distribution, and information suppliers (see the upper right-hand corner of Exhibit IV) have felt these effects so far.

Information Technology and Industry Structure

Buyer power

Videotex home shopping services, such as Comp-U-Card, increases buyers' information. Buyers use their personal computers to browse through electronic catalogs and compare prices and product specifications. Customers can make purchases at any hour at prices typically 25% to 30% below suggested retail levels. Comp-U-Card is growing quickly: revenues have quintupled in two years to $9.5 million and membership is now 15,000. According to some projections, by the mid-1990s, 75% of U.S. households will have access to such services.

Buyer power

Shelternet, an electronic information exchange offered by First Boston Corporation, allows real estate brokers to determine quickly and easily what mortgage packages are available and whether the buyer will qualify for financing. This improves the position of both brokers and homebuyers in shopping for mortgages. The parties can make preliminary commitments within 30 minutes.

Substitution

Electronic data bases, such as NEXIS, are substituting for library research and consulting firms. NEXIS subscribers can quickly search the full text of any article in 225 periodicals. Users drastically reduce the time spent in literature searches. In addition, the buyer avoids the cost of the journal subscriptions and pays only for the information required.

Information technology has had a particularly strong impact on bargaining relationships between suppliers and buyers since it affects the linkages between companies and their suppliers, channels, and buyers. Information systems that cross company lines are becoming common. In some cases, the boundaries of industries themselves have changed.

Systems that connect buyers and suppliers are spreading. Xerox gives manufacturing data to suppliers electronically to help them deliver materials. To speed up order entry, Westinghouse Electric Supply Company and American Hospital Supply have furnished their customers with

terminals. Among other things, many systems raise the costs of switching to a new partner because of the disruption and retraining required. These systems tend to tie companies more closely to their buyers and suppliers.

Information technology is altering the relationship among scale, automation, and flexibility with potentially profound consequences. Large-scale production is no longer essential to achieve automation. As a result, entry barriers in a number of industries are falling.

At the same time, automation no longer necessarily leads to inflexibility. For example, General Electric rebuilt its Erie locomotive facility as a large-scale yet flexible factory using computers to store all design and manufacturing data. Ten types of motor frames can be accommodated without manual adjustments to the machines. After installation of a "smart" manufacturing system, BMW can build customized cars (each with its own tailored gearbox, transmission system, interior, and other features) on the normal assembly line. Automation and flexibility are achieved simultaneously, a pairing that changes the pattern of rivalry among competitors.

The increasing flexibility in performing many value activities combined with the falling costs of designing products has triggered an avalanche of opportunities to customize and to serve small market niches. Computer-aided design capability not only reduces the cost of designing new products but also dramatically reduces the cost of modifying or adding features to existing products. The cost of tailoring products to market segments is falling, again affecting the pattern of industry rivalry.

While managers can use information technology to improve their industry structure, the technology also has the potential to destroy that structure. For example, information systems now permit the airline industry to alter fares frequently and to charge many different fares between any two points. At the same time, however, the technology makes the flight and fare schedules more readily available and allows travel agents and individuals to shop around quickly for the lowest fare. The result is a lower fare structure than might otherwise exist. Information technology has made a number of professional service industries less attractive by reducing personal interaction and making service more of a commodity. Managers must look carefully at the structural implications of the new technology to realize its advantages or to be prepared for its consequences.

Creating competitive advantage

In any company, information technology has a powerful effect on competitive advantage in either cost or differentiation. The technology affects value activities themselves or allows companies to gain competitive advantage by exploiting changes in competitive scope.

Lowering cost. As we have seen, information technology can alter a company's costs in any part of the value chain.[8] The technology's historical impact on cost was confined to activities in which repetitive information processing played a large part. These limits no longer exist, however. Even activities like assembly that mainly involve physical processing now have a large information-processing component.

Canon, for example, built a low-cost copier assembly process around an automated parts-selection and materials-handling system. Assembly workers have bins containing all the parts needed for the particular copier. Canon's success with this system derives from the software that controls parts inventory and selection. In insurance brokerage, a number of insurance companies usually participate in underwriting a contract. The costs of documenting each company's participation are high. Now a computer model can optimize (and often reduce) the number of insurers per contract, lowering the broker's total cost. In garment production, equipment such as automated pattern drawers, fabric cutters, and systems for delivering cloth to the final sewing

station have reduced the labor time for manufacturing by up to 50%. (See the insert, "Aim: A Competitive Edge," for further examples.)

Aim: A Competitive edge

Lowering cost

Casinos spend up to 20% of revenues on complimentary services for high rollers. One assignment for pit bosses has always been to keep an eye out for the big spenders. Now, however, many casinos have developed computer systems to analyze data on customers. Caesar's Palace lowered its complimentary budget more than 20% by developing a player-rating system for more accurate identification of big spenders.

Enhancing differentiation

American Express has developed differentiated travel services for corporate customers through the use of information technology. The services include arranging travel and close monitoring of individual expenses. Computers search for the lowest airplane fares, track travel expenses for each cardholder, and issue monthly statements.

In addition to playing a direct role in cost, information technology often alters the cost drivers of activities in ways that can improve (or erode) a company's relative cost position. For example, Louisiana Oil & Tire has taken all ten of its salespeople off the road and made them into telemarketers. As a result, sales expenses have fallen by 10% and sales volume has doubled. However, the move has made the national scale of operations the key determinant of the cost of selling, rather than regional scale.

Enhancing differentiation. The impact of information technology on differentiation strategies is equally dramatic. As noted earlier, the role of a company and its product in the buyer's value chain is the key determinant of differentiation. The new information technology makes it possible to customize products. Using automation, for instance, Sulzer Brothers has increased from five to eight the number of cylinder bore sizes of new low-speed marine diesel engines. Shipowners now choose an engine that is more precisely suited to their needs and thereby recoup significant fuel savings. Similarly, Digital Equipment's artificial intelligence system, XCON, uses decision rules to develop custom computer configurations. This dramatically reduces the time required to fill orders and increases accuracy—which enhances Digital's image as a quality provider.

By bundling more information with the physical product package sold to the buyer, the new technology affects a company's ability to differentiate itself. For example, a magazine distributor offers retailers processing credits for unsold items more efficiently than its competitors. Similarly, the embedding of information systems in the physical product itself is an increasingly powerful way to distinguish it from competing goods.

Changing competitive scope. Information technology can alter the relationship between competitive scope and competitive advantage. The technology increases a company's ability to coordinate its activities regionally, nationally, and globally. It can unlock the power of broader geographic scope to create competitive advantage. Consider the newspaper industry. Dow Jones, publisher of the *Wall Street Journal,* pioneered the page transmission technology that links its 17 U.S. printing plants to produce a truly national newspaper. Such advances in communication plants have also made it possible to move toward a global strategy. Dow Jones has started the *Asian Wall Street Journal* and the *Wall Street Journal-European Edition* and shares much of the editorial content while printing the papers in plants all over the world.

The information revolution is creating interrelationships among industries that were previously separate. The merging of computer and telecommunications technologies is an important example. This convergence has profound effects on the structure of both industries. For example, AT&T is using its position in telecommunications as a staging point for entry into the computer industry. IBM, which recently acquired Rolm, the telecommunications equipment manufacturer, is now joining the competition from the other direction. Information technology is also at the core of growing interrelationships in financial services, where the banking, insurance, and brokerage industries are merging, and in office equipment, where once distinct functions such as typing, photocopying, and data and voice communications can now be combined.

Broad-line companies are increasingly able to segment their offerings in ways that were previously feasible only for focused companies. In the trucking industry, Intermodal Transportation Services, Inc. of Cincinnati has completely changed its system for quoting prices. In the past, each local office set prices using manual procedures. Intermodal now uses microcomputers to link its offices to a center that calculates all prices. The new system gives the company the capacity to introduce a new pricing policy to offer discounts to national accounts, which place their orders from all over the country. Intermodal is tailoring its value chain to large national customers in a way that was previously impossible.

As information technology becomes more widespread, the opportunities to take advantage of a new competitive scope will only increase. The benefits of scope (and the achievement of linkages), however, can accrue only when the information technology spread throughout the organization can communicate. Completely decentralized organizational design and application of information technology will thwart these possibilities, because the information technology introduced in various parts of a company will not be compatible.

Spawning new businesses

The information revolution is giving birth to completely new industries in three distinct ways. First, it makes new businesses technologically feasible. For example, modern imaging and telecommunications technology blend to support new facsimile services such as Federal Express's Zapmail. Similarly, advances in microelectronics made personal computing possible. Services such as Merrill Lynch's Cash Management Account required new information technology to combine several financial products into one.

Second, information technology can also spawn new businesses by creating derived demand for new products. One example is Western Union's EasyLink service, a sophisticated, high-speed, data-communications network that allows personal computers, word processors, and other electronic devices to send messages to each other and to telex machines throughout the world. This service was not needed before the spread of information technology caused a demand for it.

Third, information technology creates new businesses within old ones. A company with information processing embedded in its value chain may have excess capacity or skills that can be sold outside. Sears took advantage of its skills in processing credit card accounts and of its massive scale to provide similar services to others. It sells credit-authorization and transaction-processing services to Phillips Petroleum and retail remittance-processing services to Mellon Bank. Similarly, a manufacturer of automotive parts, A.O. Smith, developed data-communications expertise to meet the needs of its traditional businesses. When a bank consortium went looking for a contractor to run a network of automated teller machines, A.O. Smith got the job. Eastman Kodak recently began offering long-distance telephone and data-transmission services through its internal telecommunications system. Where the information technology used in a company's value chain is sensitive to scale, a company may improve its

overall competitive advantage by increasing the scale of information processing and lowering costs. By selling extra capacity outside, it is at the same time generating new revenue.

Companies also are increasingly able to create and sell to others information that is a by-product of their operations. National Benefit Life reportedly merged with American Can in part to gain access to data on the nine million customers of American Can's direct-mail retailing subsidiary. The use of bar-code scanners in supermarket retailing has turned grocery stores into market research labs. Retailers can run an ad in the morning newspaper and find out its effect by early afternoon. They can also sell this data to market research companies and to food processors.

Competing in the Age of Information

Senior executives can follow five steps to take advantage of opportunities that the information revolution has created.

1. Assess information intensity. A company's first task is to evaluate the existing and potential information intensity of the products and processes of its business units. To help managers accomplish this, we have developed some measures of the potential importance of information technology.

It is very likely that information technology will play a strategic role in an industry that is characterized by one or more of the following features:

- Potentially high information intensity in the value chain—a large number of suppliers or customers with whom the company deals directly, a product requiring a large quantity of information in selling, a product line with many distinct product varieties, a product composed of many parts, a large number of steps in a company's manufacturing process, a long cycle time from the initial order to the delivered product.
- Potentially high information intensity in the product—a product that mainly provides information, a product whose operation involves substantial information processing, a product whose use requires the buyer to process a lot of information, a product requiring especially high costs for buyer training, a product that has many alternative uses or is sold to a buyer with high information intensity in his or her own business.

These may help identify priority business units for investment in information technology. When selecting priority areas, remember the breadth of information technology—it involves more than simple computing.

2. Determine the role of information technology in industry structure. Managers should predict the likely impact of information technology on their industry's structure. They must examine how information technology might affect each of the five competitive forces. Not only is each force likely to change but industry boundaries may change as well. Chances are that a new definition of the industry may be necessary.

Many companies are partly in control of the nature and pace of change in the industry structure. Companies have permanently altered the bases of competition in their favor in many industries through aggressive investments in information technology and have forced other companies to follow. Citibank, with its automated teller machines and transaction processing; American Airlines, with its computerized reservations system; and *USA Today*, with its newspaper page transmission to decentralized printing plants, are pioneers that have used information technology to alter industry structure. A company should understand how structural change is forcing it to respond and look for ways to lead change in the industry.

3. Identify and rank the ways in which information technology might create competitive advantage. The starting assumption must be that the technology is likely to affect every activity in the value chain. Equally important is the possibility that new linkages among activities are

being made possible. By taking a careful look, managers can identify the value activities that are likely to be most affected in terms of cost and differentiation. Obviously, activities that represent a large proportion of cost or that are critical to differentiation bear closest scrutiny, particularly if they have a significant information-processing component. Activities with important links to other activities inside and outside the company are also critical. Executives must examine such activities for ways in which information technology can create sustainable competitive advantage.

In addition to taking a hard look at its value chain, a company should consider how information technology might allow a change in competitive scope. Can information technology help the company serve new segments? Will the flexibility of information technology allow broad-line competitors to invade areas that were once the province of niche competitors? Will information technology provide the leverage to expand the business globally? Can managers harness information technology to exploit interrelationships with other industries? Or, can the technology help a company create competitive advantage by narrowing its scope?

A fresh look at the company's product may also be in order:

Can the company bundle more information with the product?

Can the company embed information technology in it?

4. Investigate how information technology might spawn new businesses. Managers should consider opportunities to create new businesses from existing ones. Information technology is an increasingly important avenue for corporate diversification. Lock-heed, for example, entered the data base business by perceiving an opportunity to use its spare computer capacity.

Identifying opportunities to spawn new businesses requires answering questions such as:

What information generated (or potentially generated) in the business could the company sell?

What information-processing capacity exists internally to start a new business?

Does information technology make it feasible to produce new items related to the company's product?

5. Develop a plan for taking advantage of information technology. The first four steps should lead to an action plan to capitalize on the information revolution. This action plan should rank the strategic investments necessary in hardware and software, and in new product development activities that reflect the increasing information content in products. Organizational changes that reflect the role that the technology plays in linking activities inside and outside the company are likely to be necessary.

The management of information technology can no longer be the sole province of the EDP department. Increasingly, companies must employ information technology with a sophisticated understanding of the requirements for competitive advantage. Organizations need to distribute the responsibility for systems development more widely in the organization. At the same time, general managers must be involved to ensure that cross-functional linkages, more possible to achieve with information technology, are exploited.

These changes do not mean that a central information-technology function should play an insignificant role. Rather than control information technology, however, an IS manager should coordinate the architecture and standards of the many applications throughout the organization, as well as provide assistance and coaching in systems development. Unless the numerous applications of information technology inside a company are compatible with each other, many benefits may be lost.

Sears and the Consensus

By the early 1920s, however, the "buyer for the American farmer" concept had begun to lose its relevance to economic and social realities. With the coming of the automobile and good roads, rural America rapidly became less isolated, and the kinds of merchandise of interest to the farm family came more and more to be the kinds of merchandise of interest to city dwellers as well. In this process, radio advertising also played a significant role. There was no longer a separately definable rural market with its own unique characteristics and needs; that market, and the previously distinct urban market, were homogenizing into a general American mass market.

The then managements of Sears and Ward's alike failed to grasp the significance of these new developments. They knew that their companies had problems; sales were increasingly difficult to get and profits were slipping.

Sears found the answer first—fortuitously. By bringing General Wood into the company in November of 1924, Julius Rosenwald acquired much more than the higher order of managerial skills he was seeking. He acquired a man who was capable of introducing a new entrepreneurial concept as fully responsive to the needs and opportunities of the times as Rosenwald's own had been to the needs and opportunities of a quarter-century earlier.

One of Wood's interesting personal traits was a fascination with census data. This had its origins during his years on the Canal, where good reading material—or, for that matter, any reading material—was scarce. The story is told that once, while confined to the infirmary with a minor ailment, the only thing Wood could find to read was the *Statistical Abstract of the United States*, which he began perusing simply to pass the time but soon came to study avidly. Whether or not the infirmary story is apocryphal, it is clear that in his Canal experience he acquired a taste for and an understanding of demographic and economic statistics that stayed with him for the rest of his life. During his mature years, there was a widely circulated myth (probably grounded in fact) that the *Statistical Abstract* was his favorite bedside reading. In any event, his keen grasp of major trends in American life was evident in his business planning and even ordinary conversation.

Information technology can help in the strategy implementation process. Reporting systems can track progress toward milestones and success factors. By using information systems, companies can measure their activities more precisely and help motivate managers to implement strategies successfully.

The importance of the information revolution is not in dispute. The question is not whether information technology will have a significant impact on a company's competitive position; rather the question is when and how this impact will strike. Companies that anticipate the power of information technology will be in control of events. Companies that do not respond will be forced to accept changes that others initiate and will find themselves at a competitive disadvantage.

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1.12 Assignment Questions

1. What is information technology ?, Application of information technology,

2. Write a note uses of information technology, or Explain uses of Information Technology in the society ?

3. Write a note on impact of information technology on business.

4. Explain the history of development of information technology ?

5. Write a note on Evolution of IT Management ?

6. What are the components of Information technology System ?

7. Write a note on roll of information technology in today's business ?

8. Define Information Technology. Explain the functions of each components ?

9. Explain the business benefits of information technology ?

10. Explain how information technology is used for competitive advantage ?

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CHAPTER 2

Electronic Commerce

Syllabus : Infrastructure for e-commerce, communication networks for e-commerce, Payment systems in e-commerce, Impact of e-commerce on Business. E-commerce in Indian Business Context, Business Models for e-commerce.

2.1 Infrastructure for e-commerce ;

Every business requires an infrastructure to support its customers and operations. This includes facilities, equipment, and processes to support all the functional areas of our business. Choosing the correct infrastructure to match our business strategies enables our operations to run efficiently. Conversely, if an element of our infrastructure is out of sync with our strategies, we will likely feel the pain in every aspect of our business.
Here's an example. If our value proposition is to provide the highest level of customer service for premium products, then our infrastructure should include processes to deliver quick and responsive service, including live chat, self-service tools, and quick turnaround on questions and orders. When we address strategies for value propositions we ask a question - "What's the Value Proposition of our E-commerce Company?" If our value proposition is to provide the lowest prices every day, then our infrastructure should be focused being the low cost provider. We can accomplish this in various ways, but we need to ensure that our cost of goods sold and overhead expenses — which include infrastructure costs — are as low as possible.

Typically, e-commerce businesses try to maintain a high degree of flexibility in their infrastructure to keep fixed costs low and to be able to react quickly to market changes or competitive pressures. A key infrastructure decision is whether to outsource or manage operations in house.

Most e-commerce businesses are small, with fewer than 25 employees. If we look at all the functional areas of the business that must be managed on a daily basis, it will be hard to find and afford an in house staff with all the skills required be successful. When deciding on our business infrastructure and operations, be sure to evaluate what our core strengths are. Look to outsource part time activities or ones that require high levels of skill or specialization.

Here are seven important infrastructure decisions that e-commerce businesses face.

1. Marketing

Of all the infrastructure elements, marketing may be the most important. To succeed, our website must be found. Once visitors are on our site, we need to keep them there and compel them to buy from us. That's the job of our marketing team. Whether it's website design, social media, search marketing, merchandising, email, or other forms of advertising, it's all about marketing.

To effectively manage marketing activities in-house is very challenging. Most small e-commerce businesses outsource some element of marketing.

2. Facilities

A key competitive advantage that e-commerce businesses have over brick-and-mortar stores is the investment in their physical offices and warehouses. In many cases, you can host your business out of a home office and our basement or garage. If we drop ship or outsource fulfilment, we may be able to do that for a long period of time. Even when we grow to have many employees, we can set up our offices in class B or C space, as we have no need for a fancy store in the right location.

A word of advice is to keep our options flexible. Try to find an office park that has a wide variety of spaces in different sizes. We may be able to start in a smaller space and move up to a larger one without penalty, as our needs change.

3. Customer Service

There are many choices today for delivering high-quality customer service. We can manage those activities in-house or outsource to a third party. Basic customer service for sales and post-sales activities can be handled using e-mail, and by more extensive phone support. A customer-management system will make those activities easier, but for smaller companies it is not a requirement.

Live chat will impact our operations as someone needs to be available during specified hours of operation. Be sure to gauge the impact of that on our organization, if we decide to handle those activities in house.

4. Information Technology

Choosing the right e-commerce platform is one of the most important decisions we shall make in our business. Do we want to build and host our own system, outsource the development and then manage the system going forward, or use a hosted, software-as-a-service platform that is more turnkey and externally managed?

If we build and host our own system, we may need more cash upfront and skilled administrators and developers on our staff. By using a SaaS (Software as a Service) platform, we will not need to host or manage the system in-house, but we may still need web developers on staff. Choosing to outsource the development and hosting will reduce our staffing costs, but we will incur higher costs for any future enhancements or changes to our websites.

There are pros and cons to any approach. Just be sure to think through the impacts on both our staffing and our cash flow and bottom line before we move forward.

5. Fulfilment

Another key decision is whether we will manage our own inventory or outsource those activities to a fulfilment house or through drop shipping arrangements with our suppliers.

Managing our own inventory will provide us with a high level of control, but we will tie up our cash in inventory, warehouse space, and our own fulfilment staff. In some industries — like the jewellery supply industry that my previous business was in — managing our own inventory was the most logical choice. We had no alternative for drop shipping, and most items were purchased in bulk and were very small. We did not trust preparation and fulfilment to an outside service.

Select the best fulfilment option to meet our needs. Be sure to understand the costs involved and analyze the other options before moving forward.

6. Finance and Administration

As with other business operations, we will need to decide if we want to manage our finance and administration activities in-house, outsource, or a hybrid of the two. If our e-commerce platform is tightly integrated to our accounting system, we may have very little need for an in-house bookkeeper. If we use separate systems for our website, order management and accounting, we may need more help for data entry and making sure that the information is properly managed.

Many ecommerce companies use outside services for vendor payments, payroll, and other basic accounting activities. They decide to focus on the sales, marketing, and customer service. This allows them to maintain a focus on growing their businesses, instead of paying an internal accountant — or doing that work ourself as the business owner.

On the administration side, we need a leadership team and provide direction to them. Good communication is important, whether we have 3 or 100 employees. Whether we choose to be more authoritative or democratic in our management style is up to us. But choose a style and stay consistent. Be sure that everyone understands their roles, as well as the overall business strategies. We may need to adjust our approach as our business evolves.

7. Human Resources

Many small-business owners avoid the human resources function. Recruiting, setting up compensation, maintaining compliance and other HR activities are specialized and time consuming. We may choose to bring the resources in-house to manage those activities, but also evaluate outsourcing them. There are many individuals and agencies well equipped to take on our HR activities.

When planning any part of our company's infrastructure, reflect on our target market and the value proposition we have defined. Make sure that each element of our infrastructure supports our value proposition. Be careful not to over commit either our human resources or financial capital in one area. It is very easy to extend our self financially on things like rent or hiring people, only to find out that other forces impact our growth or profits.

Requirements for a successful e-commerce infrastructure in any Country are divided into 3 categories: legal, software and hardware perspectives.

1. Legal perspectives; E-commerce laws and regulations:
In any countries, E-commerce refers to the carrying out of business using electronic means. This generally means over the internet. However, from a legal perspective, the term is often used to include remote selling by telephone and email, as well as online. It is also frequently used to refer to legal issues generally relating to the internet. There are several types of contracts which are required to exist when a business becomes involved in e-commerce transactions. As a result, laws should regulate each section of those contracts to ensure that online customers transactions will go smooth and that a judge can have clear regulations to rule with once an online dispute occurs. These include:
1. Website development, content and hosting agreements. When a business wishes to set up a website, it needs to ensure that the design and content of the website do not infringe or violate any third party rights.

2. Internet service provider agreements. Companies who are responsible for developing the ecommerce website can be the same company who provides the hosting service or they can be separate. Similar to the web design companies, web hosting companies should have clear responsibilities regarding their duties and responsibilities.
3. Website usage and privacy policies This may include the privacy of both owners and customers. Web site design and hosting companies are not supposed to expose their clients' information to their rivals.
4. Website and telephone sales terms and conditions In some countries, online or telephone sales are governed by the Consumer Protection.

2. Software perspective ;
How to build an infrastructure for a trusted e-commerce websites: This section will focus on the software, websites requirements to implement e-services or business. In most e-commerce infrastructures, to secure access to e-commerce websites, we should include two basic components in order to allow users to securely perform online transactions:
1. Digital certificates for web servers, providing guarantees of authentication, privacy and data integrity through encryption. Digital certificates can be issued by mediators called Certificate Authorities (CAs) to authenticate the seller to the buyer and vice versa.
2. Secure e-payment system and management, to allow e-commerce sites to secure and automatically accept, manage and process online payments. This can be usually organized with owners' banks. Websites will be securely connected to the buyers' bank accounts. Once an online transaction is secured executed, the money should be directly transferred from the seller to the buyer account. This process should be performed in a fast, reliable and secure way. Those 3 elements (i.e. reliability, performance and security) are vital to the success of any ecommerce website.

3. Network and hardware perspective; Internet readiness ;
A closely related requirement to the software and websites' requirements is the existence of a network or hardware infrastructure. This may include the routers, fiber optics or wireless communication channels, firewalls, etc. Since both (software and hardware perspectives) may include hardware and software elements, we will distinguish them through the location. This perspective represents any requirements outside the user machine.

4. Extra requirements for a successful e-commerce business.
Another major player in the e-commerce world is the sipping companies. In order to compete with normal shops and businesses, shipping should be also secure, reliable and quick. Laws should regulate the terms for shipping, such as costs, types, and who is in charge in case of products defects. Products defects may due to buyers or shipping issues.

E-COMMERCE INFRASTRUCTURE IN INDIA

Ecommerce encompasses all business transactions occurred over the web. It can range from financial services, travel,, entertainment to groceries etc. The Business to consumer segment for online shopping and ticketing has gained everybody's attention in the last 4-5 years and thus remains the fastest growing segment.

"Ecommerce in India is growing quickly" was a key takeaway according to a report published by Forrester Research for ASSOCHAM's 2nd National Conference on ecommerce 2012. Though India's ecommerce market is smaller than some other Asian markets, as forecasted by Forrester, it is still growing at the fastest pace and is expected to grow at 57% CAGR by 2012-16 and will be valued at around $US34 bn. 2011-12 was a milestone with

investments coming from overseas markets into Indian ecommerce arena. However India lags in terms of IT, Financial, logistics & supply chain, Investment policy issues.

Following are the key considerations to address the e-commerce Infrastructure issues.

1) **Logistics & Supply Chain –** As per Avnish Bajaj Head of Matrix Partners, a VC firm, in India stocking inventory for 60-90 days requires a working capital of $40-50 mn of the target revenue is $200mn. Moreover it still takes around 3-7 days on an average to source the product and deliver it. A welcoming change in infrastructure is also seen as several online retailers such as Myntra.com are investing heavily into warehouses and logistics to improve their revenue from non-metropolitan India, which has already crossed 50% mark. Most of the e-retailers still depend upon highly fragmented courier market that only adds to delay. Investments must go into their "own" or "self" delivery system as there is not a single ecommerce solutions provider that provides end-to-end outsourcing solutions. This Infrastructure, if developed fully, will also be a source of revenue from smaller ecommerce players.

2) **IT Infrastructure –** ecommerce needs Internet. India's internet penetration level is around 11.4% as per a report released by IMAI in 2012. There would be 175 mn people connected to internet by 2015 as per the report which would be around 14.22%. This still is a small number. US and China today have 77.86% and 40.01% penetration rate. Thus the Broadband Infrastructure needs a huge push. It is still expensive to browse the net in India and thus people from tier-2 and tier-3 cities find it difficult to get the Broadband.

The infrastructure in terms of payment gateways also demands attention, as the failure rates of payment gateways are as high as 35%. Firms such as Symantec are now partnering with e-retailers to provide them with better secured payment solutions, but it is still at nascent stage. The payment systems are still very costly as online payment gateways cost almost 4% to the ecommerce players.

3) **Financial Infrastructure –** The whole Financial Infrastructure remains a huge problem. It includes the funding for the budding and established e-commerce players along with banking services for masses. According to RBI only 2% of population has Credit card and only 13% has debit card. Most of the tier-2 and tier-3 cities are still "unbanked". Therefore COD or cash on Demand remains the only option to gain access to this budding market. According to our conversation with Mr. Santhosh Jose, CEO, Intentree ecommerce testing Services**,** getting this cash from their channel partners has now come up as a new area of concern as there are disputes.

In 2011 alone, around $US 177mn were invested into Indian ecommerce by various venture capitalists. Out of nearly 400 e-commerce players in India, only about 12% have received VC funding to the tune of USD 700 mn by 52 VCs in the last 3 years. This is a positive sign, but other players have to depend upon Bank loans that have high interest rates or in many cases Banks are reluctant to invest on account of untested business models.

4) **Other reasons** – The state specific Octroi, VAT and entry tax further reduce profits. The foreign players are still not allowed to invest in B2C corner whereas in B2B arena, 100% FDI is allowed for them. The web optimization services is at a very rudimentary stage and clear cut goals/strategy is missing due to technical and knowledge constraints.

Driving Forces behind e-commerce;

The various driving forces behind e-commerce can be listed as below:

1. **Global Customers.** Customers are people who may travel anywhere or companies with global operations. Global IT can help provide fast, convenient service.

2. **Global Products.** Products are the same throughout the world or are assembled by subsidiaries throughout the world. Global IT can help manage worldwide marketing and quality control.
3. **Global Operations.** Parts of a production or assembly process are assigned to subsidiaries based on changing economic or other conditions. Only global IT can support such geographic flexibilities.
4. **Global Resources.** The use and cost of common equipment, facilities, and people are shared by subsidiaries of a global company. Global IT can keep track of such shared resources.
5. **Global Collaborations.** The knowledge and expertise of colleagues in a global company can be quickly accessed, shared, and organized to support individual or group efforts. Only global IT can support such enterprise collaboration.

2.2 Communication networks for e-commerce ;

What technologies are necessary for e-commerce? The short answer is that most information technologies and Internet technologies are involved in e-commerce systems, viz.–
• The Internet, intranets, and extranets are the network infrastructure or foundation of e-commerce.
• Customers must be provided with a range of secure information, marketing, transaction, processing, and payment services.
• Trading and business partners rely on Internet and extranets to exchange information and accomplish secure transactions; including electronic data interchange (EDI) and other supply chain and financial systems and databases.
• Company employees depend on a variety of Internet and intranet resources to communicate and collaborate in support of their EC work activities.
• Information system professionals and end users can use a variety of software tools to develop and manage the content and operations of the websites and other EC resources of a company.

Architectural framework of e-commerce means the synthesizing of various existing resources like DBMS, data repository, computer languages, software agent-based transactions, monitors or communication protocols to facilitate the integration of data and software for better applications.
The architectural framework for e-commerce consists of six layers of functionality or services as follows:
1. Application services.
2. Brokerage services, data or transaction management.
3. Interface and support layers.
4. Secure messaging, security and electronic document interchange.
5. Middleware and structured document interchange, and
6. Network infrastructure and the basic communication services.
1. **Applications:** In the application layer services of e-commerce, it is decided that what type of e-commerce application is going to be implemented. There are three types of distinguished e-commerce applications i.e., consumer to business application, business-to-business application and intra-organizational application.
2. **Information Brokerage and Management Layer:** This layer is rapidly becoming necessary in dealing with the voluminous amounts of information on the networks. This layer works as an intermediary who provides service integration between customers and information providers, given some constraint such as low price, fast services or profit

maximization for a client. For example, a person wants to go to USA from India. The person checks the sites of various airlines for the low-price ticket with the best available service. For this he must know the URLs of all the sites. Secondly, to search the services and the best prices, he also has to feed the details of the journey again and again on different sites. If there is a site that can work as information broker and can arrange the ticket as per the need of the person, it will save the lot of time and efforts of the person. This is just one example of how information brokerages can add value.

Another aspect of the brokerage function is the support for data management and traditional transaction services. Brokerages may provide tools to accomplish more sophisticated, time-delayed updates or future-compensating transactions.

3. **Interface and Support Services:** The third layer of the architectural framework is interface layer. This layer provides interface for e-commerce applications. Interactive catalogs and directory support services are the examples of this layer.

Interactive catalogs are the customized interface to customer applications such as home shopping. Interactive catalogs are very similar to the paper-based catalog. The only difference between the interactive catalog and paper-based catalog is that the first one has the additional features such as use of graphics and video to make the advertising more attractive. Directory services have the functions necessary for information search and access. The directories attempt to organize the enormous amount of information and transactions generated to facilitate e-commerce.

The main difference between the interactive catalogs and directory services is that the interactive catalogs deal with people while directory support services interact directly with software applications.

4. **Secure Messaging Layer:** In any business, electronic messaging is an important issue. The commonly used messaging systems like phone, fax and courier services have certain problems like in the case of phone if the phone line is dead or somehow the number is wrong, you are not able to deliver the urgent messages. In the case of courier service, if you want to deliver the messages instantly, it is not possible as it will take some time depending on the distance between the source and destination places. The solution for such type of problems is electronic messaging services like e-mail, enhanced fax and EDI.

The electronic messaging has changed the way the business operates. The major advantage of the electronic messaging is the ability to access the right information at the right time across diverse work groups. The main constraints of the electronic messaging are security, privacy, and confidentiality through data encryption and authentication techniques.

5. Middleware services: The enormous growth of networks, client server technology and all other forms of communicating between/among unlike platforms is the reason for the invention of middleware services. The middleware services are used to integrate the diversified software programs and make them talk to one another.

6. Network Infrastructure: We know that the effective and efficient linkage between the customer and the supplier is a precondition for e-commerce. For this a network infrastructure is required. The early models for networked computers were the local and long distance telephone companies. The telephone company lines were used for the connection among the computers. As soon as the computer connection was established, the data travelled along that single path. Telephone company switching equipment (both mechanical and computerized) selected specific telephone lines, or circuits, that were connected to create the single path between the caller and the receiver. This centrally-controlled, single connection model is known as **circuit switching.**

However, circuit switching does not act well for sending data across a large network. In order to implement circuit switching, point-to-point connections for each pair of senders/receivers has to be established which is both expensive and difficult to manage. There is one more

technique that is used by the Internet. It is called a *packet switching network*. In a packet switching network, files and messages are broken down into packets that are labeled electronically with codes that indicate both their origin and destination.
Packets travel from computer to computer along the network until they reach their destination. The destination computer collects the packets and reassembles the original data from the pieces in each packet. In packet switching, as the packet passes through various computers on its line the computers determine the best way to move the packet forward to its destination.

TCP/IP INTERNET PROTOCOL FOR NETWORK INFRASTRUCTURE
A protocol is a collection of rules for formatting, ordering, and error-checking data sent across a network. Protocols determine how the sending device indicates that it has finished sending a message and how the receiving device will indicate that it has received (or not received) the message.
The set of protocols that underlie the basic operation of the Internet are Transmission Control Protocols (TCP) and the Internet Protocol (IP). The TCP/IP is a two-layered program that computers use to make and break communication in a network. TCP controls assembly of the message into smaller packets before it is transmitted over the Internet. It also controls the reassembly of packets at the destination sites. The IP protocol consists of rules for routing individual data packets from their source to their destination. IP ensures that each data packet is labelled with the correct destination address.

Internet as communication Network Infrastructure :
The Internet, a global system of connected computers, was once available only to the government, academic, and research communities. Now the greatly publicized information superhighway is accessible to anyone with time, interest, and curiosity .Information on the internet and opportunities to use it are growing at a phenomenal rate. The last decade has witnessed an explosion of internet activity. Many of these users are in Corporation, Universities, and Government Institution. But the number of users connecting from home also continues to grow dramatically.

Development of Internet
In 1969, the American defense Department wanted to connect all the computers in the department offices and military research institutions. When it was connected, the network was called ARPANET (Advanced Research Project Agency network). It also included many universities doing military funded research. Later the span of this network expanded covering the whole of USA. As it was very successful, various research institution and universities wanted to get connect themselves with the ARPANET.
Hence, the defense wanted to preserve its privacy and thereby, divided the network in to two divisions, viz, ARPANET ad MILNET (Military Network). These two divisions are connected with a technology called network protocol. Protocol means, a set of communication rules. In the network protocol means a set of rules to contact a person on the network. Hence we need a protocol to connect a person on the other networks. The protocol in- between the networks is called internet protocols. Thus, internet protocol is a technical switching scheme, which enables a node of network to communicate with a node of another network. To control and monitor the network communications, the department of defense redesigned the existing protocol and protocols Transmission Control protocol/ Internet protocol (TCP\IP) were developed.

At this stage, the ―American National Foundation ―developed another network of computers in USA. In this new network all universities and research institution were allowed to join in to and provide their contribution in the development of super computer.
In early 1990, many institution turn to‖ American National Foundation`s ―network and as a result ARPANET was shutdown. During 1994 many privet organization introduced global networks. They designed protocols and communicate between the nodes of different networks. This network is called internet.

Definition
"INTERNET" refers to the global information system that-
i) Is logically linked together by a globally unique address space based on the Internet protocol (IP) or its subsequent extension /follow –on:
ii) Is able to support communications using the transmission Control protocol / Internet protocol (TCP/IP) suite its subsequent extension /follow –ones, and/ or other IP compatible protocols; and
iii) Provides, uses or make accessible either publicly or privately .high level service layered on the communication and related infrastructure described therein.
Today the internet is a public, cooperative, and self-sustaining facility accessible to thousand of millions of people worldwide. Physically, the Internet uses a portion of the total resources of the currently existing public telecommunication networks. Technically, what distinguishes the internet is its use of asset of protocols called (TCP/IP) for Transmission Control protocol / Internet protocol.

HOW INFORMATION TRAVELS ACROSS THE INTERNET
The internet comprises network that are attached to one another via pathway that facilitate the exchange of information, data and files. Being connected to the internet means having access to these pathway. The computer sends information over this pathway to any other computer connected to the Internet. The information or data that is being sent over the Internet must be broken up in to small packets. Each of these packets is given a header that contains a variety of information, such as the order in which the packets should be assembled with other related packets, the address of the destination, etc.
So when one sends information across the Internet, the information is first broken down into packets these are then delivered to the proper destinations. Where is they are reassembled into their original form so that receiving computer can use them. This job is done by the two most important communication protocols on the Internet – the **Transmission Control Protocol** (**TCP)** and **Internet protocol (IP)**. They are frequently referred to as *TCP/IP*. TCP breaks and reassembles the packets, whereas, IP is responsible for ensuring the packets are sent to the right destination.
INTERNET ADDRESS
To do just about anything on the Internet one need to understand internet address. The *internet protocol (IP)* uses internet address information to deliver mail and other data from computer to computer. Every IP address on the internet is actually a series of four numbers separated by dots, such as 163.52.128.72. However, it would be difficult for one to remember such numeric addresses when one want to access something on the net .And also numeric IP addresses something change. So to overcome this problem Sun Microsystems developed **Domain Name Server (DNS).** The DNS establishes a hierarchy of domains, which are group of computers on the internet. The DNS give each computer on the Internet and Internet address, or domain name, using letter and words instead of numbers.
DNS address has two parts: an individual name, followed by a domain (a name for a computer connected to the internet) that generally identifies the type of institution that uses

the address such as .com for commercial business or *.edu* for school, college and universities. For example, DNS address of Microsoft is **microsoft.com.**

DNS address and numeric IP address identify individual computers, but a single computer might have separate users, each of whom must have an account. When a person sends a message to another person rather than a computer, then the recipient`s user name must be included in the address. The standard format is the user name first, separated from the DNS address (Which identifies the specific computer where the person has an Internet e-mail account) by a symbol (@). For example, a person named xyz would have e-mail address has xyz@widgets.com.

CLIENTS AND SERVERS

The basic architecture of all Internet connection is based on client –server relationship. A client application on user`s computer requests information from a server already connected to the Internet. A server is a powerful computer, generally containing a large hard disk, which acts as a shared storage resource. In addition to containing stored files, a server may also allow access to program and data from other computer.

To make this relationship work there are major components:

 Telecommunication connection- This connection is the physical electrical connection between your computer and the sever computer. This connection is used to pass requests and data between your computer and the server.

 Server-The server in an Internet connection is usually a service provider or Internet access provider. The server provider is the company that owns and operates the particular network to which you are going to connect your computer.

 Client –The client in an internet connection is one or more software programs that run on your computer and interact directly with the server provider or route their date request to and from the Internet through the service provider`s network.

INTERNET

An enormous amount of information and entertainment is available on the Internet. To access this information various Internet tools are provided. These tools include:

 Information Retrieval Tools (FTP and Gopher)

 Communication Tools (E-mail, telnet, Usenet)

 Multimedia information Search Tools (WAIS, Archie, Veronica)

INFORMATION RETRIEVAL TOOLS

FTP

FTP or File transfer protocol is the Internet tool used to copy files from one computer to another. When the user has accounts on more than one computer. FTP can be used to transfer data or programs between them. It is basically a command that activates the client – server relationship. The user sends the request for a particular file to the server and server responds back by sending the requested file if the requested file is that found on that server. Another popular way to retrieve file is through an anonymous file server. In this case, the user logs on to the server using the special user ID and the password. This server is called anonymous as it allows anyone to make copies of their files. Using FTP is simple. The only difficult part locating a file that one wants to download.

Gopher

The second type of information retrieval tool on the Internet is Gopher a menu based interface that provides access to information residing on special server, called Gopher server. Although, Gopher performs primarily the same tasks as FTP command, its interface is more user-friendly and it provides additional function, such as links to other Internet service. By selecting an item from the Gopher menu, users can move retrieve, or display files from

remote sites .The menu also allows user to move from one Gopher sit to another, where each site provides different information.

COMMUNICATION TOOLS

E-mail

E-mail or Electronic mail refer to exchanging message or files electronically. Anyone with an e-mail account can send message to other users of the Internet. E-mail systems have two basic part: *user agents, message transfer agent.* User agent allows people to read and send e-mail and message transfer agent move the message from the source to the destination. The user agents are generally local program that provide a command based, menu –based or graphical method for interacting with the e-mail system. The message transfer agents run in the background and move e-mail though the system. E-mail is not a live connection between the originator of the message and its recipient. There is always a delay between the time a massage is send and the time it arrives. This delay can be of few second and more.

When one sends a message, your computer passes it to post office server. Which identifies the destination address and passes it though the Internet to a mail server, where a message is stored in a mailbox unit the recipient opens his/her mailbox. E-mail system support five basic function:

- Composition: Process of creating message and answers.
- Transfer: Moving message from the original to the recipient.
- Reporting: Telling the originator what happened to the message.
- Displaying: Incoming message are being displayed for the people to read.
- Disposition: Concerns with what the recipient does with the message after receiving it. Possibilities include deleting it after reading or before reading, saving it and so on.

In addition on these basic service ,most e-mail system provide a large variety of advanced features such as mailboxes (to store incoming mails),automatic notification of undelivered e-mail, facility to make carbon copies (cc) and blind carbon copies (bcc)of mail, etc.

Telnet

Telnet is a command that connects the user to a remote machine may be located anywhere on the internet. In other word it is tool for using one computer to control a second computer. Using Telnet one can send command that run program and open text or data files on same computer The telnet program is basically a transparent window between your one computer and a computer that you are logging onto.

Usenet

The Usenet is a network that provides users with discussion groups forums. A user posts an article to a chose newsgroup on the Usenet, where each newsgroup id devoted to a particular topic such as politics, environment, surfing and so one. The article is routed only to those sites that have expressed an interest in receiving information on the topic .May find the Usenet to be helpful for gathering information on a variety of topics. Another popular application of Usenet is downloading new or upgraded software from vendors and obtaining quotes for products and services.

MULTIMEDIA INFORMATION TOOLS

World Wide Web (WWW)

World Wide Web or WWW is one of the newest and most popular hypertext –based Internet tools. It allows users to access and display document and graphics stored on any server on the Internet. Its capability to provide an enormous wealth of information on almost every conceivable subject in a graphical colorful way has led to its popularity. WWW is also based on client –server model. Here the client is the browser that runs on your local system. Web browser or browser is software that is used to request resources from the Internet. Some of the popular web browsers are Microsoft Internet Explorer, Netscape Navigator, Mosaic etc.

Server is a program that runs somewhere on the Internet and is used to serve the resources that have been made available on the server. The main components of WWW are :

 URL (Uniform Resource Locator): It is a way of specifying the location of web page on the net. URLs look like:

Type://address/path

Where type specifics the type of server in which the file is located address of the server and path is the location within the file structure of the server. For example, http://www.microsoft.com.

 HTTP (Hyper Text Transfer Protocol): The internal structure of the WWW is built on the set of rules called HTTP. It establishes the communication path between a web server and a client. The communication takes place in for steps: First the *connection* is established between the client and the server. Then the client sends some *request* like requesting some particular file. The server then *responds* by sending a message that the file is being found. If the file is not found on the server then an error message indicating that file is not found, is sent back and the connection is closed.

 HTML (Hyper Text MARKUP Language): HTML is the language in which WWW documents are written in, it allows users to produce web pages that included text, graphics, and like to other pages.

Unlink Gopher which organize information on the Internet into logical menu, the WWW does not provide a basic structure for locating resources. To overcome this, an assortment of directories and search tools is available online.

INFORMATION SEARCH TOOLS

Archie

Archie is a search tool designed specifically to locate files on anonymous FTP servers. It creates a central index of all the files available on anonymous FTP sites and creates a central database that users can access to locate information. User who have ARCHIE software can access this database The only disadvantage is that the use must know at least part of the filename in order to be able to search for the file. When the desired file is located, the server identifies the file`s address and the user can use the FTP command to access and retrieve the file. Though Archie is a very tool for locating files, not all anonymous FTP sites are included in the Archie database

Veronica

Veronica is a search tool specifically designed to locate all files on Gopher sites and it is listed under *Other Gopher and Information* Sever on the Gopher menu. Users who have access to a Gopher server and a veronica server can access the database. One of the biggest advantages of Veronica over Archie is that the user doesn`t have to know the filename.

WAIS

WAIS (Wide area Information Server) is a search system that accesses servers all over the world to locate requested files. The WAIS database has an index of keyword that helps users to locate files. When given the keyword, WAIS returns the address where the files are located The user can them use one of the other services discussed above to download the files. If a particular file is not found on a given WAIS server, the server will automatically direct the query to other WAIS server on the Internet.

INTERNET PROTOCOL

A communication protocol allows different kind of computer using different operating system to communicate with one another. It is high essential because Internet is not made up

of any single type of computer system. Instead there are great diversities found in the computer used on the internet. The user connected on any network on the Internet can communicate with others or software. Locate on any other network connected to the internet using common set of protocols. An Internet protocol is a set of standards or rules for exchanging information between computer systems in a network. The most commonly used protocols are:

1. Transmission Control Protocol/ Internet Protocol (TCP/IP)
2. File Transfer Protocol (FTP)
3. Hyper Text transfer Protocol (HTTP)
4. Telnet
5. Gopher
6. Wide Area Information Service (WAIS)

1. Transmission Control Protocol/ Internet Protocol (TCP/IP)

TCP/IP/ is actually a collection of protocols that govern the way travel from one computer to another computer across networks. A user connected on any network on the Internet can communicate with people or software locates on any other network connected to the internet using this common set of protocols, the TCP/IP. Thus any computer that speaks the language TCP/IP can talk to any internet machine. On the Internet, the protocol that permits two internet connected computers to establish a reliable connection is called TCP/IP.TCP ensures reliable data delivery. The computer that sends the data continues to do so until it receives a confirmation from the receiving computer that the data has been received intact. Simply this is the set of standards (Protocols) for data transmission and error correction that allow the transfer of data from one computer to another computer over Internet.

2 File Transfer Protocol (FTP)

FTP Is the protocol set of rules which enable files to be transferred between computers. It is a powerful tool which allows files to be transferred from one computer to another computer.

FTP work on the client / server principle. A client program enables the user to interact with a server in order to access information and service on the server computer. Files that can be transferred are store on server computer. A client can access these files only though a client application program helps a client computer to locate the required file to be transferred and start the process of transfer.

To access other computer, user has to normally supply a login name and password and after that he can access the computer file dictionary system and can upload (send)and download (receive) files .Anonymous FTP facilities are also available which allows the user to access any information without giving a password . Sometime an anonymous FTP site may ask for your electronic mail address as password. May web browsers can function as FTP client to download files from anonymous file archives.

3. Hyper Text transfer Protocol (HTTP)

HTTP is can internet standard or set of rules that allows the exchange of information on the World Wide Web (WWW). Hyper text is an method of preparing and publishing text ideally suited to the computer, in which users can select their own text .To prepare hyper text, the whole material should be divided into small segment such as single pages of text. These small segments are called nodes. Then hyper links (also called anchors) are embedded in the text. When the user clicks on a hyper link, the hypertext software display a different node. The process of navigating among the nodes linked in this way is called `browsing`. A collection of nodes that are interconnected by hyper links is called a web The World Wide Web (WWW) is a hyper text system on global scale. Hyper link enable the user to access document that have been linked with other document. Web document contain highlighted

words/ phrases, and a click of the mouse on that spot will transport the user to another site. A hyper text is prepared using Hyper Text Markup Language (HTML). The HTML codes are used to create links.

HTML is also based on the client /server principle .It allows the client computer to contact with sever computer and make a request. The server accepts the connection requested by the client and sends back a response. An HTTP request identifies the information or text that the client is needed and it tell the server to supply the text. In short HTTP allows the user to jump from one to another according to his requirements.

4. Telnet

Telnet is an internet protocol of set of rules that enable internet users to connect to another computer linked to the internet .This process is also called as remote login. The user`s computer is referred to as the local computer and the computer being connected to is referred to as remote or host computer. One access is established between local and host computer. Local computer can give command so that they are executed in the host computer. The user`s computer clearly display the process undertaken by the remote computer during the telnet session. After getting connection to a remote computer, instruction or menus appear. Sometimes the user has to give his own user name or password .However, much information such as library catalogues are available through telnet even without giving password.

5. Gopher

Gopher is a protocol linked to the internet to search, retrieve and display documents from remote sites on the internet. It is a menu based program that helps the user to find file program, definition and other topics that the user specifies. Gopher protocol allows the user to free from the troubles of specifying the details of host, directory and file name. Instead, the user can browse through menus and press Enter when he finds some interesting topic.

The user usually sees another menu, with more option, until finally the selects an option that displays information. The user can then read the information or save it on disk after retrieving it with anonymous FTP .When information is displayed the user may feel as if all the information available to Gopher resides on their local computer, when in fact Gopher is interacting with a large number of independently Owned computer around the world.

6. Wais

WAIS stands for wide Area Information service .WAIS is a internet search tool and describes as a protocol for computer to computer information retrieval. It is a program that permits the user to search information worldwide based on a service of key words WAIS has the capability of simultaneously searching in more than one database.

INTERNET ADDRESSING

Internet address is used to identify people computer and information related with internet.

IP Address

IP address is required to communicate with other computers in the net. One must known the address of the computer to transfer file, send e-mail messages etc.

An IP (Internet Protocol) address is an identifier for a particular computer on a particular network. A32-bit binary number that uniquely and precisely identifies the location of a particular computer on the Internet. Every computer that is directly connected to the Internet must have an IP address. An IP address consists of four sections separate by period .Each section contains a number ranging from 0 to 255. Example, 128.43.7.12. The address has the following common characteristic.

1. IP address is unique number
2. No two computers can have the same IP number.
3. IP addresses are also global and standardized.

Domain Name

A domain name is a name used to identify and locate computers connected to the internet. No two organizations can have the same domain name.
A domain name always contains two or more components separated by periods called `dots`. Some example of domain name are Microsoft .com, Indiacapital.com, Kerala.com pugmark .org, Mid.edu, etc,. The last portion of the domain name is the top level domain name and describes the type of organization holding that name. The important types of top level domain names are the following.
.com -Commercial Institutions
.edu -Education Institutions
.org - Miscellaneous organization not included above

Country codes – A two letter abbreviation for a particular country. For example .in for India .uk for United Kingdom. .fr for France, etc.
Each domain name is an English Version of an IP address consists of four selection separated by periods. The Internet uses the numeric IP address to send data. A user is using a domain name, but a network is connecting to the web server with IP address related with that domain name. The domain name like kerala.com is easy to remember than IP address like 204-28.12.5. Domain name and corresponding IP addresses must be unique. Domain name system server are software that translates domain names to IP addresses.

FACILITIES AVAILABLE ON THE INTERNET
Internet provides several software tools to take maximum benefits from the net. It is possible to communicate with people all around the world. Information on various subjects can be accessed very easily. A user can navigate from one topic to another and download any information required by him. Friendship can be built with people of related interest from around the world. Further business can be done and product can be advertised on the Internet. The following are some of the services that can be exploited by an internet user.
1. E-mail
2. Internet Relay (IRC)
3. World Wide Web
4. FTP
5. Telnet

World Wide Web (WWW) :
World Wide Web or simply web is one of the main reasons for the growing popularity of the Internet. Information can be accessed on the internet through World Wide Web. Web is a system of organizing, linking and providing access to related internet files, resources and services. Files can be access to related internet files, resources and services. Files can be accessed at the click of the mouse. This is mainly due to the arrangement of file based a hyper-text or hyper media approach. The web is an internet based navigational system, an information distribution and management system with vast potential of trade and commerce.
The World Wide Web is the graphical internet service that provides a network of interactive document and the software to access them. It is an internet based navigational system based on document called pages that combine text, picture, forms, sound, animation and hyper links. In simple words, the web is a collection of distributed document referred to as pages located on computers or servers all over the world. Servers store hyper text mark-up language (HTML) files and respond to requests. Users can access documents through the use of a browser.

Internet provides several facilities for its maximum exploitation. File transfer, electronic mail and news group are some of the important facilities provided by internet. However World Wide Web (WWW) is perhaps one of the most popular and fastest growing facilities in the history of networking. Experts predict that use of web going to be so widespread like the use of telephone in the near future. It has become not only an integral part of internet but has become the exciting aspect of the internet.

The ever increasing use of web has accelerated the growth of the internet. Web is an easy to use, point and click graphical interface. It is also interactive because it is easy to use and combines graphics, text, sound, and animation into an effective communication medium. It also enables the creation, manipulation, organization and retrieval of documents that contain audio and video clips, graphical images and formatted text. Web servers, also called web sites are equivalent of a book and web ‘page` are the specific pages of the book. A web server is essentially a collection of multimedia pages. Use start their exploration of a web site at the `home page` which often server as a table of contents. A home page is accessed by entering the domain name of a site. Then user can `surf` from one page to another pointing and clicking on the hyper link in text or graphics.

Originally, web was developed to share document between distant scientists. In 1989, Tim Berners Lee at CERN (European Laboratory for particle physics) an engineer, began the web project. As soon as the basic outline of the web was complete, CERN To made all the software source code publicly available. Many programmers in USA participated in the initial development of the web. Later in1993, programmers developed `Mosaic` the first browser with graphical user interface. Use the web facilities, user needs special software called a web browser. It acts as an interface between the user and the internet. It sends request for data to other computers and then formats them for the users screen. Documents are formatted using hyper text Mark-up Language (HTML).

2.3 Payment systems in e-commerce :

E-Commerce or Electronics Commerce sites use electronic payment where electronic payment refers to paperless monetary transactions. Electronic payment has revolutionized the business processing by reducing paper work, transaction costs, labour cost. Being user friendly and less time consuming than manual processing, helps business organization to expand its market reach / expansion. Some of the modes of electronic payments are following.

- Credit Card
- Debit Card
- Smart Card
- E-Money
- Electronic Fund Transfer (EFT)

[1] Credit Card

Payment using credit card is one of most common mode of electronic payment. Credit card is small plastic card with a unique number attached with an account. It has also a magnetic strip embedded in it which is used to read credit card via card readers. When a customer purchases a product via credit card, credit card issuer bank pays on behalf of the customer and customer has a certain time period after which he/she can pay the credit card bill. It is usually credit card monthly payment cycle. Following are the actors in the credit card system.

- The card holder - Customer

- The merchant - seller of product who can accept credit card payments.
- The card issuer bank - card holder's bank
- The acquirer bank - the merchant's bank
- The card brand - for example , visa or mastercard.

Credit card payment process

Step	Description
Step 1	Bank issues and activates a credit card to customer on his/her request.
Step 2	Customer presents credit card information to merchant site or to merchant from whom he/she want to purchase a product/service.
Step 3	Merchant validates customer's identity by asking for approval from card brand company.
Step 4	Card brand company authenticates the credit card and paid the transaction by credit. Merchant keeps the sales slip.
Step 5	Merchant submits the sales slip to acquirer banks and gets the service chargers paid to him/her.
Step 6	Acquirer bank requests the card brand company to clear the credit amount and gets the payment.
Step 6	Now card brand company asks to clear amount from the issuer bank and amount gets transferred to card brand company.

[2] Debit Card

Debit card, like credit card is a small plastic card with a unique number mapped with the bank account number. It is required to have a bank account before getting a debit card from the bank. The major difference between debit card and credit card is that in case of payment through debit card, amount gets deducted from card's bank account immediately and there should be sufficient balance in bank account for the transaction to get completed. Whereas in case of credit card there is no such compulsion.

Debit cards free customer to carry cash, cheques and even merchants accepts debit card more readily. Having restriction on amount being in bank account also helps customer to keep a check on his/her spending.

[3] Smart Card

Smart card is again similar to credit card and debit card in appearance but it has a small microprocessor chip embedded in it. It has the capacity to store customer work

related/personal information. Smart card is also used to store money which is reduced as per usage.

Smart card can be accessed only using a PIN of customer. Smart cards are secure as they stores information in encrypted format and are less expensive/provides faster processing. Mondex and Visa Cash cards are examples of smart cards.

[4] E-Money

E-Money transactions refers to situation where payment is done over the network and amount gets transferred from one financial body to another financial body without any involvement of a middleman. E-money transactions are faster, convenient and saves a lot of time.

Online payments done via credit card, debit card or smart card are examples of e-money transactions. Another popular example is e-cash. In case of e-cash, both customer and merchant both have to sign up with the bank or company issuing e-cash.

[5] Digital Wallet (Electronic wallet):-

Electronic wallets being very useful for frequent online shoppers are commercially available for pocket, palm-sized, handheld, and desktop PCs. They offer a secure, convenient, and portable tool for online shopping. They store personal and financial information such as credit cards, passwords, PINs, and much more. To facilitate the credit-card order process, many companies are introducing electronic wallet services. E-wallets allow you to keep track of your billing and shipping information so that it can be entered with one click at participating merchants' sites. E-wallets can also store e checks, e-cash and your credit-card information for multiple cards.

[6] Electronic Cheque:-

Electronic cheque is messages that contain all the information that is found on an ordinary Cheque but it uses digital signature for signing and endorsing and has digital certificate to authenticate bank account. There are many websites that accept Electronic Cheque. An electronic payment process that resembles the function of paper cheques but offers great security and more feature. Electronic checks are typically used in orders processed online and are governed by the same laws that apply to paper checks. Electronic checks offer protective measures such as authentification and digital signatures to safeguard digital transactions.

[7] Electronic cash:-

Similar to regular cash, e-cash enables transactions between customers without the need for banks or other third parties. When used, e-cash is transferred directly and immediately to the participating merchants and vending machines. Electronic cashes a secure and convenient alternative to bills and coins. E-cash usually operates on a smartcard, which includes an embedded microprocessor chip. The microprocessor chip stores cash value and the security features that make electronic transactions secure. When e-cash created by one bank is accepted by other reconciliation must occur without any problem cash must be storable and receivable. Most E-cash is transferred directly from the customer's desktop to the merchant's site. Therefore, e-cash transactions usually require no remote authorization or personal identification number (PIN) codes at the point of sale.

Limitations of traditional Payment Systems in the context of online Payments:- Several limitation of traditional payment system in the context of e commerce can be outlined.

a) Lack of usability
b) Lack of security
c) Lack of eligibility
d) High usage costs for customers and merchants
e) Lack of efficiency
f) Lack of consistency

Component of effective electronic payment system:-

1. Consumer and browser:-

A consumer interact with the online commerce system through a web browser typically a consumer first accessing a shopping mall and then uses the hyperlink from the mall to access the merchant home page.

2. Shopping mall:-

A shopping mall is where most consumer first visit for a shipping free there will be several shopping malls and it may pay to enlist with one or more well known mall.

3. Merchant systems:-

It consists of the home page and related software to manage the business.

4. Banking network:- it consist of several components there is bank that processes the online financial transaction for the given merchant the bank maintain the account for the merchant authorize and processes the payment the merchant bank also maintain a link with the consumer bank for verifying the trans actions.

Electronic Fund Transfer

It is a very popular electronic payment method to transfer money from one bank account to another bank account. Accounts can be in same bank or different bank. Fund transfer can be done using ATM (Automated Teller Machine) or using computer.

Now a day, internet based EFT is getting popularity. In this case, customer uses website provided by the bank. Customer logins to the bank's website and registers another bank account. He/she then places a request to transfer certain amount to that account. Customer's bank transfers amount to other account if it is in same bank otherwise transfer request is forwarded to ACH (Automated Clearing House) to transfer amount to other account and amount is deducted from customer's account. Once amount is transferred to other account, customer is notified of the fund transfer by the bank.

The following steps are carried out for payments during online procedures:-

1. The payment procedure is initiated by the applicant. The applicant selects a bank.
2. A payment request is sent to the bank that contains an XML message with a redirection URL that points to the government application. In response, the bank opens a session and forwards the user to the given URL.
3. The authority's application forwards the applicant on to the online banking application of his bank. After he has been authenticated, the payment transaction is carried out.
4. Before the transaction is carried out, the bank checks if there is still a connection open between the bank and the authority.
5. After the connection is confirmed by the authority, the bank carries out the money transfer.
6. A confirmation message is sent to the authority stating whether the payment was successful or not.
7. The authority responds with an acknowledgement message.

8. The payment process is finalized and the applicant is referred back to the authorities application.

An **e-commerce payment system** facilitates the acceptance of electronic payment for online transactions. Also known as a sample of Electronic Data Interchange (EDI), e-commerce payment systems have become increasingly popular due to the widespread use of the internet-based shopping and banking.

Over the years, credit cards have become one of the most common forms of payment for e-commerce transactions. In North America almost 90% of online B2C transactions were made with this payment type.[1] Turban et al. goes on to explain that it would be difficult for an online retailer to operate without supporting credit and debit cards due to their widespread use. Increased security measures include use of the card verification number (CVN) which detects fraud by comparing the verification number printed on the signature strip on the back of the card with the information on file with the cardholder's issuing bank.[2] Also online merchants have to comply with stringent rules stipulated by the credit and debit card issuers (Visa and MasterCard) this means that merchants must have security protocol and procedures in place to ensure transactions are more secure. This can also include having a certificate from an authorized certification authority (CA) who provides PKI (Public-Key infrastructure) for securing credit and debit card transactions.

Despite widespread use in North America, there are still a large number of countries such as China, India and Pakistan that have some problems to overcome in regard to credit card security. In the meantime, the use of smartcards has become extremely popular. A Smartcard is similar to a credit card; however it contains an embedded 8-bit microprocessor and uses electronic cash which transfers from the consumers' card to the sellers' device. A popular smartcard initiative is the VISA Smartcard. Using the VISA Smartcard you can transfer electronic cash to your card from your bank account, and you can then use your card at various retailers and on the internet.

There are companies that enable financial transactions to transpire over the internet, such as PayPal. Many of the mediaries permit consumers to establish an account quickly, and to transfer funds into their on-line accounts from a traditional bank account (typically via ACH transactions), and *vice versa*, after verification of the consumer's identity and authority to access such bank accounts. Also, the larger mediaries further allow transactions to and from credit card accounts, although such credit card transactions are usually assessed a fee (either to the recipient or the sender) to recoup the transaction fees charged to the mediary.

The speed and simplicity with which cyber-mediary accounts can be established and used have contributed to their widespread use, although the risk of abuse, theft and other problems—with disgruntled users frequently accusing the mediaries themselves of wrongful behavior—is associated with them.

2.4 Impact of e-commerce on Business

E-commerce will change the way the businesses are being carried on. It will lead to the emergence of new businesses as well as business practices and also a new role for intermediaries. Indeed, all the functional areas of business will undergo change as follows :

• The new technology will transform business processes, the way products and services are created and marketed, dynamics of competitions, the organization structure of the enterprise and the nature of the enterprise itself. This will include marketing, supply management, customer and sales management, product development etc.

• Local proximity may no longer be a significant factor in retaining customer. Local markets will be replaced by global markets. Indeed it may bring to reality the goal of making the whole world as one family.
• Transparency and openness continue and will continue, to be effective business strategy. Already many businesses have started recognizing key customers, employees and suppliers more like a partner in the business. E-commerce will lead to better customer service, more personalized products, reduced costs, supply chain efficiency and faster time to market. The most significant aspect of e-commerce is new market development. The e-commerce links and the infrastructure, initially set up, can be successfully used in other sectors.
• The change in the business functions will lead to new business models and create new set of facts and circumstances that can materially change the incidence of taxation.
• The Internet will emerge as a new platform for marketing of products and services that will displace and rebuild existing economy. It will affect organizational structure; require different skills for negotiation, new regulatory and legal framework, electronic money, taxation and many other things. The evolution of e-commerce will have profound impact on competition, mobility of enterprises, effect on consumer behavior, changes in the way the work is defined and managed. The net will enable businesses to save time on product design, design according to the individual customer specification, order and delivery of components, tracking sales and getting feedback from customers.
• The businesses can have virtual project team, virtual learning space so that the employees who are dispersed over various countries can work together as if they are together in one physical room. Business can be connected to the retail points in order to ascertain market trends, demand of the products and with the suppliers upstream to order the desired requirements. Better demand forecasting and stock replenishment can lead to significant reduction in the cost.

(1) Impact on direct marketing :

Product promotion E-commerce enhances promotion of products and services through direct, attractive and interactive contact with customers.

New sales channel E-commerce creates a new distribution channel for existing products. It facilitates direct reach of customers and the bi-directional nature of communication.

Direct savings The cost of delivering information to customers over the Internet results in substantial savings to senders when compared with non electronic delivery. Major savings are also realized in delivering digitized products versus physical delivery.

Reduced cycle time The delivery of digitized products and services can be reduced to seconds. Also, the administrative work related to physical delivery, especially across international borders, can be reduced significantly, cutting the cycle time by more than 90 percent.

Customer service Customer service can be greatly enhanced by enabling customers to find detailed information online. Also, intelligent agents can answer standard e-mail questions in seconds and human experts' services can be expedited using help-desk software.

Corporate image On the Web, newcomers can establish corporate images very quickly. Corporate image means trust, which is necessary for direct sales. Traditional companies such as Intel, Disney, Dell, and Cisco use their Web activities to affirm their corporate identity and brand image.

(2) Impacts on organizations :

Technology and Organizational Learning: Rapid progress in E-Commerce will force companies to adapt quickly to the new technology and offer them an opportunity to experiment with new products, services, and processes. New technologies require new organizational approaches. For instance, the structure of the organizational unit dealing with E-Commerce might have to be different from the conventional sales and marketing

departments. To be more flexible and responsive to the market, new processes must be put in place. This type of corporate change must be planned and managed.

Changing Nature of Work: The nature of work and employment will be transformed in the Digital Age; it is already happening before our eyes. Driven by increased competition in the global marketplace, firms are reducing the number of employees down to a core of essential staff and outsourcing whatever work they can to countries where wages are significantly less expensive. The upheaval brought on by these changes is creating new opportunities and new risks and forcing us into new ways of thinking about jobs, careers, and salaries. The Digital Age workers will have to become very flexible. Few of them will have truly secure jobs in the traditional sense, and all of them will have to be willing and able to constantly learn, adapt, make decisions, and stand by them.

New product capabilities: E-commerce allows for new products to be created and existing products to be customized in innovative ways. Such changes may redefine organizations' missions and the manner in which they operate. E-Commerce also allows suppliers to gather personalized data on customers. Building customer profiles as well as collecting data on certain groups of customers, can be used as a source of information for improving products or designing new ones. Mass customization, as described earlier, enables manufacturers to create specific products for each customer, based on his or her exact needs. For example, Motorola gathers customer needs for a pager or a cellular phone, transmits them electronically to the manufacturing plant where they are manufactured, along with the customer's specifications and then sends the product to the customer within a day.

(3) Impacts on Manufacturing :

E-Commerce is changing manufacturing systems from mass production to demand-driven and possibly customized, just-in-time manufacturing. Furthermore, the production systems are integrated with finance, marketing, and other functional systems, as well as with business partners and customers. Using Web-based ERP systems, orders that are taken from customers can be directed to designers and to the production floor, within seconds. Production cycle time is cut by 50 percent or more in many cases, especially when production is done in a different country from where the designers and engineers are located. Companies like IBM, General Motors, are assembling products for which the components are manufactured in many locations. Sub-assemblers gather materials and parts from their vendors, and they may use one or more tiers of manufacturers. Communication, collaboration, and coordination become critical in such multitier systems. Using electronic bidding, assemblers get sub-assemblies 15 percent to 20 percent cheaper than before and 80 percent faster.

(4) Impacts on Finance :

E-commerce requires special finance and accounting systems. Traditional payment systems are ineffective or inefficient for electronic trade. The use of the new payment systems such as electronic cash is complicated because it involves legal issues and agreements on international standards. Nevertheless, electronic cash is certain to come soon and it will change the manner in which payments are being made. In many ways, electronic cash, which can be backed by currency or other assets, represents the biggest revolution in currency since gold replaced cowry shells. Its diversity and pluralism is perfectly suited to the Internet. It could change consumers' financial lives and shake the foundations of financial systems and even governments.

2.5 E-commerce in Indian Business Context

India’s e-commerce market was worth about $3.8 Billion in the year 2009, it went up to $12.6 Billion in 2013. In the year 2013, the e-retail market was worth US$ 2.3 Billion. About 70 per cent of India’s e-commerce market is travel related. India has close to 10 Million online shoppers, and is growing at an estimated 30 per cent CAGR vis-à-vis a global growth

rate of 8 to 10per cent. It also includes busy lifestyles, urban traffic congestion and lack of time for offline shopping; lower prices compared to brick and mortar retail driven by disintermediation and reduced inventory and real estate costs; increased usage of online classified sites, with more consumer buying and selling second-hand goods; evolution of the online marketplace model with websites like Jabong.com, Flipkart, Snap deal, and Infibeam respectively.

According to Report by Avendus Capital, entitled "India Goes Digital", the Indian e-tailing industry is estimated to grow to Rs 53,000 Crores ($11.8 Billion) in the year 2015. On 7th March 2014, e-tailer Flipkart claimed that it has hit $1 Billion in sales, a feat it has managed to achieve before its own target (2015). A report recently published by the Boston Consulting Group also stated that online retail in India could be an $84 Billion industry by the year 2016 more than 10 times its worth of the year 2010.

E- Commerce Challenges: A Case Study of Flipkart.com Versus Amazon.in :

Flipkart & Amazon are the two big players of e-commerce scenario: It has mainly covered following.

History & Growth of Flipkart.com:

It is an e-Commerce company founded in the year 2007, by Mr. Sachin Bansal and Binny Bansalboth alumni of the Indian Institute of Technology, Delhi. They had been working for Amazon.com previously. It operates exclusively in India, where it is headquartered in Bangalore, Karnataka.

It is registered in Singapore, and owned by a Singapore based holding company. Flipkart has launched its own product range under the name "DigiFlip", Flipkart also recently launched its own range of personal healthcare and home appliances under the brand "Citron". During its initial years, Flipkart focused only on books, and soon as it expanded, it started offering other products like electronic goods, air conditioners, air coolers, stationery supplies and life style products and e-books.

Legally, Flipkart is not an Indian company since it is registered in Singapore and majority of its shareholders are foreigners. Because foreign companies are not allowed to do multi-brand e-retailing in India, Flipkart sells goods in India through a company called WS Retail. Other third-party sellers or companies can also sell goods through the Flipkart platform. Flipkart now employs more than 15000 people.

Flipkart allows payment methods such as cash on delivery, credit or debit card transactions, net banking, e-gift voucher and card swipe on delivery. Flipkart is presently one of the largest online retailers in India, present across more than 14 product categories & with a reach in around 150 cities. Flipkart is currently a 10,000 member strong team, with 3000 sellers on its platform and delivering 5 million shipments per month. It made its presence felt in online retailing by offering path breaking services like Cash on Delivery (COD), 30 Day replacement Guarantee, EMI options, Flipkart mobile app, etc.

History & Growth of Amazon. In:

Amazon.com, founded by Jeff Bezos in 1994, is an American electronic commerce company with headquarters in Seattle, Washington. Jeff Bezos incorporated the company as "Cadabra" on July 5, 1994, and the site went online as Amazon.com in 1995. Bezos changed the name cadabra.com to amazon.com because it sounded too much like cadaver. Additionally, a name beginning with "A" was preferential due to the probability it would occur at the top of any list that was alphabetized. It is the largest Internet based company in the United States. Amazon.com started as an online bookstore, but soon diversified, selling DVDs, VHSs, CDs, video and MP3Downloads/Streaming, Software, Video Games, Electronics, Apparel, Furniture, Food, Toys, and Jewellery. The company also produces consumer electronicsnotably, Kindle, Fire Tablets, Fire TV and Phone and is a major provider of cloud computing services.

Amazon has separate retail websites for United States, United Kingdom & Ireland, France, Canada, Germany, The Netherlands, Italy, Spain, Australia, Brazil, Japan, China, India and Mexico, with sites for Sri Lanka and South East Asian countries coming soon. Amazon also offers international shipping to certain other countries for some of its products. In the year 2011, it had professed an intention to launch its websites in Poland, and Sweden.

In early June 2013, Amazon.com had launched their Amazon India marketplace without any marketing campaigns. In July, 2013, Amazon had announced to invest $2 Billion (Rs 12,000 Crores) in India to expand business, after its largest Indian rival Flipkart too had announced to invest$1 Billion.

Business Model and Market Share, Financial and Revenue Generation: Flipkart.com &Amazon. In:

The business model used by this e-retailers are 'Inventory-Led Model' [FLIPKART]and 'Marketplace Model' [AMAZON] respectively.

Flipkart started its operation with inventory led model. Inventory- led model requires huge investment in warehouse and logistics, Now, Flipkart.com e-commerce websites are using mix of both the models. Flipkart started its operation with books, but soon it started adding more categories.
Inventory Led Model as well as market place model. Flipkart, which had an inventory-led format, lately announced a shift to the marketplace model, which is about hosting many retailers on a single online platform. However, industry sources reason that Flipkart may still not have left the inventory-based format and, therefore, it requires significant investments. Major players like Amazon, eBay and Snap deal opted for the marketplace route in India as foreign investment is permitted in that format, unlike in the inventory-led model.

Table Number 1: Financial and Revenue Positions :

Year	Source of Fund	Amount	Sales
2008	Founders contribution for making website to set up the business	₹4,000,000	-
2009	Funding from venture capi- tal funds Acela India	US$1 Mil- lion	40 Mil- lion
2010	Tiger Global	US$10 Mil- lion	200 Million
2011 June	Tiger Global	US$20 Mil- lion	-
August 2012	MIH (part of Naspers Group) and ICONIQ Capital	$150 Mil- lion	750 Million
10/7/13	Tiger Global, Naspers, Ac- cel Partners and Iconic Capital	$200 Mil- lion	
2014	On average, Flipkart sells nearly 10 products per minute		10 Bil- lion
2015	Aiming at generating a revenue		50 Billion

Net sales of Amazon had increased by 22 percent to reach figure of $74.45 Billion, compared with figure of $61.09 Billion of the year 2012. Operating income had increased 10 percent to $745 Million, compared with $676 Million of the year 2012. Net income for the year was $274 Million, an improvement over the net loss of $39 Million of the year 2012.

Table Number: 02 : War is on for Indian Market Share

Parameters of compari- sons	Flipkart	Amazon
Sales	$4 Billion in 2015	Sales reached to figure of $1 Billion in 2014 [Oct-Dec] and expects to get 30 per cent market share
Sellers	Expects to increase seller base to 50 K in 12 months	It has grown merchant base to 8500.
Warehouses	6 warehouses, & it will grow this to 50 in the next three years	It will increase its ware- houses count to 10 in the 2015 from 07.
Focus	The focus is now on Fashion and Lifestyle Business Base Model	The focus is on Elec- tronics and Books
Exclusive Partnership	It had Sold 1 Mil- lion Motorola prod- ucts in 5 months. It is now selling Xiaomi Phones	It has Launched a sales of a Samsung phone and Swipe's Slice tables in Nov,2014

Source:www.businessstandard.com

Promotional Techniques:
Promotional Techniques of Flipkart.com:
Web stores advertise in traditional media newspapers and television media with prime time slot also. But, it largely advertises on Web with targeted and a personalized banner ads and other Web page and e-mail promotions with incentives like discounts to buy.
Promotional Techniques of Amazon.In:

It is also doing one-to one marketing and relationship building to web shoppers with personalized e-mails and cross linked websites. Amazon. In is a customized Website where through personalized shopping service and alliance with thousands of other dealers with trusted brands and prices of millions of products from single store front. Amazon is also using targeted emails apart from networking with other popular websites for ads and tags promotions.

Comparison of Customers' Shopping Experience of Flipkart. comversus Amazon. In:

Risks and Backup:

Talk about who has more to lose in the battle of sales figures. Well, surely Flipkart. The reason why we are putting forward this argument is the fact that Flipkart does only one kind of business which is that of online retailer ship. Besides, just more experience, on the other hand, Amazon is backed up by more business streams which it has been successfully carrying out. Let us take the example of Amazon Web Services which is known to be generating a lot of revenue for the company. Even if, it loses its hand in the Indian market to its main rival Flipkart, it does not have too much to lose.

Amazon Drones And Other Innovations:

It is a recent buzz according to which Amazon is busy building or has probably built drones to increase its business. Sooner or later, drones will be acting as local delivery boy and will be delivering goods at customers' footsteps and giving online retailership just another level. So, customers' do not have to worry too much anymore whether the person delivering goods to your address is confused at how to find your address. Who knows? Maybe Amazon someday makes it possible. A customer wishing to get delivered a set of books merely has to locate his house on Google maps, and a flying machine comes with the stuff you ordered.

Books:

Both the companies have started their journeys and turned out popular but how did they start? Both the brands are known to have started their efforts with books. Books was what Amazon began with, and it was what Flipkart targeted to achieve first when they were nothing but a warehouse. However, talking about books, it is a popular opinion that Amazon is cheaper dealing with when it comes to books. Not only does it involve less shipping charges, it has more seller options usually.

Model of Working:

Comparing Flipkart and Amazon, one can dig out the old pages and the new and can infer that both the companies had started with their own warehouse. But, today, both follow the common similar marketplace model. However, talking about the same, Flipkart and Amazon India are known to be sharing a difference which is again about Books. While Flipkart enjoys putting its warehouses into good use when it comes to stocking books, Amazon likes to continue working in the trend it enjoys that is with the marketplace model. Presentation: Now, do we really need to put up our own opinion about the presentation and looks of both the brands? While the website of Flipkart is presented with the use of bright colors and beautiful buttons, Amazon lags much behind in the name of presentation and colors, if not in anything else.

Amazon Kindle:

Now, Amazon has an extra advantage, the advantage of Technology, Invention and Innovation. We all know about the Amazon Kindle which is an e-book reader specially designed by Amazon for enabling its customers buy eBooks from Amazon and read on the Kindle. Kindle is blessed with charged ink technology and does not use the normal LED/LCD displays. Hence, reducing the strain on the eye to an extent, it almost pushes customers to buy the e-Book instantly for his or her Kindle. And anyway, e-Books come at much lower price than the hard copies of books. Not only do they save paper, it seems they are the future of reading. On the other hand, Flipkart does not seem to be doing that awesomely when it comes to the sale of e-books. Definitely, Flipkart has not been of much use when it comes to invention. They do not have something like the Kindle of their own and it doesn't seem likely to be in near future either.

Amazon's Google App. Store:

Now, this is just brains, not too much technology, not another 'Invention'. Besides, trying its hands on all other kinds of business, Amazon has its own collection of Google App Store products which customer can purchase and download. Flipkart does not have a business of this kind.

Ease-of-Use and Convenience:

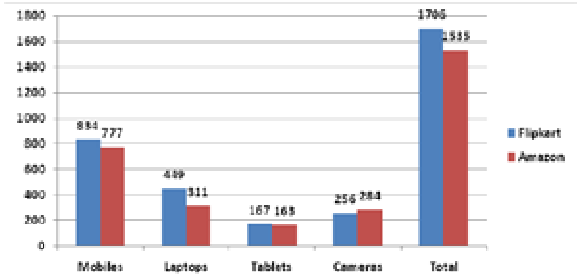
When it comes to ease of use and convenience, we do not hesitate to vote up the brand from the nation. Flipkart does have a very appreciable and convenient way for the typical customer. Log on to the Amazon India website, and all you find is a confusing set of links. Customer do not understand where to click and where to not. Besides, if a user wants to order something at Amazon India, let us say a book, s/he cannot do it just like that. One needs to have a user account at Amazon, separately registered by the user. This kind of rudeness is something which the Flipkart people have not shown. If you have a Facebook or Google account, all you need to do is use your credentials, feed in the details and place your order. There is no need to create a special Flipkart account, registering separately for the same even though you could, if you really want to. Amazon has a lot of stuff like Prime Membership, and a lot of more confusing booty traps which Flipkart chooses to avoid. Even the search facility on Flipkart was something we greatly admired.

Same Day Delivery:
Newly, after its entry into the Indian retail sphere, Amazon India has come out with something called 'Same Day Delivery'. According to this plan, if you are a customer and are so desperate to get the products you ordered that you want them delivered on the same day, you can enjoy this facility. All you have to do is pay an extra fee of Rs. 99. But recently, even Flipkart too has launched the same feature. However, the better bet here is because you have to shell out Rs. 9 less. You need to place your order before 6 P.M., and the order will be delivered to you within the same day. If however you place your order (on Flipkart) after 6 P.M. Your product(s) will be delivered only the next day. So, when comparing Amazon and Flipkart on same day delivery services, both offer pretty much good services.

Delivery Manners:
There is a subtle change in the manner both the companies. Let us say you order two things, a book, and a movie DVD. It may be possible that you receive your book the next day by Amazon, and the DVD may arrive a few days later if the seller takes more time to ship it. However, the same is not usually true with Flipkart. What Flipkart will do this, it will ship the two products together, in the same package, and will most likely make you wait. While some favour Filpkart's shipping habits, the others believe Amazon India does it better? Some may like the responsibility Amazon takes by shipping the product as soon as it can reach the customers; some believe Flipkart understands how a person expects his products to come all together, keeping things simple. While some states that Flipkart does this to save its expense on shipping the package, some have opined that Amazon too saves its expense by avoiding any midway intervention in the delivery process.

Selling Your Product:
A mere look at Amazon India's top left area will let you to the 'Sell' page. It elaborates the user as to how s/he can actually sell his or her product on Amazon India without going through an elaborate process to get his business listed in the website.

Graph No: 1 : Product Offering Comparison between Flipkart.com and Amazon. in



Source: www.econmictimes.com

In Mobiles category Flipkart has about 7 percent more SKUs than Amazon For Laptops category, the gap is wider with Flipkart having a 45percent bigger catalogue size. Tablets category is a close fight. In Cameras Category, Amazon leads the race with 284 SKUs against Flipkart's 256 SKUs.

Amazon, though public listed, does not share India-specific numbers but its founder and chief Jeff Bezos has stated that at the current scale and growth rates, India is on track to be its fastest country ever to reach $1 Billion Dollars in gross sales. It is estimated that it took it years to cross the revenue benchmark even in China, where it has been present since 2004, and another market dominated by local giants.

Logistical Support:
The rapid growth of e-commerce in India is only possible with the help of logistical activities as supporting functions. The e-commerce offering enormous varieties of products to vast geographical area cannot possible without sound logistical chain network and delivery model as a value chain to e-commerce. The success of e-commerce largely depends on key infrastructural support in the area of logistical network to ensure safe and secure time bound delivery of ordered products to every corner of the area in India. Supply chain capacity is also an important influential factor to push inventory and products with effective carriage capacity to consumer. And, in India it is still considered as a barrier due to poor transport networks, unavailability of warehouses and low internet penetration in small cities and far geographical areas.

Supply Factor Comparison: X-Factor-Vendor Network &Value Management:

Flipkart.com :
One crucial thing in the e-commerce war could be the key vendor on the sites. In the case of Flipkart it is WS Retail (Warehouse), which used to be the in-house and sole seller through the platform before it turned a marketplace early last year. This firm is owned by an angel investor and employees of Flipkart, to comply with

FDI norms. However, this is a key player for Flipkart. Although, the breakup of sales from WS Retail and other vendors is not in the public domain, it is estimated that the bulk of its sales are through this vendor (it also happens to be the partner for Flipkart's run away hits like Motorola Moto series of handsets). WS Retail also happens to be a key spoke in its Flipkart First offering, at least for now.

Amazon. In:

It is still dependent on its third-party vendor base to sell in India. However, it has reportedly sealed an unconventional deal with Catamaran Ventures, the private investment arm of Infosys co-founder N R Narayana Murthy. Catamaran is holding a majority stake in a venture which is supposed to work at the back-end of operations for Amazon in India. However, this is seen as the first step for preparing groundwork for Amazon to start selling in India on its own as and when (as anticipated soon) multi-brand online retail is brought on par with offline retail in terms of FDI norms.

This could really pump up the activity for Amazon and take the competition right to the door steps of Flipkart.

Challenges Faced in October 2014:

Flipkart.com:

Flipkart launched 'Big Billion Day', after the successive rise in turnover-tailer Flipkart launched Big Billion Day with intention to increase the popularity by targeting Billion sales, a daylong shopping event on 6-10-2014 & promised greatest sale ever in India. This even though helped Flipkart to achieve the target led to public outcry, and widespread criticism across Customers, Competitors and Partners heavily damaging its reputation. Flipkart hosted what it claimed to be its biggest sale with discounts and offers across 70 categories. The online marketplace had called it 'The Big Billion Day' and stated that it has dedicated 10,000 field staff to fulfill orders. As part of the sale, the company was offering multiple items at price of Re 1, up to 30 percent off on Smartphones, Laptops starting Rs 15,000, Fashion and Perfumes at 50percent off and Toys at 50percent off, among others. It was also hosting exchange offers on Televisions and Phones. The sale started at 8 A.M. with some limited time, limited stock and partner offers. Many users could not place the order because the servers were not capable enough to take the load and was giving random errors to users which led to frustration among customers. Many users who placed orders received e-mail informing them that the order stand as cancelled. Most of the products were sold for price less than cost price and Flipkart was accused of killing the competition. Major competitors filed complaints against Flipkart to Commerce Ministry claiming that selling products for less than cost price is against the commerce policy of India. Ministry announced that it will form new trade rules for e-retail after this incident. The site crumbled due to increased load throwing random errors. And large number of customers failed to receive order confirmation after making payments, and some were unable to find items they added to their shopping cart. They too shared their grievances on social networking website, Twitter. Flipkart thereafter promised that it would resolve these issues and try to offer a better experience. Some customers had also complained that Flipkart cancelled orders even after assigning a delivery time slot and charging their cards. Kulbhushan Rakheja, a New Delhi resident, placed an order for a Philips LED TV, only to be informed three hours later that the order had been cancelled "due to high demand for the item, and in order to provide all customers an equal opportunity." He had stated that he has planned to lodge a police complaint against the website. The correspondent also faced certain issues while placing an order and receiving a confirmation. The Flipkart website failed to display past and new orders for customers. A day after its Big Billion Day sale, e-commerce giant Flipkart had sent a letter to its customers apologizing for the glitches that the website encountered as it struggled to keep up with the heavy traffic. Flipkart issued a statement attributed to founders Sachin Bansal and Binny Bansal, informing that the Flipkart website had received a Billion hits and achieved its 24 hour sales target of $100 Million in GMV (Gross Merchandise Value) in just 10 hours. The statement did not talked about problems faced by customers and the Flipkart has not responded to allegations of price discrepancies and arbitrary order cancelations. It only mentioned that the Flipkart technology team was dedicated towards addressing errors and providing constant support to accommodate traffic and customer visits. Meanwhile, Filpkart's competitors, Amazon and Snap deal also had started offering discounts on a large number of products to counter the sale. Snap deal published a fullpage newspaper ad with a message that cheekily said, "For others it's a big day. For us, today is no different."

Amazon. In:

After big day sale of Flipkart, Amazon went to run a massive flash sale from October 10, 2014 till October 16, 2014. The sale was comprised of Amazon's traditional Lightning Deals, but with better prices and more products than usual. The deals run from 7 A.M. to 6 P.M. During the same period, Apple's latest iPhone 6 and iPhone 6 Plus were available for pre-orders in India. This was probably the first time a number of online stores were taking pre-orders for the iPhone. There were a number of ways you can save a little money while pre-ordering the new iPhones. Amazon's Diwali sale had the House of Marley Earphones, Headphones, and Portable Speakers at a massive discount exclusive to Amazon. 50 percent off on Samsung Smart Cameras. Amazon has slashed prices on Samsung's Smart Cameras for this week.

Amazon India was careful not to make too big a splash as it kicked off the October 10-16 Diwali Dhamaka Sales. Under pressure from big consumer electronics brands such as Samsung, Sony and LG, the online marketplace steered clear of deep price cuts on the first day, except on products meant solely for sale on Amazon or end-of-life items. Such goods were available at discounts of more than 50 percent.
With Amazon India seemingly toeing the line, Sony and Samsung have promised to work closely with it, a person with direct knowledge of the development said. Hewlett-Packard India joined other manufacturers in advising vendors not to sell online on Friday. LG, HTC and Sony had previously issued similar trade advisories.
Amazon India Diwali Dhamaka Sale Flops as Website Crashes and Poor Discounts on Offer www.india.com October 10, 2014 4:06 P.M.
Amazon India's much awaited Diwali Dhamaka Week-long sale turned out to be a flop show. The sudden crash of Amazon.in website was a repeat of what happened Flipkart on Billion Day Sale. The Amazon India website too crashed as the sale opened at 7 A.M. on Friday and the visitors expecting a better deal, were treated to poor deals and discounts. In short, another bad experience for the customers. There were reports of Amazon.in website crashing and Diwali Dhamaka deals not accessible for initial few minutes. The users who did manage to get through, too were not impressed with the discounts and offers. Amazon had announced that it will offer its customers more lucrative deals than its competitors- Flipkart and Snap deal. There are few user-friendly features added on the website such as creating a wish list and making multiple lists within itself. The biggest test for Amazon India will be its inventory strength during this week long sale. Unlike the Flipkart Billion Day Sale, Amazon had decided to offer deals for the next six days. The format of the deal was pretty similar to Flipkart with hourly deals from 7 A.M. to 6 P.M. Flipkart had failed to anticipate the heavy demand, and was butt of jokes as deals vanished as soon as they appeared. Snap deal too joined in and announced its own discounted sales the same day. Friday was no different as Snap deal ran a full page ad in leading newspapers. Earlier, Amazon indulged in dirty trick on Monday when Flipkart launched its sale, and bought the domain identified as "www.bigbillionday.com" named after Flipkart's mega day offer. As a result the visitors landed on Amazon site looking for Flipkart sale.
Amazon had retouched their inventory and had made it look more appealing but the question remained whether they could learn from their mistakes and it will be answered only after the first day of the sale when people tried the discounts depending upon quality products being made available on the other e-commerce websites unlike Flipkart.
After Flipkart's Billion Day sale, it was then Amazon India that had to face the ire of customers as its Pre-Diwali sale started on the wrong footing. Amazon had publicized its Diwali Dhamaka sale that went live an hour ago but many customers failed to access the website while others were unable to see any deals. Update: Amazon India had issued a statement, addressing buyer's complaints. Contrary to a media report, the Amazon.in website has been up and running all through. They accepted to have a latency issue for a few minutes, limited to the Deals page, at about 7A.M. when they kicked off the deals. They fixed the issue immediately and their systems were scaled to manage the load. Many customers were also complaining the lack of any deals on the website. In addition to the site not being able to keep up with the rush, Amazon was not offering many deal either. What is more, Amazon's promotional price was also more than Snap deal.

Future Prospects: Flipkart.com & Amazon.In :

Flipkart.com: :

With the entry of Amazon in the Indian market, Flipkart needs to renovate & expand its business in order to sustain or increase its present market share. Flipkart's plans for the future mainly include scaling up the size of its business. It plans to have 10 to 12000 sellers on its platform within the next few years. Also, on acquisition of Myntra, Flipkart, currently owns about 50 percent of the organized lifestyle market in India. It plans to increase this figure to 70 percent. It has more than 1,000 sellers now, & it wants to scale up this number to 10,000 to 15,000 in a year's time, & to a few lakhs in 4 to 5 years. Around 40 percent of Flipkart's online traffic now comes from Mobiles. It thus wants to add more features to its mobile shopping app to increase customers' satisfaction& loyalty. Flipkart is also trying to develop its IT infrastructure, as online shopping is heavily dependent on technology. It wants to customize its IT framework to perform 2 functionalities. One, its ability to recommend its buyers to what other purchases can be bought to complement a product that has been already purchased from Flipkart like recommending a Stereo Headset for a Mobile Phone, and second one is to simultaneously conduct a live survey by siphoning a small portion of this data to analyze customers' purchase patterns & preferences respectively. Flipkart is also considering having their own logistics so as to reduce dependability on the third party companies to provide it. Flipkart has also freshly launched its own Digital Accessories brand Digiflip, & its apparel brand Flippd, is yet to see how it is likely to perform in the market. Also, part of its agenda is to be present in more number of Cities, & for that it is contemplating on having larger number of warehouses. It has also increased automation in its supply chain system. Flipkart also wants to include more categories of products in its domain, & plug the gaps in its existing categories.

Amazon. In :

As part of its expansion plan in India, Amazon has been pushing its Kindle tablet, especially the Kindle Fire range which can automatically act as a catalyst for promoting its merchandise sales. As customers are majorly shifting from Computers to Mobile Handsets, they will be majorly benefited from reading e- books & streaming live Music & Videos through the Kindle devices. Amazon is mostly interested in its cash flow per share valuation rather than percentage margins. Thus, they are likely to offer even larger discounts to push sales. The company is also in talks with leading retail chains of India like Future Group, Spencer's Retail, Woodlands, Shoppers Stop & Crosswords to act as a selling platform for their products. Amazon is also planning to introduce its very own mobile handset in the future through which it hopes customers will have more access to its online store & its contents. But, perhaps the most interesting & path-breaking service that Amazon is about to offer yet is using Drones, or unmanned aerial vehicles to deliver packages to customers.
According to Media Reports, Amazon came up with this concept in the year 2013 & will supposedly be launching it first in India in late 2014.The drone, known as Amazon's Prime Air is an octocopter, that is fitted with 8 Rotors, weighing less than 25 kilogram (kg), and travelling at over 80 kmph. The drone is supposed to be carrying a payload of up to 2.26 kg, which covers 86 percent of products sold on Amazon. Using this, Amazon believes, top-selling products like Mobiles & Books within 90 minutes to 3 hours for select customers.
Flipkart's 'Big Billion Day' sale helped the company to achieve record single day sales of Rs. 600 Crores on Monday, and its competitor Snap deal too increased its daily average sale with company claiming to have reached sales of Rs. 1 Crores per minute, adding up to Rs 600 Crores for it too. But, both these companies, particularly Flipkart, were also flooded with complaints on the social media of products disappearing after being shown on the screen and website crashing frequently preventing sale from being completed. Complaints ranged from technical errors, to comments on pricing scams, to lack of product variety, prompting the company to send out a public apology. The episode also sparked a backlash from traditional retailers who had complained about what they said was predatory pricing, persuading the Government to announce that it would look into the matter. Big brands too who were highly unhappy about online price cut also came out in open support of traditional retail channels. The silent winner on the sale day appeared to be Amazon which strengthened its pool of offerings after leaning from the mistakes of others but there were no sales figures released by Amazon.
To Conclude, There is an old saying, "Physician, heal thyself." The meaning of the phrase suggests that because doctors are always busy healing others, they often fail to pay attention to their own health. Every once in a while, physicians need to turn their expertise inward to make sure they are in good shape so they can be ready to kelp others. The concept is applicable to e-commerce business companies also as they are very busy industry to focus on delivery of consumer service and solutions provider in merchandising with effective technology and expertise. So, every time they require to update their Internal Structure Systems and Innovative Management System with sound database to provide end-to-end connectivity across all the different processes to reach out its suppliers, partners and customers effectively. Promising future-commerce in India, which is now a minuscule portion of the $500 Billion Indian retail market, is set to be the fastest growing channel in the sector.

Questions :
1. Do you think Flipkart.com can continue to be successful with coming days of competition to come from amazon.in? Explain your answer.
2. Is Amazon India going to enter our markets and defeat the most popular online retail company of India because of its age long experience or will Flipkart be able to defend its goodwill in the market, stand the competition in a dominative manner and will tell the world no breaching our gates?

3. Flipkart has faced an issue on 6thOctober.2014, due to its shortsightedness but Amazon also followed the same kind of strategy for a big sale. Do you think competitor should follow blindly without thinking of issues generated out of competitors 'decision? How Flipkart can regain its customers' trust back?

4. Flipkart.com, which is now being valued at over $1.5 Billion, manages to use the hundreds of Millions, it has raised the right way and emerge as India's Amazon? Or, is it on just a high-burn track with no focus on profitability?

5. Which Website Flipkart.com or Amazon.in would you choose for shopping for your Micro Max Brand Smart phone Nitro A310? Why?

2.6 Business Models for e-commerce :

A business model is a set of process/activities that results in sustainable profit through desired revenue and customer value. The business model spells out how a company makes money by specifying its position in the value chain. A business model which uses electronic communication technology such as internet for exchanging information is called e-business

model. The e-business model includes the roles and relationships among a firm's customers, allies, and suppliers; the major flows of product, services, information, and money; and the major benefits to the participants. The model include eight ingredients of business like value proposition, revenue model, market opportunity, competitive environment, competitive advantage, market strategy, organizational development, and management team. The model also include the business elements such as customer management (including value proposition); product and service portfolio, processes, and activities; required resources, suppliers and business networks; and financial viability (including revenue sources). All the business models used in practice mainly focus on the value proposition and revenue generation by using e-business processes.

(a) Value proposition : Since the focus of the value proposition is on the customer, state the proposition from the customer's perspective. Value propositions (with examples) may be based on lowest cost (Buy.com), superior customer service (Amazon.com), reduction in product search (Autobytel) or price discovery (Shopping.com) costs, product customization (Dell), or provision of niche products (Anything Left Handed). A good resource to use in writing the value proposition is the brainstorming session for writing the mission statement. Review the words or phrases that describe your business or that describe the company's ideal image from a customer's point-of-view. Sort out the most important one or two, and then elaborate on it or them to create your company value proposition.

(b) Revenue generation : A revenue model identifies how a business will generate revenue. Examples of revenue models include sales, transaction fees, subscription fees, advertising fees, affiliate fees, and licensing fees. Consider these options for your business idea and identify a revenue model (or two) you intend to use.

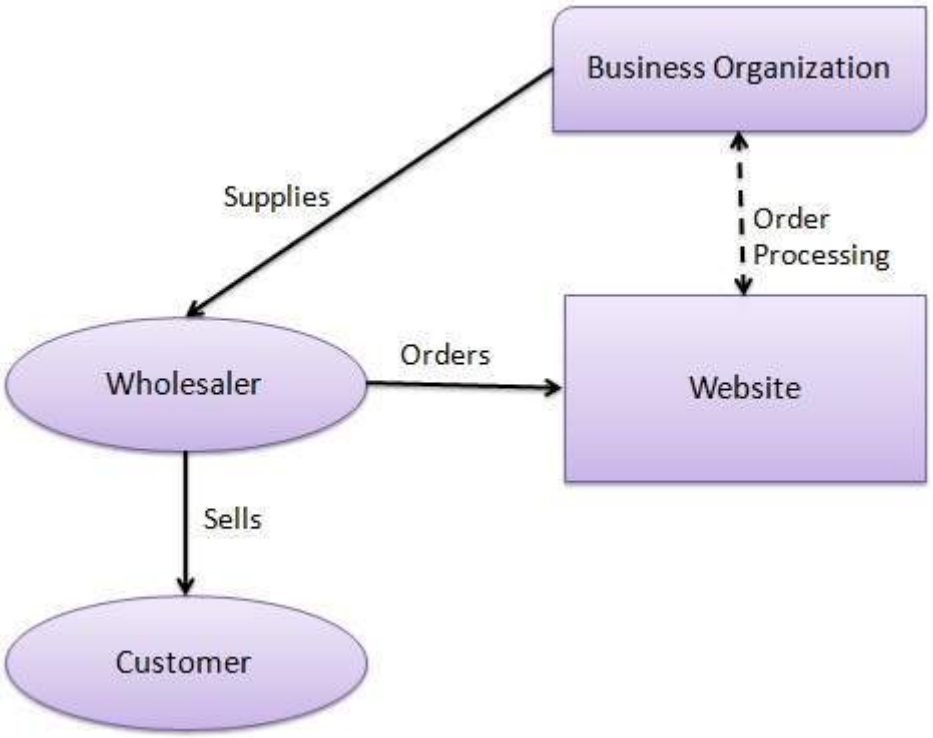
TABLE 2.1 KEY INGREDIENTS OF A BUSINESS MODEL

BUSINESS MODEL COMPONENTS	KEY QUESTIONS
Value proposition	Why should the customer buy from you?
Revenue model	How will you earn money?
Market opportunity	What marketspace do you intend to serve, and what is its size?
Competitive environment	Who else occupies your intended marketspace?
Competitive advantage	What special advantages does your firm bring to the marketspace?
Market strategy	How do you plan to promote your products or services to attract your target audience?
Organizational development	What types of organizational structures within the firm are necessary to carry out the business plan?
Management team	What kinds of experiences and background are important for the company's leaders to have?

All the major E-commerce business models which fall under 3 main categories : B2B - Business to business, B2C - Business to consumer, C2C - Consumer to consumer are also discussed with their benefits and limitations.

1. E-Commerce - B2B Models :

Website following B2B business model sells its product to an intermediate buyer who then sells the product to the final customer. As an example, a wholesaler places an order from a company's website and after receiving the consignment, sells the end product to final customer who comes to buy the product at wholesaler's retail outlet.



B2B implies that seller as well as buyer is business entity. B2B covers large number of applications which enables business to form relationships with their distributors, resellers, suppliers etc. Following are the leading items in B2B e-Commerce.

- Electronics
- Shipping and Warehousing
- Motor Vehicles
- Petrochemicals
- Paper
- Office products
- Food
- Agriculture

Key technologies

Following are the key technologies used in B2B e-commerce −

- **Electronic Data Interchange (EDI)** − EDI is an inter organizational exchange of business documents in a structured and machine processable format.
- **Internet** − Internet represents world wide web or network of networks connecting computers across the world.
- **Intranet**

− Intranet represents a dedicated network of computers within a single organization

- **Extranet** − Extranet represents a network where outside business partners, supplier or customers can have limited access to a portion of enterprise intranet/network.
- **Back-End Information System Integration** − Back End information systems are database management systems used to manage the business data.

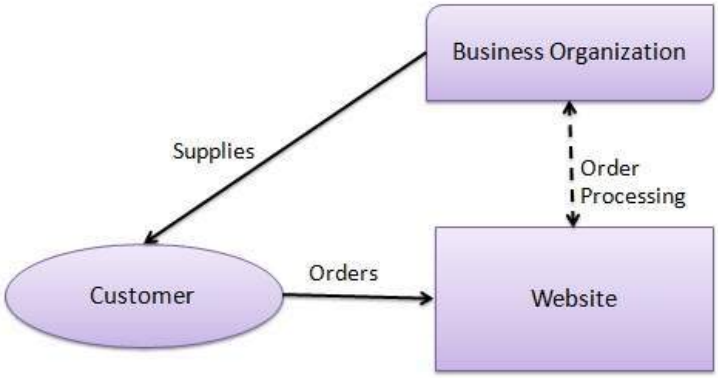
Architectural Models :

Following are the architectural models in B2B e-commerce −

- **Supplier Oriented marketplace** − In this type of model, a common marketplace provided by supplier is used by both individual customers as well as business users. A supplier offers an e-stores for sales promotion.
- **Buyer Oriented marketplace** − In this type of model, buyer has his/her own market place or e-market. He invites suppliers to bid on product's catalog. A Buyer company opens a bidding site.
- **Intermediary Oriented marketplace** − In this type of model, an intermediary company runs a market place where business buyers and sellers can transact with each other.

2. E-Commerce - B2C Models :

Website following B2C business model sells its product directly to a customer. A customer can view products shown on the website of business organization. The customer can choose a product and order the same. Website will send a notification to the business organization via email and organization will dispatch the product/goods to the customer.



In B2C Model, a consumer goes to the website, selects a catalog, orders the catalog and an email is sent to business organization. After receiving the order, goods would be dispatched to the customer. Following are the key features of a B2C Model

- Heavy advertising required to attract large no. of customers.
- High investment in terms of hardware/software.
- Support or good customer care service

Consumer Shopping Procedure

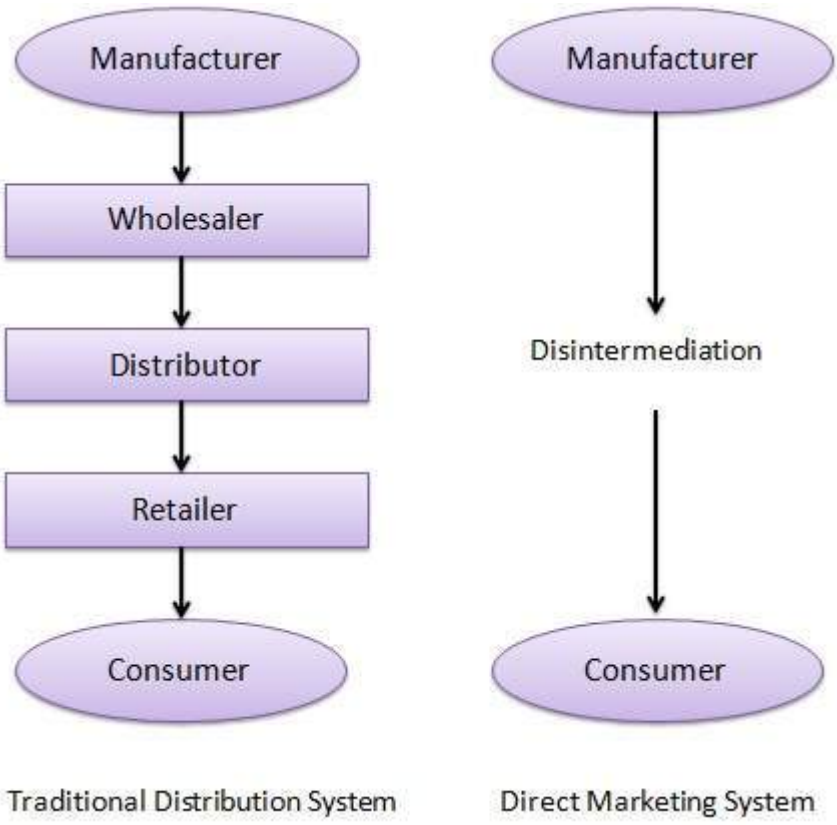
Following are the steps used in B2C e-commerce −

A consumer

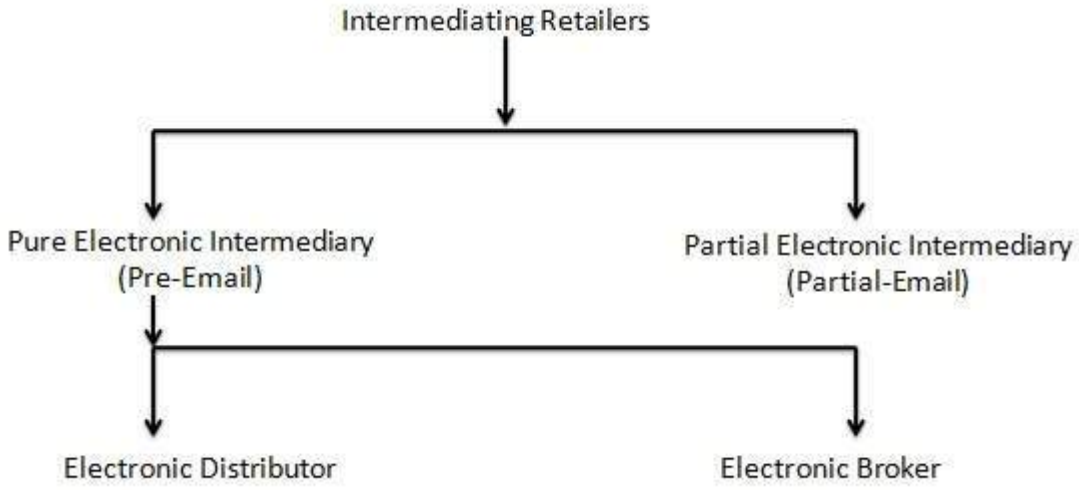
- determines the requirement.
- searches available items on the website meeting the requirment.
- compares similar items for price, delivery date or any other terms.
- gives the order.
- pays the bill.
- receives the delivered item and review/inspect them.
- consults the vendor to get after service support or returns the product if not satisfied with the delivered product.

Disintermediation and Reintermediation

In traditional commerce, there are intermediating agents like wholesalers, distributors, retailers between manufacturer and consumer. In B2C website, manufacturer can sell products directly to consumers. This process of removal of business layers responsible for intermediary functions is called Disintermediation.



Now-a-days, a new electronic intermediary breed is emerging like e-mall and product selection agents are emerging. This process of shifting of business layers responsible for intermediary functions from traditional to electronic mediums is called Reintermediation.

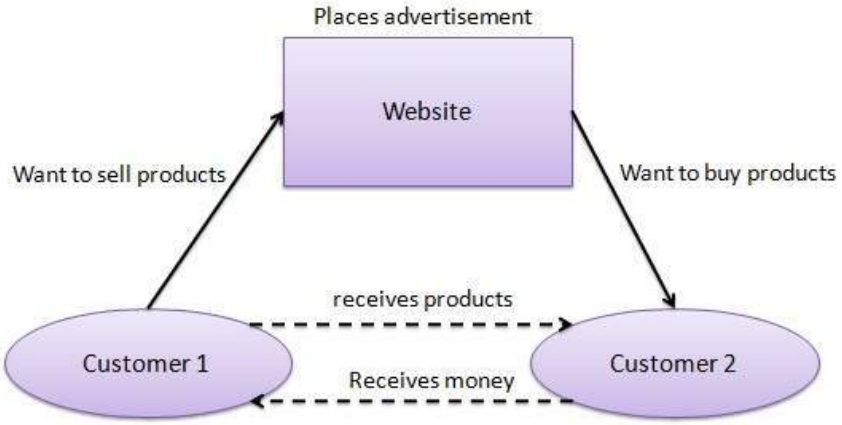


As per Kenneth C. Laudon and Carol Guercio Traver in their e-commerce textbook, *E-Commerce: Business. Technology. Society, take a slightly different approach to classification of business models. They list and describe various models by type or mode of electronic commerce—B2C (portal, e-tailer, content provider, transaction broker, market creator, service provider, community provider), For each model, the authors include variations ("submodels"), examples, a description, and revenue model(s).*

3. E-Commerce - C2C Models :

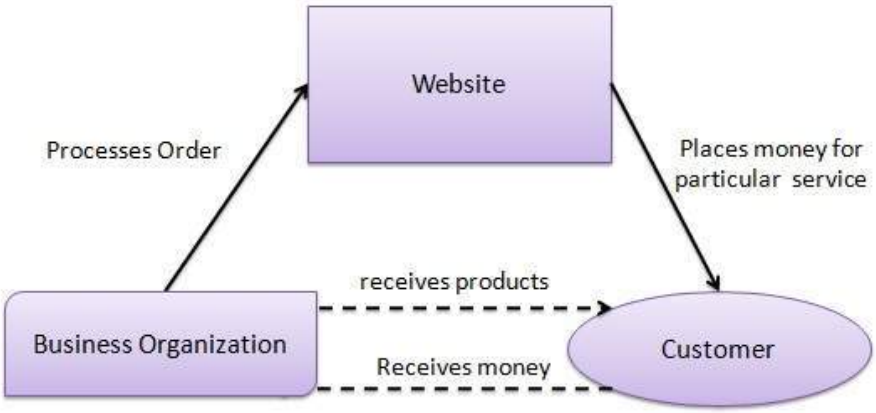
Website following C2C business model helps consumer to sell their assets like residential property, cars, motorcycles etc. or rent a room by publishing their information on the

website. Website may or may not charge the consumer for its services. Another consumer may opt to buy the product of the first customer by viewing the post/advertisement on the website.



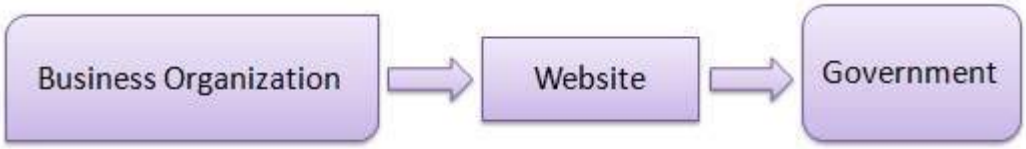
4. Consumer - to - Business (C2B)

In this model, a consumer approaches website showing multiple business organizations for a particular service. Consumer places an estimate of amount he/she wants to spend for a particular service. For example, comparison of interest rates of personal loan/ car loan provided by various banks via website. Business organization who fulfills the consumer's requirement within specified budget approaches the customer and provides its services.



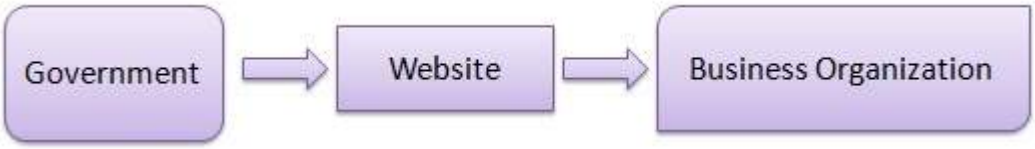
5. Business - to - Government (B2G)

B2G model is a variant of B2B model. Such websites are used by government to trade and exchange information with various business organizations. Such websites are accredited by the government and provide a medium to businesses to submit application forms to the government.



6. Government - to - Business (G2B)

Government uses B2G model website to approach business organizations. Such websites support auctions, tenders and application submission functionalities.



7. Government - to - Citizen (G2C)

Government uses G2C model website to approach citizen in general. Such websites support auctions of vehicles, machinery or any other material. Such website also provides services like registration for birth, marriage or death certificates. Main objectives of G2C website are to reduce average time for fulfilling people requests for various government services.

TABLE 2.2 FIVE PRIMARY REVENUE MODELS

REVENUE MODEL	EXAMPLE	REVENUE SOURCE
Advertising	Yahoo.com	Fees from advertisers in exchange for advertisements
Subscription	WSJ.com, Consumerreports.org, Sportsline.com	Fees from subscribers in exchange for access to content or services
Transaction Fee	eBay.com, E-Trade.com	Fees (commissions) for enabling or executing a transaction
Sales	Amazon.com, DoubleClick.net, Salesforce.com	Sales of goods, information, or services
Affiliate	MyPoints.com	Fees for business referrals

Rappa M (2007) [1], and Applegate L. M. (2001) [2], identified some of the e-business models.

The first approach of classifying e-business models as given in Rappa M (2007) [1], and Applegate L. M. (2001) [2], is listed below :

(1) Brokerage E- Business Model : (B2B, B2C, C2C) The Brokerage e-business model is a website that brings two parties together to conduct business, The best example of this is online auctions like Ebay. However it is not limited to online auctions, Online Real estate, business brokers, boat brokers etc also use this method. They generally collect a fee for their service which can be worked out with a percentage base or a set fee. Brokers are market makers. They bring buyers and sellers together and facilitate transactions in B2C, B2B, or C2C markets.

- Marketplace Exchange
- Buy/Sell Fulfillment
- Demand Collection System
- Auction Broker
- Transaction Broker
- Distributor

- Search Agent
- Virtual Marketplace

(2) Advertising E-Business Model : (B2C) The advertising e-business model is based on advertising in daily newspapers and monthly magazines. The company can collect revenue either by renting a small space on its pages or getting paid for every click on the advertisement. Google adsense is a perfect example of this. There are many paths out there regarding online advertising company to explore. Advertising should always be targeted directly at the readers to compliment websites content, most advertising companies are good at doing this job. This model is an extension of the traditional media broadcasting model. This model only works when the volume of viewer traffic is large or highly specialized.

- Portal
- Classifieds
- User Registration
- Query-based Paid Placement
- Contextual Advertising
- Content-Targeted Advertising
- Intromercials
- Ultramercials

(3) Infomediary E-Business Model : (B2B, B2C) The Information e-business model is based largely around specialized information on a particular subject. These websites can attract a large following of people interested in their specific field of knowledge and will use E-business models, other than their specialized information, to create revenue. Data about consumers and their buying habits are extremely valuable, especially when that information is carefully analyzed and used to target marketing campaigns. Independently collected data about products are useful to consumers. Infomediaries provide information to both buyers and sellers.

- Advertising Networks
- Audience Measurement Services
- Incentive Marketing
- Metamediary

(4) Merchant E-Business Model : (B2C) The merchant e-business model is the online version of local store. Some of these may have a brick and mortar store and an Internet store "bricks and clicks", but the great majority are solely online. They accept online payment methods and ship the merchandise to the customer, or they use a 3rd party online shipping and warehousing service. These companies warehouse and ship goods directly to the customer. These are classic wholesalers and retailers of goods and services—in other words, "e-tailers."

- Virtual Merchant
- Catalog Merchant
- Click and Mortar
- Bit Vendor

(5) Manufacturer (Direct) E-Business Model: (B2C) This model is predicated on the power of the Web to allow manufacturers to reach buyers directly and thereby compress the distribution channel.

- Purchase
- Lease
- License
- Brand Integrated Content

(6) Affiliate E-Business Model : (B2B, B2C) The affiliate e-business model is based on commission sales. The affiliated company need not have to buy the product to resell, and it

need not involved in the handling or shipping. All of this is done by the parent company. The affiliated company simply redirect the customer from its own website to the product on the parent company's website and if they make a purchase affiliated company earn a commission. Amazon is a good example of a parent company. They were, infact, the first company to use this method of selling, allowing anyone to sell and get commission through Amazons merchandise. This model provides purchase opportunities from a number of different sites. The affiliate sites provide purchase-point click-through to the merchant.

- Banner Exchange
- Pay-Per-Click
- Revenue Sharing

(7) Community E-Business Model: (B2B, B2C, C2C) Users who have a common interest in an area congregate at community Web sites. The viability of the community model is based on user loyalty.

- Open Source
- Public Broadcasting
- Knowledge Networks

(8) Subscription E-Business Model : (B2C, C2C) In the Subscription e-business model customers pay a set fee on a monthly or yearly basis to get access to the products or services of the company. Some good examples of this model are online newspapers or magazines, adult websites, and Internet service providers. In this model, users are charged a periodic fee to subscribe to a service.

- Content Services
- Person-to-Person Networking Services
- Trust Services
- Internet Service Providers

(9) Utility E-Business Model: (B2C, C2C) A metered usage or pay-as-you-go approach.

- Metered Usage
- Metered Subscriptions

(10) Focused Distributor E-Business Models: (B2C) provide products and services related to a specific industry or market niche.

- Retailer: Like brick-and-mortar equivalents, e-tailers assume control of inventory, set a nonnegotiable price, and sell physical products (Amazon.com, LandsEnd.com).
- Marketplace: Marketplaces make their money through commissions and transaction fees when they sell information-based products and services online at a nonnegotiable price, without taking control of physical inventory (Quicken Insurance, E-Loan).
- Aggregators: Aggregators provide information on products or services for sale by others, but do not complete the final transaction. Their main revenue source is advertising and referral fees (InsWeb, Autoweb).
- Infomediary: This special class of aggregator unites buyers and sellers of information. Because no physical product is involved, the transaction can be completed online. Again advertising and referral fees are the main source of revenue (Office.com).
- Exchange: These sellers may or may not take control of physical inventory and may or may not complete the final sales transaction online. The key differentiating feature of this model is that the price is not set; the buyer and seller negotiate the price at the time of the sale (Priceline, eBay).

(11) Portal E-Business Models : (B2B, B2C, C2C) A portal is a gateway or entry, and on the Web a portal business model provides a gateway for consumers to gain access to content or services.

- Horizontal Portals: The giants of the portal model, these sites provide a gateway to the Internet's vast store of content, and also a broad range of tools for locating information (e.g.,

search engines) and Web services (e.g., e-mail, personalized pages, home pages). Their goal is to "attract eyeballs" to appeal to advertisers, which is their primary source of revenue (Yahoo!, Microsoft's MSN).

- Vertical Portals: While horizontal portals try to appeal to everyone, a vertical portal specializes in a particular area. Lacking the huge traffic of horizontal portals, vertical portals cannot depend on advertising as a primary source of revenue. Instead commissions and referral fees take up a much larger portion of their revenue (Expedia).
- Affinity Portals: These are the most specialized portals of all, offering deep content, commerce, and community features to a specific market segment. Like vertical portals, affinity portals must depend on a variety of revenue sources (iVillage.com, TheKnot.com).

(12) Producer E-Business Models: (B2B, B2C) Producers design, produce, and distribute products and services that meet customer needs. These are usually brick-and-mortar firms that are integrating the Internet into their core business activities.

- Manufacturers use the Internet to design, produce, and distribute physical products (Ford, Pepsi).
- Service providers produce and deliver a wide range of online service offerings (American Express, Citigroup).
- Educators create and deliver online educational offerings (Harvard Business School).
- Advisors provide online consulting and advice (Accenture, IBM Business Consulting Services).
- Information and new services providers create, package, and deliver online information (*Wall Street Journal* online).
- Custom suppliers design, produce, and distribute customized products and services (Boeing, McGraw-Hill).

(13) Infrastructure Provider E-Business Models : (B2B, B2C) Unlike previous business models that use the digital infrastructure of the Internet, these models provide that infrastructure.

- Infrastructure retailers sell the infrastructure (CompUSA).
- Infrastructure marketplaces take inventory and complete the sales transactions (TechData, MicroAge).
- Infrastructure exchanges (Converge).
- Horizontal infrastructure portals include, principally, Internet service providers, network service providers, and Web hosting providers (AOL, Sprint).
- Vertical infrastructure portals host software applications for rent (Oracle Business online).
- Equipment/Component Manufacturers
- Software Firms
- Infrastructure Services Firms
- Custom Suppliers, Hardware
- Custom Suppliers, Software

The second approach is proposed by Peter Weill and Michael Vitale (2001) [3] offer eight "atomic business models." Instead of trying to specify a comprehensive list, as Rappa [1] and Applegate [2] have done, these authors define eight models that can be combined (like atoms combine to form molecules) in multiple ways to represent virtually any kind of business model. The atomic business models are:

(1) **Content Provider**: Provides content (information, digital products, and services) via intermediaries.

(2) **Direct to Consumer:** Provides goods or services directly to the customer, often bypassing traditional channel members.

(3) **Full Service Provider:** Provides a full range of services in one domain (e.g., financial, health, industrial chemicals) directly and attempts to own the primary consumer relationship.
(4) **Intermediary:** Brings together buyers and sellers by concentrating information.
(5) **Shared Infrastructure:** Brings together multiple competitors to cooperate by sharing common IT infrastructure.
(6) **Value Net Integrator:** Coordinates activities across the value net by gathering, synthesizing, and distributing information.
(7) **Virtual Community:** Creates and facilitates an online community of people with a common interest, enabling interaction and service provision.
(8) **Whole of Enterprise:** Provides a firm-wide single point of contact, consolidating all services provided by a large multiunit organization.

The third approach of e-business model is suggested by Cisco managers Armir Hartman and John Sifonis (2000) [4] who have developed "extended e-conomy business models" and identified five extended business models that are changing the way value is delivered. Successful Net Ready organizations take on one or more of these models. Many business model experts consider their description of the infomediary model to be one of the best available. Their "extended e-conomy business models" are:
(1) **E-Business Storefront :** An entity in which commerce occurs, margin is created, and value is extracted using existing as well as new digital market channels. When end users need to buy something, chances are they go to an e-business storefront.
(2) **Infomediary :** An entity that brokers content, information, knowledge, or experiences that add value to a particular e-business transaction; also known as a content aggregator.
(3) **Trust Intermediary :** An entity that creates trust between the buyer and seller. These firms provide a secure environment in which buyers and sellers can confidently exchange value.
(4) **E-Business Enabler :** An entity that creates and maintains an infrastructure in which product and service providers can conduct transactions reliably and securely.
(5) **Infrastructure Providers/Communities of Commerce** : Members aggregated across a set of complementary interests (products, content, and services) and markets; communities of enterprises organized around common interests through a common infrastructure.

The fourth approach of classification of e-business models is Business Models for Electronic Markets: Perhaps the earliest attempt to construct a taxonomy of e-business models by Paul Timmers (1998) [5]. Timmers in his article, provides brief descriptions, benefits (for businesses, customers, suppliers), and examples of 11 models: e-shop, e-procurement, e-auction, e-mall, third party marketplace, virtual community, value chain service provider, value chain integrator, collaboration platform, information brokerage, and trust services as explained below :

1. E-shop model :

This is the most ubiquitous form of commerce on the World Wide Web. It involves a company presenting a catalogue of its wares to Internet users and providing facilities whereby such customers can purchase these products. Almost invariably such a site will contain facilities for ordering and paying for products by means of credit cards. The sophistication of sites described by this business model range from just the simple presentation of a static catalogue to the presentation of an interactive catalogue, the display of samples of products – for example the use of sound clips in a site selling CDs – the maintenance of mailing lists and the ability for customers to post reviews or customer reactions to specific products. Sites described by the e-shop model provide global presence, a

cheap way to place products in front of an audience and decrease marketing and promotion costs.

2. E-auction model :

This model describes sites which electronically simulate the bidding process in a conventional physical auction. Such sites can range in sophistication from those which present a simple catalogue of items to those which offer multimedia presentations. Most sites which are described by this business model are concerned with selling items to individual consumers. However, there are an increasing number of sites which provide facilities for businesses to auction products to other businesses. Revenues are raised by this form of site by charging for a transaction and for advertising. Some sites also sell the technology they use to other sites.

3. E-procurement model :

'Procurement' is the term used to describe the tendering of goods and services: a company decides that it requires some goods, say a fleet of cars for its sales force. It would then announce this publicly and invite a number of auto companies to bid for the business. Many companies are now switching to the Web for the procurement process. A Web site devoted to procurement will normally advertise current procurement opportunities, provide forms facilities for companies interested in tendering and provide facilities whereby the progress of a tender can be tracked. There are a number of advantages in carrying out the procurement process electronically. For suppliers it means that there are often more tendering opportunities, lowered cost of tender submission and collaborative tendering with other companies. For the company offering tenders there is a major reduction in costs.

4. E-mall model :

An electronic mall or e-mall is a collection of e-shops which are often devoted to a specific service or product, for example an e-mall might be devoted to selling goods. Associated with a leisure activity such as fishing. Usually e-malls are organised by a company which charges the e-shops for administering their presence: maintaining the Web site, hosting the e-mall, and providing payment and transaction facilities and marketing.

The e-mall operator gains revenue for charging the e-shops; the individual e-shops have the benefits normally associated with e-shops, plus the fact that they are clustered together with other shops which operate in the same market segment and hence attract customers who might be browsing from shop to shop.

5. Virtual communities model :

A virtual community is a Web site which sells some product or service. In this respect there is no difference from an e-shop. The feature which distinguishes a virtual community is that the operator of the Web site provides facilities whereby the customers for a product or a service interact with each other, for example by pointing out ways a product can be improved. Technologies used for this interaction include mailing lists, bulletin boards and FAQ lists. The theory behind virtual communities is that they build customer loyalty and enable the company running the Web site to receive large amounts of feedback on the product or service they sell. A typical company that might run a virtual community would be a software supplier. Customers for software products manufactured by the company might post bug reports, bug fixes and work-around on a set of FAQ pages. Staff from the company would participate in the bulletin boards and also organise the FAQ lists.

Customers are often attracted to companies associated with virtual communities, particularly those that are maintained by companies that sell complex products, in that they see them as readily accessible stores of experience and unbiased advice. A company can make pro<ts from virtual communities in a number of ways. They can charge for participation in the community, and they can benefit from increased sales to customers attracted by the knowledge base held by the company and from a reduction in support costs. The virtual

community model is usually associated with another Internet business model, for example the Amazon Web site is primarily an e-shop; however, the fact that it contains facilities for users to submit reviews and questions to authors and artists gives it the favour of a virtual community.

6. Third party marketplaces model :

A third party marketplace is characterised by Web sites which offer access to a number of related companies, for example companies that are wholesalers of of<ce stationery. A distinguishing feature of this model is that the companies delegate the marketing and sales of their products to the company that administers the marketplace. Typically a Web site which operates as a third party marketplace would provide a common interface to the products or services which are being sold, together with facilities for payment and delivery. A third party marketplace is similar in some ways to the e-mall. The main difference is the fact that the product or service providers within the marketplace are more closely integrated, for example by virtue of the fact that there is a common catalogue interface to the products or services offered.

7. Information brokerage model :

Web sites described by this business model offer access to information – usually business information. For example, a Web site which offers the results of surveys of customer satisfaction for a product such as a car would be used by car hire companies, auto companies and consumer organisations. Major providers in this area provide information derived from financial data such as company performance figures, pension fund performance figures and financial market trends such as the growth of different types of mortgage. Companies whose Internet presence can be described by this business model usually raise revenues by subscription or by a per-transaction charge.

8. Trust brokerage model :

This business model describes those companies or organisations who provide some service connected with security or trust. For example, copyright is a major issue for the Internet. A company might develop a sophisticated graphic which could easily be copied by another company that would then claim that they developed the graphic. A trust company might offer the facility for companies to register their work with them and then be able to testify to the date that the work was registered. Other trust brokers are associated with computer security and, for example, certify that a particular Web site run by a company is in fact associated with that company.

9. Collaboration platforms model :

Companies whose Internet offerings can be described by this business model provide sites which enable companies to collaborate with each other, usually when the companies are spread over large distances. For example, a company which runs a collaboration platform might provide facilities for companies who wish to come together in order to tender for a complex project in a particular market sector such as aerospace.

10. Value chain service provider model :

Specialise in providing functions for specific part of the value chain such as the logistic company United Parcel Services.

11. Value chain integrator model :

They offer a range of service across the value chain.

The fifth approach of classifying e-business models based on the strategy of providing service as:

1. Dynamic pricing model :

The dynamic pricing model is one which has a number of different instantiations. Basically, such models treat the price of a product or service (primarily a product) as variable and open

to negotiation. The name-your-price instantiation of this model is where the customer of a site offers the price that he or she thinks is reasonable for a product or service. The administrator of the Web site will pass on this bid to the provider of the product or service who will decide whether to accept it. The comparison pricing sub-model encompasses Web sites which provide an interface to e-shops that sell a specific product. The model provides the facility for the customer to interrogate a database of product catalogues to look for the cheapest price for a particular product such as book or a CD. The demand sensitive pricing sub-model is based on the fact that suppliers of a product will lower the price of a product if a number of units of that product are included in a single sale. Web sites which employ this model provide facilities whereby consumers can notify each other of their interest in buying a particular product such as a freezer. The site keeps a database of current products that have attracted a number of buyers with a predicted price and allow users to join the database of buyers who are committed to a sale. The bartering sub-model allows consumers to barter services or products for other services or products. A site devoted to this form of economic activity will keep a structured database of items for sale and allows a buyer to barter with a seller.

2. B2B exchanges model :

A B2B exchange is a Web site or collection of Web sites which make the process of carrying out business to business transactions much easier. Under this banner comes sites which enable multiple companies to procure services and products from each other; help businesses form temporary alliances to carry out activities such as joint marketing or project bidding, and enable a marketplace in raw materials to function.

3. Online trading model :

This business model encompasses the trading of financial instruments such as bonds and stocks via the Internet. Online trading has been a feature of the financial industry for some time. However, it was carried out using internal networks. The Internet has enabled the individual user to trade stocks and shares from home and has given rise to the term day trading.

4. E-learning model :

This term is used to describe companies or organisations who offer educational courses via the Web. The quality and features found in sites which can be described by this business model can vary. At its simplest such sites offer students the ability to download conventional texts. More complex instantiations of the model offer the students facilities to read individual lessons, try out online multiple choice questions and experience simulations relevant to the topic being taught.

5. Free products and services model :

It might seem paradoxical to include sites which provide free products or services under the category of business models. Typical sites which come under this category include gaming sites where users can play computer games using their browser, sites which run free raf>es and sites which offer free software. Such sites do not earn any revenues from the products or services they offer; revenue is earned indirectly, for example by means of banner adverts or by receiving revenue from sites which you have to visit before experiencing a service or buying a product. One of the largest free product areas is that of free software. Organisations in this area include those who raise revenues and those who do not. An example of a company in the former category is Red Hat. This is a company that provides free versions of the LINUX operating system. You can download LINUX from the Red Hat Web site and install it on your computer without paying a penny to the company. Red Hat raise their revenues through support, packaging distributions onto CDs and providing services to companies who employ LINUX for application development. Companies such as Red Hat are the analogue of those companies who sell a razor for little or no cost but make their profit

from selling the razor blades. There are a number of sites in the Internet which do not make any money from issuing software. These are sites associated with Open Source development.

Another effort of identifying New Business Models for E-Commerce is made by Dennis Viehland (1999) [6] who has identified three new or emerging business models that the Web made possible—**virtual retailer, distributed storefront, and buyer-led pricing.**

Kenneth C. Laudon and Carol Guercio Traver (2003) [7] in their e-commerce textbook, E-Commerce: Business. Technology. Society, take a slightly different approach to classification of business models. They list and describe various models by type or mode of electronic commerce—B2C (portal, e-tailer, content provider, transaction broker, market creator, service provider, community provider), B2B (e-distributor, e-procurement, exchanges, industry consortia, single-firm networks, industry-wide networks), and others (C2C, peer-to-peer, mobile commerce). For each model, the authors include variations ("submodels"), examples, a description, and revenue model(s).

Another way of classification is given in the book "A Managerial Perspective", published by Turban E. D., et. Al. (2006) [8] includes a list of 17 typical EC business models. While some models on this list are similar to others listed previously, there are some new twists and an emphasis on auction-type models. This list of typical EC business models includes online direct marketing (Wal-Mart), electronic tendering systems (General Electric's Global Exchange Services (GXS), name your own price (Priceline), find the best price (E-Loan), affiliate marketing (Amazon.com), viral marketing (Blue Mountain Arts), group purchasing (LetsBuyIt.com), online auctions (e-Bay), product and service customization (Dell), electronic marketplaces and exchanges (Agentrixcs), information brokers (Google), bartering (BarterOnline), deep discounting (Half.com), membership (Net Market), value-chain integrators (Autos.msn.com), value-chain service providers (United Parcel Service), and supply chain improvers (Orbis).

TABLE 2.3 B2C BUSINESS MODELS

BUSINESS MODEL	VARIATIONS	EXAMPLES	DESCRIPTION	REVENUE MODEL
Portal	Horizontal/General	Yahoo.com, AOL.com, MSN.com, Excite@home.com	Offers an integrated package of services and content such as search, news, e-mail, chat, music downloads, video streaming, and calendars. Seeks to be a user's home base.	Advertising, subscription fees, transaction fees
	Vertical/Specialized (Vortal)	iBoats.com	Offers services and products to specialized marketspace.	Advertising, subscription fees, transaction fees
E-tailer	Virtual Merchant	Amazon.com	Online version of retail store, where customers can shop at any hour of the day or night without leaving home or office.	Sales of goods
	Clicks and Mortar	Walmart.com	Online distribution channel for company that also has physical stores.	Sales of goods
	Catalog Merchant	LandsEnd.com	Online version of direct mail catalog.	Sales of goods
	Online Mall	Fashionmall.com	Online version of mall.	Sales of goods, transaction fees
	Manufacturer-direct	Dell.com	Online sales made directly by manufacturer.	Sales of goods
Content Provider		WSJ.com, Sportsline.com, CNN.com	Information and entertainment providers such as newspapers, sports sites, and other online sources that offer customers up-to-date news and special interest, how-to guidance, and tips and/or information sales.	Advertising, subscription fees, affiliate referral fees

(continued)

TABLE 2.3 B2C BUSINESS MODELS (*CONTINUED*)

BUSINESS MODEL	VARIATIONS	EXAMPLES	DESCRIPTION	REVENUE MODEL
Transaction Broker		E-Trade.com, Expedia.com, Monster.com	Processors of online sales transactions, such as stock brokers and travel agents, that increase customers' productivity by helping them get things done faster and more cheaply.	Transaction fees
Market Creator	Auctions and other forms of dynamic pricing	eBay.com, Priceline.com	Web-based businesses that use Internet technology to create markets that bring buyers and sellers together.	Transaction fees
Service Provider		xDrive.com, whatsitworthtoyou.com, myCFO.com	Companies that make money by selling users a service, rather than a product.	Sales of services
Community Provider		About.com, iVillage.com, BlackPlanet.com	Sites where individuals with particular interests, hobbies, and common experiences can come together and compare notes.	Advertising, subscription, affiliate referral fees

TABLE 2.4 B2B BUSINESS MODELS

BUSINESS MODEL	VARIATIONS	EXAMPLES	DESCRIPTION	REVENUE MODEL
Marketplace/ Exchange (B2B Hub)	Vertical	DirectAg.com, e-Steel.com	Helps bring buyers and sellers together to reduce procurement costs for a specific industry.	Transaction fees
	Horizontal	TradeOut.com	Same as vertical except focused on specific types of products and services.	Transaction fees
E-Distributor		Grainger.com	Connecting businesses directly with other businesses, reducing sales cycles and mark-up.	Sales of goods
B2B Service Provider	Traditional	Employeematters.com	Supports companies through online business services.	Sales of services
	Application Service Provider (ASP)	Salesforce.com, Corio.com	Rents Internet-based software applications to businesses.	Rental fees
Matchmaker		iShip.com	Helps businesses find what they want and need on the Web.	Transaction fees
Infomediary	Audience Broker	DoubleClick.net	Gathers information about consumers and uses it to help advertisers find the most appropriate audience.	Sales of information
	Lead Generator	AutoByTel.com	Gathers customer data, and uses it to direct vendors to customers.	Referral fee

TABLE 2.5 BUSINESS MODELS IN EMERGING E-COMMERCE AREAS

TYPE	MODEL	EXAMPLE	DESCRIPTION	REVENUE MODEL
Consumer-to-consumer	Market Creator	eBay.com, Half.com	Helps consumers connect with other consumers who have items to sell.	Transaction fees
Peer-to-peer	Content Provider	Napster.com, My.MP3.com	Technology enabling consumers to share files and services via the Web.	Subscription fees, advertising, transaction fees
M-commerce	Various	Amazon.com	Extending business applications using wireless technology.	Sales of goods

IDEAL BUSINESS E-COMMERCE MODEL :

As per the ideal business model developed by Aithal P.S. (2015) [27], the various ideal properties are separated under input conditions, market conditions, system requirements, and output conditions and is shown in figure 1. The various properties of ideal business are listed below :

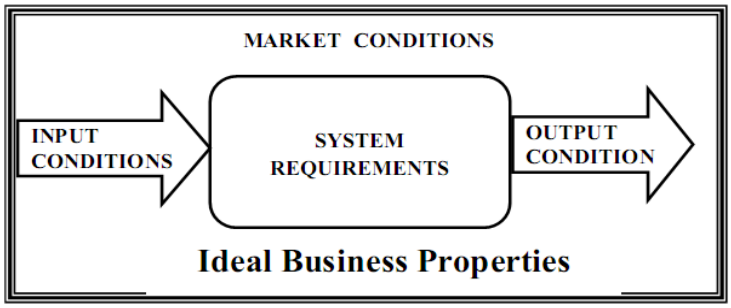


Figure 1 : Categorization of ideal business properties/characteristics.

A. Market Conditions :

1) The Ideal Business sells its products/services to the entire world rather than a single neighborhood and hence it has an unlimited global market.

2) The Ideal Business offers a product/service, which enjoys an inelastic demand in the market. (inelastic refers to a product that people need or desire almost at any price.)

3) The Ideal Business markets a product/service that cannot be easily copied. This means that the product/service is an original or, at least, it is something that can be copyrighted or patented.

B. Input Conditions

1) The Ideal Business has minimal labor requirements. The fewer personnel, the better is the business.

2) The Ideal Business operates on a low overhead. It does not need an expensive location. It does not need large amounts of electricity, or advertising, or legal advice, or high-priced employees, or a large inventory.

3) The Ideal Business does not require big cash outlays or major investments in equipment or product. In other words, it does not require huge capital.

C. System Requirements

1) The Ideal Business is relatively free of all kinds of government regulations or restrictions.

2) The Ideal Business is portable or easily moveable. This means one can shift his business and himself anywhere he wants to.

3) The Ideal Business satisfies its owner‟s intellectual needs. There is nothing like being fascinated with what he does.

4) The Ideal Business leaves enough free time to its owner. In other words, it doesn't require his labor and attention of 12, 16, or 18 hours a day.

5) The Ideal Business is one in which the income is not limited by personal output (Leverage). In the Ideal- Business, one can have 10,000 customers as easily as can have one."

6) The ideal Business will not have any liability after sales.

7) The ideal Business will not have problems like seasonality, perishability and price drop

D. Output Conditions

1) In ideal Business the demand is always very high than supply and the efficiency of production is always 100%.

2) The ideal Business will be sustainable for long time.

The above properties are ideal in nature and cannot be completely realized in practice. However, many of the ideal business model properties can be closely achievable in mobile business e-commerce model for intangible products.

2.7 Security Issues in E-commerce ;

Security is an essential part of any transaction that takes place over the internet. Customer will loose his/her faith in e-business if its security is compromised. Following are the essential requirements for safe e-payments/transactions −

- **Confidential** − Information should not be accessible to unauthorized person. It should not be intercepted during transmission.
- **Integrity** − Information should not be altered during its transmission over the network.
- **Availability** − Information should be available wherever and whenever requirement within time limit specified.
- **Authenticity** − There should be a mechanism to authenticate user before giving him/her access to required information.
- **Non-Repudiabiity** − It is protection against denial of order or denial of payment. Once a sender sends a message, the sender should not able to deny sending the message. Similary the receipient of message should not be able to deny receipt.

- **Encryption** − Information should be encrypted and decrypted only by authorized user.
- **Auditability** − Data should be recorded in such a way that it can be audited for integrity requirements.

Measures to ensure Security :

Major security measures are following −

- **Encryption** − It is a very effective and practical way to safeguard the data being transmitted over the network. Sender of the information encrypt the data using a secret code and specified receiver only can decrypt the data using the same or different secret code.
- **Digital Signature** − Digital signature ensures the authenticity of the information. A digital signature is a e-signature authentic authenticated through encryption and password.
- **Security Certificates** − Security certificate is unique digital id used to verify identity of an individual website or user.

Security Threats :

Three types of security threats

- *–denial of service,*
- *–unauthorized access, and*
- *–theft and fraud*

(1) Security (DOS): Denial of Service (DOS)

• Two primary types of DOS attacks: spamming and viruses

• Spamming

–Sending unsolicited commercial emails to individuals

–E-mail bombing caused by a hacker targeting one computer or network, and sending thousands of email messages to it.

–Surfing involves hackers placing software agents onto a third-party system and setting it off to send requests to an intended target.

–DDOS (distributed denial of service attacks) involves hackers placing software agents onto a number of third-party systems and setting them off to simultaneously send requests to an intended target

• Viruses: self-replicating computer programs designed to perform unwanted events.

• Worms: special viruses that spread using direct Internet connections.

• Trojan Horses: disguised as legitimate software and trick users into running the program

(2) Security (unauthorized access)

• Illegal access to systems, applications or data

• Passive unauthorized access –listening to communications channel for finding secrets.

–May use content for damaging purposes

• Active unauthorized access

–Modifying system or data

–Message stream modification

• Changes intent of messages, e.g., to abort or delay a negotiation on a contract

• Masquerading or spoofing –sending a message that appears to be from someone else.

–Impersonating another user at the ―name‖(changing the ―From‖field) or IP levels (changing the source and/or destination IP address of packets in the network)

• Sniffers–software that illegally access data traversing across the network.

• Software and operating systems‘ security holes

(3) Security (theft and fraud)

• Data theft already discussed under the unauthorized access section

• Fraud occurs when the stolen data is used or modified.

• Theft of software via illegal copying from company‘s servers.

• Theft of hardware, specifically laptops.

Security Protocols in Internet :

Following are the popular protocols used over the internet which ensures security of transactions made over the internet.

(1) Secure Socket Layer (SSL)

It is the most commonly used protocol and is widely used across the industry. It meets following security requirements −

- Authentication
- Encryption
- Integrity
- Non-reputability

"https://" is to be used for HTTP urls with SSL, where as "http:/" is to be used for HTTP urls without SSL.

(2) Secure Hypertext Transfer Protocol (SHTTP)

SHTTP extends the HTTP internet protocol with public key encryption, authentication and digital signature over the internet. Secure HTTP supports multiple security mechanism providing security to end users. SHTTP works by negotiating encryption scheme types used between client and server.

(3) Secure Electronic Transaction

It is a secure protocol developed by MasterCard and Visa in collaboration. Thereoritically, it is the best security protocol. It has following components −

- **Card Holder's Digital Wallet Software** − Digital Wallet allows card holder to make secure purchases online via point and click interface.
- **Merchant Software** − This software helps merchants to communicate with potential customers and financial institutions in secure manner.
- **Payment Gateway Server Software** − Payment gateway provides automatic and standard payment process. It supports the process for merchant's certificate request.
- **Certificate Authority Software** − This software is used by financial institutions to issue digital certificates to card holders and merchants and to enable them to register their account agreements for secure electronic commerce.

SECURE ONLINE SHOPPING GUIDELINES :

1. Shop at Secure Web Sites

How can you tell if a Web site is secure? Secure sites use encryption technology to transfer information from your computer to the online merchant's computer. Encryption scrambles the information you send, such as your credit card number, in order to prevent computer hackers from obtaining it en route. The only people who can unscramble the code are those with legitimate access privileges. Here's how you can tell when you are dealing with a secure site:

- If you look at the top of your screen where the Web site address is displayed (the "address bar"), you should see https://. The "s" that is displayed after "http" indicates that Web site is secure. Often, you do not see the "s" until you actually move to the order page on the Web site.
- Another way to determine if a Web site is secure is to look for a closed padlock displayed on the address bar of your screen. If that lock is open, you should assume it is not a secure site. Of course, transmitting your data over secure channels is of little value to you if the merchant stores the data unscrambled. You should try to find out if the merchant stores the data in encrypted form. If a hacker is able to intrude, it cannot obtain your credit data and other personal information. Be sure to read the merchant's privacy and security policies to learn how it safeguards your personal data on its computers.

2. Research the Web Site before You Order

Do business with companies you already know. If the company is unfamiliar, do your homework before buying their products. If you decide to buy something from an unknown company, start out with an inexpensive order to learn if the company is trustworthy. Reliable companies should advertise their physical business address and at least one phone number, either customer service or an order line. Call the phone number and ask questions to determine if the business is legitimate. Even if you call after hours, many companies have a "live" answering service, especially if they don't want to miss orders. Ask how the merchant handles returned merchandise and complaints. Find out if it offers full refunds or only store credits. You can also research a company through the

Better Business Bureau (see listing below), or a government consumer protection agency like the district attorney's office or the Attorney General. Perhaps friends or family members who live in the city listed can verify the validity of the company. Remember, anyone can create a Web site.

3. Read the Web Site's Privacy and Security Policies

Every reputable online Web site offers information about how it processes your order. It is usually listed in the section entitled ―Privacy Policy. You can find out if the merchant intends to share your information with a third party or affiliate company. Do they require these companies to refrain from marketing to their customers? If not, you can expect to receive ―spam‖ (unsolicited email) and even mail or phone solicitations from these companies. You can also learn what type of information is gathered by the Web site, and how it is — or is not — shared with others. The online merchant‘s data security practices are also often explained in the Privacy Policy, or perhaps a separate Security Policy. Look for online merchants who are members of a seal-of approval program that sets voluntary guidelines for privacy related practices, such as TRUSTe (www.truste.org), Verisign (www.verisign.com), or BBBonline (www.bbbonline.org). However, be aware that a strong privacy policy and membership in a Web-seal program don‘t guarantee that the Web merchant will protect your privacy forever. Policies can change. The company can file for bankruptcy and sell its customer data base. The Web merchant might be purchased by another company with a weaker privacy policy. And the company‘s data can be subpoenaed for law enforcement investigations or civil cases. You have little control over the use of your customer data in such matters.

Given all of these uncertainties, you will want to think about the sensitivity of the data that is being compiled about you when you shop online. We cannot prescribe the best approach to take. Each consumer has a different interpretation of what is considered ―sensitive.

4. Be Aware of Cookies and Behavioural Marketing

Online merchants as well as other sites watch our shopping and surfing habits by using "cookies," an online tracking system that attaches pieces of code to our Internet browsers to track which sites we visit as we search the Web. "Persistent" cookies remain stored on your computer while "session" cookies expire when you turn the browser off. Online merchants use cookies to recognize you and speed up the shopping process the next time you visit. You may be able to set your browser to disable or refuse cookies but the trade-off may limit the functions you can perform online, and possibly prevent you from ordering online. Generally, you will need to enable session cookies to place an order. Privacy advocates worry that as more and more data is compiled about us — without our knowledge or active consent — it will be combined to reveal a detailed profile, even our actual identities. This data is often collected to market goods and services to us, encouraging us to buy them.

There are a number of companies that specialize in targeted online advertising called "behavioral marketing." Companies say consumers benefit by being exposed to more targeted advertising and that online merchants can make more money more efficiently by targeting the right shoppers.

For example, you might buy a book on golf from Amazon, visit the Professional Golfer's Association site, purchase golf shoes at Zappos, and search online for golf courses near your home. When you do, a cookie or your computer's Internet Protocol (IP) address could be used to generate golf-related ads. When you open the USA Today site to read the morning news, you may see an ad offering you a new set of clubs at a discount. When you go back to Amazon later that day you might be offered a biography of Tiger Woods.

What if your behavioral marketing profile is shared with others, without your permission? You might not care if a drug company shares your prescription drug information with a coupon service to save you money. But what if that same information were obtained by your employer, resulting in more expensive health insurance coverage?

5. What's Safest: Credit Cards, Debit Cards, Cash, or Checks?

The safest way to shop on the Internet is with a *credit card*. In the event something goes wrong, you are protected under the federal Fair Credit Billing Act. You have the right to dispute charges on your credit card, and you can withhold payments during a creditor investigation. When it has been determined that your credit was used without authorization, you are only responsible for the first $50 in charges. You are rarely asked to pay this charge. Make sure your credit card is a true credit card and not a debit card, a check card, or an ATM card. As with checks, a debit card exposes your bank account to thieves. Your checking account could be wiped out in minutes. Further, debit and ATM cards are not protected by federal law to the extent that credit cards are.

The ―Restore Online Shoppers‘ Confidence Act‖ (P.L. 111-345) (signed December 29, 2010) makes it illegal for a company that sells goods or services online to give a consumer‘s credit card number (or other financial account number) to a third-party for sales purposes. This practice is known as ―data passing. The Act prohibits a third-party seller from charging a consumer for any good or service, unless the seller (1) clearly and conspicuously discloses the material offer terms and that the third-party seller is not affiliated with the initial merchant and (2) receives express consent for the charge from the consumer. The third-party seller must obtain the full financial account number directly from the consumer. The initial online seller may not transfer a consumer‘s financial account number to a third-party seller. The Act also regulates ―negative option‖ plans. A consumer must give express, informed consent before being charged for goods or services sold online through ―negative option‖ marketing, such as ―free trials‖ that the consumer must cancel in order to avoid being

charged. Companies that use negative option plans must (1) clearly and conspicuously disclose the material terms of the transaction before obtaining the consumer‘s billing information, (2) obtain a consumer‘s express consent before charging the consumer, and (3) provide a simple mechanism to stop any recurring charges. Online shopping by *check* leaves you vulnerable to bank fraud. And sending a cashier's check or money order doesn't give you any protection if you have problems with the purchase. Never pay for online purchases by using a *money transfer service*. You could be transferring cash to a fraudster. Scammers will ask consumers to send them payment using a money transfer service such as Western Union or MoneyGram because they can get your cash fast and it‘s difficult to trace. Legitimate sellers normally do not ask consumers to send payment that way. Money transfer services should only be used to send money to people that you know well, not to unknown sellers of merchandise online.

6. Never Give Out Your Social Security Number

Providing your Social Security number is not a requirement for placing an order at an online shopping site. There is no need for the merchant to ask for it. Giving out your Social Security number could lead to having your identity stolen.

7. Disclose Only the Bare Facts When You Order

When placing an order, there is certain information that you must provide to the web merchant such as your name and address. Often, a merchant will try to obtain more information about you. They may ask questions about your leisure lifestyle or annual income. This information is used to target you for marketing purposes. It can lead to "spam" or even direct mail and telephone solicitations. Don't answer any question you feel is not required to process your order. Often, the web site will mark which questions need to be answered with an asterisk (*). Should a company require information you are not comfortable sharing, leave the site and find a different company for the product you seek.

8. Keep Your Password Private

Many online shopping sites require the shopper to log-in before placing or viewing an order. The shopper is usually required to provide a username and a password. Never reveal your password to anyone. When selecting a password, do not use commonly known information, such as your birthdate, mother's maiden name, or numbers from your driver's license or Social Security number. Do not reuse the same password for other sites, particularly sites associated with sensitive information. The best password has at least eight characters and includes numbers and letters.

9. Check the Web Site Address

The address bar at the top of your device's screen contains the web site address (also called the URL, or Uniform Resource Locator). By checking that address, you can make sure that you are dealing with the correct company. Don‘t click on any link embedded within a potentially suspicious email. Instead, start a new Internet session by typing in the link‘s URL into the address bar and pressing ―Enter‖ to be sure you are directed to a legitimate Web site.

10. Don't Fall for "Phishing" Messages

Identity thieves send massive numbers of emails to Internet users that ask them to update the account information for their banks, credit cards, online payment service, or popular shopping sites. The email may state that your account information has expired, been compromised or lost and that you need to immediately resend it to the company. Some emails sent as part of such ―phishing‖ expeditions often contain links to official-looking Web pages. Other times the emails ask the consumer to download and submit an electronic form. Remember, legitimate businesses don‘t ask for sensitive information via email. Don‘t respond to any request for financial information that comes to you in an email. Again, don‘t click on any link embedded within a suspicious email, and always call the retailer or financial institution to verify your account status before divulging any information.

11. Always Print or Save Copies of Your Orders

After placing an order online, you should receive a confirmation page that reviews your entire order. It should include the costs of the order, your customer information, product information, and the confirmation number.

We recommend you print out or save a copy of the Web page(s) describing the item you ordered as well as the page showing company name, postal address, phone number, and legal terms, including return policy. Keep it for your own records for at least the period covered by the return/warranty policy. Often you will also receive a confirmation message that is emailed to you by the merchant. Be sure to save and/or print this message as well as any other e-mail correspondence with the company.

12. Shop with Companies Located in the United States

When you shop within the U.S., you are protected by state and federal consumer laws. You might not get the same protection if you place an order with a company located in another country.

13. Pay Attention to Shipping Facts

Under the law, a company must ship your order within the time stated in its ad. If no time frame is stated, the merchant must ship the product in 30 days or give you an "Option Notice." This gives you an opportunity to cancel the order and receive a prompt refund, or agree to the delay. Here are key shipping questions to ask:

- Does the site tell you if there are geographic or other restrictions for delivery?
- Are there choices for shipping?
- Who pays the shipping cost?
- What does the site say about shipping insurance?
- What are the shipping and handling fees, and are they reasonable?

14. Learn the Merchant's Cancellation, Return and Complaint-Handling Policies

Even under the best of circumstances, shoppers sometimes need to return merchandise. Check the Web site for cancellation and return policies. Be sure to check for the following:

 Who pays for shipping?
 Is there a time limit or other restrictions to the return or cancellation?
 Is there a restocking charge if you need to cancel or return the order?
 Do you get a store credit, or will the company fully refund your charges to your credit card? If the merchant only offers store credits, find out the time restriction for using this credit
 Does the merchant post a phone number and/or email address for complaints?
 How long has the company been in business?
 Will they still be around when you need them?
 Is there an easy, local way for you to get repairs or service?
 Is there a warranty on the product, and who honors that guarantee?
 What are the limits, and under what circumstances can you exercise your warranty rights?

Don't expect less customer service just because a company operates over the Internet. This is especially important if you are buying something that may need to be cleaned or serviced on occasion.

15. Use Shopper's Intuition

Look at the site with a critical eye. And heed the old adage, "If it looks too good to be true, it probably is." If any of these questions trigger a warning bell in your head, you will be wise to find another online merchant:

 Are there extraordinary claims that you question?
 Do the company's prices seem unusually low?
 Does it look like the merchant is an amateur?
 Are there a lot of spelling or grammar errors?
 Does the company's phone go unanswered.
 The use of a post office box might not send up a red flag, but a merchant who does not also provide the company's physical address might be cause for concern.

16. Be Wary of Identity Theft

As online shopping becomes more common, there will be more cases of identity theft committed over the Internet. Imposters are likely to obtain their victims' identifying information using low-tech means like dumpster diving, mail theft, or workplace access to SSNs. But they are increasingly using the Web to apply for new credit cards and to purchase goods and services in their victims' names. The same advice for avoiding low-tech identity theft applies to shopping on the Internet. Many are mentioned in the above tips. Most important: Be aware of who you are buying from. And use *true* credit cards for purchases, not debit cards. Check your credit card bills carefully for several months after purchasing on the Internet. Look for purchases you did not make. If you find some, immediately contact the credit card company and file a dispute claim.

2.8 APPLICATIONS OF E-COMMERCE

Following are some of the widely used e-commerce applications.

(1) Internet Bookshops ;

It is one of the first applications of e-commerce on Internet. Books as an item of merchandize have the following significant advantages for the online retailers:

• Books can be described well on the Internet. Moreover, it is not an item, which is required to be checked physically.

• Normally, the books have nominal prices and not too much risk is involved in the online payments.

• Books are small items and can be delivered in the customer’s letterbox. The customer does not need to be at home.

Amazon.com is an example of Internet bookshops. The large online bookstores need a sophisticated website, both to attract and retain the attention of their customers. The facilities of the online bookshop may include:

• A large database of books. The details available for display include a picture of the cover, description of the book including page numbers, price of the book and reviews of other customers also if possible.
• The book can be searched with the help of search engines. The search can be made on the author's name, title of the book or the subject etc.
• There may be software on the site, that may record the interest of the particular customer and can inform the customer on the new arrivals on that subject.
Some large online bookshop sites are:
• www.amazon.com
• www.barnsandnoble.com
• www.bol.com
• www.bookshop.blackwell.co.uk

(2) Grocery Supplies
One who goes to purchase items from the supermarket must be aware of some of the similar problems as described below.
• The customer has to plan to go to the supermarket at the scheduled time of opening of the supermarket.
• The car park may be overcrowded.
• The supermarket may also have a big crowd.
• You have to pick the items and wait for your turn for billing.
• You have to unload the items on the checkout, reload into bags, load again into the car, take to the home and unload again from the car.
All these problems may be resolved with the help of online supermarket. The online supermarket is set up to meet the needs of those who cannot get to the supermarket or those who do not want to go.
The online supermarket is similar to any other online shop. The customer has to log-on on the site and select the groceries that are required. The staff pick the goods, pack and dispatch them.
Some of the noteworthy sites for grocery supplies are as follows:
• www.peapod.com
• www.homestore.com
• www.sainsbury.co.uk
• www.tesco.net

(3) Electronic Newspapers
One of the hot areas on the Internet is the electronic newspaper. Electronic newspaper has advantages over both, the printed newspapers and the broadcast news on radio and televisions. In comparison to printed newspaper, the e-newspaper can give up-to-date news similar to broadcast news. Further, the browser could be set to select the news of interest of the reader and to leave out the rest. This is not possible with the broadcast news. Despite the said advantages, the electronic newspapers are not being very popular due to the following reasons:
• Radio and television news are often consumed while people are doing other things like eating their foods or driving a car.
• Printed newspapers may be read on the train or in the park and then may be shared with someone else.
• The printed newspapers give the reader the chance to be selective (the selection depends on the moods and time of the reader).

There are a number of online newspapers and most of them are web versions of existing newspapers. For example:
• www.timesofindia.com
• www.dainikjagran.com

(4) Internet Banking

Sometimes the bank, customers want to make an urgent payment but to visit the bank is not convenient. Similarly, to go to the bank to just know the balance is also not justified. Internet banking (or telephone banking) can solve these problems. To solve the problems on phone or Internet is also profitable for banks as it reduces their overheads.
With the help of online banking a customer can check his or her balance at any time of the day or night. The customer can also pay various bills like telephone, electricity etc. without going to the bank or billing centers. The typical services offered by the online banking are as follows:
• The customers can check their account balances at any time.
• The customer can obtain statements regarding any specific debit or credit that has gone through.
• Credit transfers so that bill can be paid online.
• Maintenance of standing orders and direct debits.
• The major service that is not provided is cash in and cash out. To get the money, the customer has to go to the bank or ATMs.
Some sites related to Internet banking are as follows:
• www.rbs.co.uk
• www.smile.co.uk
You cannot use the services provided by the online banks till you are not the customer.

(5) Electronic Auctions

Auctions have been a well-established market mechanism for trading items at a market negotiated price, based upon demand and supply. The Internet has added a new dimension by creating an online mechanism for implementing the auction process. Traditional auctions had limited participation of people who turned up at the place of auction. Today, the same auction mechanisms can be implemented using e-commerce technologies, allowing people connected through the Internet to bid. Electronic auctions potentially encourage greater participation as Internet users can connect to a webhosting an auction and bid for an item. www.wbay.com, http://www.wbay.com, and www.auctionindia.com, are the examples of such sites.

Reading 1 : NETWORKS AND INTERNETS :

A computer network consists of two or more computers that are connected to each other using cables and other network devices that handle the flow of data. When you connect two or more computers together, you form a network. Later, if you connect one network to another, you form Internetwork or an Internet, for short. Network technology enables employees to use resources located in computers of different networks, without being influenced by the technology difference behind each of these networks. Figure 1 shows the relationship between networks and Internetworks (Internets).

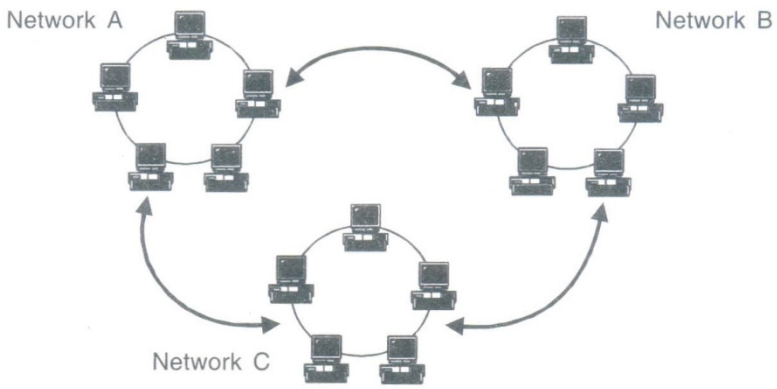


Figure 1 : Relationship between networks and internet.

Through the use of communication switching, computer networks allow computers to transfer data using shared lines of communication such as a cable. Communication switching works similar to telephone switching networks. A telephone switching network eliminates the need to connect a wire between your telephone and every telephone you may ever call. Instead, the phone company connects your phone (and everyone *else's* phone) to a set of switches. When you place a phone call, the switches create the connection between the two phones. Without a telephone switching network, if you needed to call 1000 different *people,* you would need to connect 1000 lines to your phone. In a similar way, computer networks rely on communication switches. Networks use two common methods of communication switching to transfer data-circuit switching and packet switching. In circuit switching, the switches create a single, unbroken path between devices that want to communicate. Most computer networks, including the Internet, do not use circuit switching. They use a technique called packet switching. In a typical terminal-to-host data connection, the line remains idle for most of the time. Thus, with data connections, a circuit-switched approach is inefficient. In a circuit-switched network, the connection provides for transmission at a constant data rate. Thus, each of the two devices that are connected must transmit and receive at the same data rate as the other. This limits the utility of the network in interconnecting host computers and terminals.

In packet switching, In packet switching, data are transmitted in short packets. A typical upper limit on packet length is 1 kilobyte. If a source has a longer message to send, the message is broken up into a series of packets. Each packet contains a portion (or all for a short message) of the user's data, plus some control information. The control information, at a minimum, includes the information that the network requires in order to be able to route the packet through the network and deliver it to the intended destination. At each node on the route, the packet is received, stored briefly, and passed on to the next node. In packet switching, programs break data into small pieces, called *packets,* and then transmit the packets between computers. Packets are pieces of data that adhere to a standard set of rules (protocols) that define their size and format. Unlike circuit switching, in a packet-switched network, data can flow along multiple paths, as shown in Figure 2. In packet-switched networks, breaking one path does not prevent the data from reaching its destination. The packet will simply find a different path. Each packet must contain its destination address. As the packet travels from one computer to another, each computer examines the packet's address and routes the packet to its next intermediate hop or directly to the destination. The Internet is a packet-switched network. Think of a packet in a packet switched network as a traveller flying from New Delhi to Mumbai. Depending on the available flights, the traveller may be able to fly non-stop (if the packet is lucky enough to get a direct connection). In most

cases, however, the traveller must stop at airports along the way (possibly in Ahmedabad or Jaipur). In a similar way, a packet may visit several computers as it travels across the Internet. As signals travel through network media (cables and wires), they become weak. Engineers refer to this weakening of signals as attenuation. To overcome this, the network designers use special networking devices called *repeaters* which amplify network data.

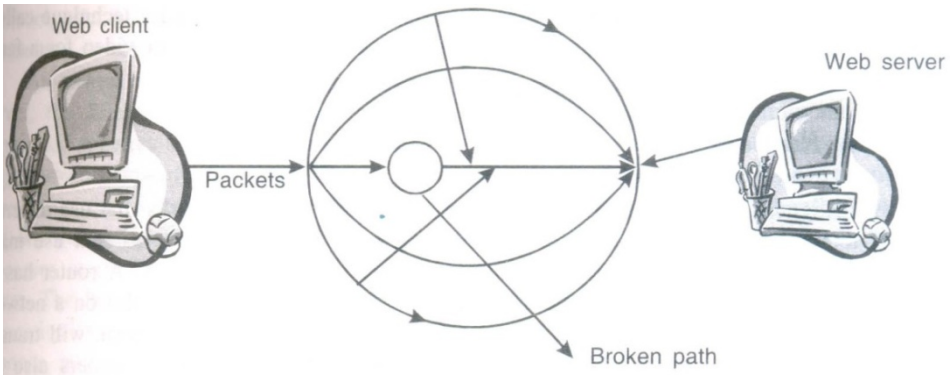


Fig. 2 : A packet switching network with a broken path.

Network Routers :

Network designers use routers to transfer or route data between networks that use different network technologies. Since the Internet is comprised of various networks that use many different network technologies, routers are an integral part of the Internet. A router has an address on the network. Using the addressing capability of routers, the nodes on a network can send packets destined for another network to a router. The router, in turn, will transfer the packet to the other network. To manage network traffic, network designers also use routers to segment large sections of a Local Area Network (LAN) to smaller segments, called *subnets.* To route data, routers commonly use routing tables, which are similar to a lookup database. Using a routing table, routers can look up the correct path (or the best route) from the packet's current location to any destination on the network. Depending on the network's requirements, a designer can implement routing tables as static or dynamic. With a static routing table, the network administrator must manually update the table. Network software automatically updates the dynamic routing tables. The advantage of dynamic routing tables is that, should a part of the network get bogged down with a lot of traffic, the network software can update the routing tables to route packets around the current bottleneck.

Network Switches :

A network switch is a small hardware device that joins multiple computers together within one local area network (LAN). Technically, network switches operate Data Link Layer. Network switches appear nearly identical to network hubs, but a switch generally contains more intelligence (and a slightly higher price tag) than a hub. Unlike hubs, network switches are capable of inspecting data packets as they are received, determining the source and destination device of each packet, and forwarding them appropriately. By delivering messages only to the connected device intended, a network switch conserves network and offers generally better performance than a hub. Mainstream Ethernet network switches support either *10/100* Mbps Fast Ethernet or Gigabit Ethernet *(10/100/1000)* standards. Different models of network switches support differing numbers of connected devices. Most consumer-grade network switches provide either four or eight connections for Ethernet devices. Switches can be connected to each other, a so-called *daisy chaining* method to add progressively larger number of devices to a LAN.

Connectionless and Connection-oriented protocols :

Connectionless protocols differ from connection-oriented protocols in the way requests and responses to requests are handled. With a connectionless protocol, clients connect to the server, make a request, get a response, and then disconnect. With a connection-oriented protocol clients connect to the server, make a request, get a response, and then maintain the connection to service future requests.
An example of a connection-oriented protocol is FTP. When you connect to an FTP server, the connection remains open after you download a file. The maintenance of this connection requires system resources. A server with too many open connections quickly gets bogged down. Consequently, many FTP servers are configured to allow only 250 open connections at one time, that is, only 250 users can access the FIP server at once. Additionally, processes that are not disconnected cleanly can cause problems on the server. The worst of these processes is running out of control, using system resources, and eventually crashing the server. The best of these processes simply eat up system resources. In contrast, HTTP is a connectionless protocol. When clients connect to the server, they make a request, get a response, and then disconnect. Since the connection is not maintained, no system resource is used after the transaction is completed. Consequently, HTTP servers are only limited to active connections and can generally do thousands of transactions with low system overhead. The drawback to connectionless protocols is that when the same client requests additional data, The connection must be re-established. To the Web users, this means a waste of time and energy.

Signal Bandwidth :
The primary limit on any communications channels its bandwidth. Bandwidth merely specifies a range of frequencies, from the lowest to the highest, that a channel can carry or that are present in the signal. Bandwidth is expressed in a different way for analog and digital circuits.
In analog technology, the bandwidth of a circuit is the difference between the lowest and the highest frequencies that can pass through the channel. Engineers measure analog bandwidth in kilohertz or megahertz. In a digital circuit, the bandwidth is the amount of information that can pass through a channel. Engineers measure digital bandwidth in bits, kilobits, or megabits per second.

Channel Bandwidth :
The bandwidth of a communications channel defines the frequency limits of the signals that they carry. This channel bandwidth may be physically limited to the medium used by the channel or artificially limited by communications standards. The bandwidths of radio transmissions, for example, are artificially limited, by law to allow more different modulated carrierst9 share the air waves at the same time while preventing interference between them. In wire-based communications channels, bandwidth is often limited by the wires. Certain Physical characteristics of wires cause degradations in their high frequency transmission capabilities. The capacitance between conductors in a cable pair, for instance, increasingly degrades signals as their frequencies rise, until it reaches a point at which a high frequency signal might not be able to traverse more than a few centimetres of wire. Amplifiers or repeaters, which boost signals so that they can travel longer distances, often cannot handle very low or very high frequencies.
Most of the telephone channels have an artificial bandwidth limitation imposed by the telephone company. To get the greatest financial potential from the capacity of their transmission cables, microwave systems, and satellites, telephone carriers normally limit the bandwidth of telephone signals. One reason why bandwidth is limited is that many separate

telephone conversations can be stacked atop one another through multiplexing techniques, which allow a single pair of wires to carry hundreds of simultaneous conversations.

Internet Protocol :

A Protocol is defined as a set of rules governing the exchange of data between two entities. The key elements of a protocol are:

1. Syntax, which includes such things as data format and signal levels.
2. Semantics, which includes control information for coordination and error handling.
3. Timing, which includes speed matching and sequencing.

TCP/IP is the networking protocol of the Internet, and an extension of intranets. For TCPIlP to work, your network interfaces need to be assigned IP addresses. Addresses are assigned to interfaces and not to computers. So, one computer can have more than one IP address. For example, if you have two network cards on your computer, then each of them will have a different IP address-either static or dynamic.

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ASSIGNMENT QUESTIONS

1. Define e-commerce. Name the areas in which companies conduct business online and explain each of them.
2. Discuss the significant issues that are required to implement e-commerce in organization.
3. Explain in detail the infrastructure requirement for e-commerce
4. Write a note on communication networks used for e-commerce/e-business ?
5. What are the Payment systems used in e-commerce ? Explain them with examples.
6. Explain Impact of e-commerce on Business with special emphasis to India.
7. Explain the six layers of functionality or services of architectural framework for e-commerce.
8. Explain the following tools with examples :
   (a) Information Retrieval Tools, (b) Communication Tools, (c) Multimedia information Search Tools.
9. Write a note on E-commerce development & opportunities in Indian Business Context.
10. What are the objectives of Business Models for e-commerce ? How they are classified based on different types of e-commerce/e-business.
11. List different types e-commerce/e-business strategies with examples.
12. How do you purchase or sell items or products on Internet?
13. Differentiate between the traditional commerce and e-commerce.
14. What technologies are required for e-commerce?
15. Discuss the economic potential of e-commerce. How does it affect marketing and retail industry?
16. List and explain about the incentives for engaging in e-commerce.
17. What are the various driving forces behind e-commerce/e-business.
18. Discuss the advantages of e-commerce in reference to the following:
(*i*) Customers
(*ii*) Business
(*iii*) Society
(*iv*) Women
19. What are the various types of e-commerce? Explain each in short.
20. Write down the differences between B2C and B2B e-commerce.
21. What do you understand by architectural framework for e-commerce? Explain the various

services that form the e-commerce architectural framework.
22. Write short notes on the following:
(*a*) TCP/IP protocol for network structure
(*b*) Impact of e-commerce on business
(*c*) Applications of e-commerce
23. Comment and compare e-commerce strategy of (a) Amazon.in, (b) Flipkart.in and (c) e-bay.in, (e) Snapdeal.com, (f) Walmart.com.

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CHAPTER 3

Information Systems for Mobile Commerce :

Syllabus : Information Systems for Mobile Commerce, Legal and Ethical Issues in E commerce and M commerce.

3.1 E-COMMERCE DISADVANTAGES

Although the list of e-commerce advantages is long, yet the e-commerce environment is far from perfection. In fact, some of the e-commerce disadvantages cause both consumers and businesses to suffer considerable misfortune. Although cost savings are usually mentioned, there are hidden costs that can quickly turn a credit into a debit. In addition, the technology is not perfect, for example, the network unreliability is a continuing concern. Moreover, some other concerns involve security, the loss of privacy, low and remote service levels, and complex legal issues. Let us discuss these disadvantages one by one.

1. Hidden Costs

Although buying on-line is convenient, the cost of this convenience is not always clear at the front end. For example, on-line purchases are often accompanied by high shipping and re-stocking fees, a lack of warranty coverage, and unacceptable delivery times. The online purchases must be shipped and the shipping charges may be considerable. In fact, too many e-commerce companies have developed a reputation of overcharging for shipping and handling.

2. Network Unreliability

With a user population of well over 100 million in North America alone, the Internet is a very busy information highway. Although the Internet is designed to overcome the single point of failure problem, there have been several well-publicized incidents of network failures during the past few years. An e-commerce website that cannot serve its customers loses sales, credibility, and even customers. In effect, a network failure can be compared to having a location at an exclusive mall that is in middle of nowhere and has no access roads that lead to it. Network reliability problems may be generated by such factors as:

- Equipment failure in the network connection provider or ISP.
- Long response time due to increased network traffic or inadequate bandwidth.
- Accidental problems caused by nature—such as lightning, floods, earthquakes that affect communication lines—or by human error—such as a road construction worker severing a network line by accident.

3. The Cost of Staying in Business

We know that getting into business is relatively easier in an e-commerce environment. Unfortunately, the flip side of the coin is that staying in business may be more difficult. Remember that the easy access means increased competition, thus causing businesses to operate with very thin profit margins. To be profitable, e-businesses must maintain high sales volumes, which in turn means developing and maintaining a big and loyal customer base. Attracting customers and transforming them into repeat buyers is the key to profitability. To survive and remain competitive, businesses must invest heavily in often-costly technology. The introduction of computer technology within a business not only automates the business process but it also changes the way the company does business internally and externally. Such synergy between technology and business operations makes the company more dependent on technology, therefore making it more vulnerable to the pace and network failures.

4. Lack of Security

One of the main roadblocks to the wide acceptance of e-commerce by businesses and consumers alike is the perceived lack of adequate security for on-line transactions. For example, consumers are growing increasingly weary about providing credit card information over the Internet. During the past few years, the press has been filled with reports about hackers breaking into e-business websites and stealing credit card information. In many cases, the break-ins passed inadvertently for several months before either the seller or the buyer discovered the problem.

Securing on-line transaction data during its generation and then safeguarding it after it has been stored in the database are critical issues to be faced. For example, in June of 2001, a small computer retailer exposed credit card information through its website. The problem, caused by a coding error in a web page, allowed unauthorized access to stored order and credit card information for thousands of customers, dating as far back as one year.

5. Lack of Privacy

Ensuring the security of the data is of paramount importance to customers and to the credibility of the business. Customers also worry about the privacy implications of data gathered by organizations of all types and sizes. The incredible data collection process is a mixed blessing to customers. Even at the simplest data level, sales information is stored in databases connected to web servers, thus exposing the information to cyber criminals. Because data gathering on the web is so easy, databases routinely contain information about customer purchasing habits, demographic data, credit information, and so on.

In many cases, companies sell customer database information to marketing companies. In turn, the marketing companies engage in massive e-mail campaigns to attract new customers. It doesn't take long for the customer's e-mail box to be filled with unwanted and unsolicited e-mail (also known as "spam"). The growing sales of personal firewalls and the large number of "hits" on websites that deal with privacy issues are testimony to the fact that customers are growing increasingly worried about their online privacy, and that they are seeking ways to protect themselves from cyber attackers.

6. Low Service Levels

Another common complaint about doing business online is the low level of customer service that online companies tend to provide. Although technology has automated business transactions to a large extent, there remains a real need for the human touch. Therefore, customer service has become a major differentiating factor. Because the web buying experience is much more impersonal than the traditional one, providing good customer service is critical to the survival of any e-business. Therefore, e-commerce websites must provide

• a pleasant and problem-free pre-ordering and ordering experience. The website design is an important interface.

• readily available easily used feedback options. Major customer complaints include the lack of contact information on websites and the difficulty of contacting a customer service representative.

• quick and courteous complaint resolution.

• timely and low-cost shipping and prompt delivery of merchandise to customers.

7 Legal Issues

Legal problems encountered in the e-commerce environment include :

• **Software and copyright infringements.** The amount of illegal content flowing freely on the Internet is illustrated by the so-called Napster case. Napster, a popular music website, was sued by the Recording Industry Association because it hosted millions of illegal digital copies of copyrighted songs that were freely downloaded by millions of users worldwide. After court action, Napster was forced to change its business model and to eliminate all illegal material from its website.

• **Credit card fraud and stolen identities.** The lack of security mentioned earlier has put credit card fraud on the proverbial front burner. In addition, lack of security makes it relatively easy to assume another person's identity in order to make fraudulent transactions. Loss of confidence in the security of online transactions is a brake on the e-business train.
• **Business fraud.** Online fraud also takes the form of companies that fail to deliver products and/or services to the customers who paid for them.

3.2 REASONS FOR THE E-COMMERCE NOT BEING VERY SUCCESSFUL

Although vast amounts of money have been invested into making e-commerce work, and although it causes vast amounts of money and large numbers of goods to change hands every day, it has so far failed to deliver the goods for a broad audience. The answer to why e-commerce has not been an overwhelming success for the masses can roughly be answered as follows:
1. Not everybody has access to a computer.
2. Buying goods over the internet is not 'natural':
• One cannot feel or see the products in real life
• The interaction is unnatural, there is no salesperson present.
3. People are concerned that it is unsafe to buy over the internet.

1. Limited Access to Computers

The computer is very essential to access e-commerce sites on Internet. Using a computer screen, people have visual access to a large amount of information, i.e., large number of goods to choose from. They can browse, select, get in-depth information, get overviews and so on, all at the click of a mouse button. But still in India or abroad, a large number of people do not have access on computers and therefore they are not able to take the advantage of the era of e-commerce.

2. Lack of Natural Quality

There are two issues to be addressed with respect to lack of natural quality in ecommerce. The first pertains to the fact that people are not able to touch and feel products with their own hands before buying something. Buying something from just the picture is essentially different from buying it in a shop. People probably only tend to buy things over the internet from which they already know what they look/feel/sound like from real life, and which have little between-product variation (examples are books, CDs and videotapes) or products that they can assess from behind their computer (an example is software). This seems to be a problem for e-commerce, which can be labeled as the 'Seeing is believing' problem.
The second natural quality problem has to do with natural interaction during a purchase. People are used to talking to a salesperson when they purchase something. Asking questions like: "Is this product really waterproof?" or "Do I get a money back guarantee on this item?" and thousands of questions like these seem to sooth people in their purchase. It guarantees them that they get what they want. This kind of question asking is of course not available in e-commerce, aside may be from some FAQ section (FAQ = Frequently Asked Questions).

3. Unsafe Buying

A third problem of e-commerce is that of unsafe connections to the vendor. When sending credit card information over the internet, hackers could seize this information and use it for illegal transactions.

3.3 Legal Issues in E commerce ;

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sued by the Recording Industry Association because it hosted millions of illegal digital copies of copyrighted songs that were freely downloaded by millions of users worldwide. After court action, Napster was forced to change its business model and to eliminate all illegal material from its website.

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• **Business fraud.** Online fraud also takes the form of companies that fail to deliver products and/or services to the customers who paid for them.

• **Domain Names :** The competition over domain names is another legal issue. Internet addresses are known as domain names and they appear in levels. A top level name is *qburst.com* or *microsoft.com*. A second level name will be *qburst.com/blog*. Top level domain names are assigned by a central non-profit organization which also checks for conflicts or possible infringement of trademarks. Problems arise when several companies having similar names competing over the same domain name. The problem of domain names was alleviated somewhat in 2001 after several upper level names were added to com.

• Another issue to look out for is Cybersquatting, which refers to the practice of registering domain names with the desire of selling it at higher prices.

Security features such as authentication, non-repudiation and escrow services can protect the sellers in e-commerce. One needs to be careful while doing e-commerce activities. The need to educate the public about the ethical and legal issues related to e-commerce is highly important from a buyer as well as seller perspective.

3.4 Ethical Issues in E commerce :

In general, many ethical and global issues of Information Technology apply to e-business. So, what are the issues particularly related to e-commerce? Let's list some of the ethical issues spawned with the growing field of e-commerce.

Web tracking

E-businesses draw information on how visitors use a site through log files. Analysis of log file means turning log data into application service or installing software that can pluck relevant information from files in-house. Companies track individual's movement through tracking software and cookie analysis. Programs such as cookies raise a batch of privacy concerns. The tracking history is stored on your PC's hard disk, and any time you revisit a website, the computer knows it. Many smart end users install programs such as Cookie cutters, Spam Butcher, etc which can provide users some control over the cookies.

The battle between computer end users and web trackers is always going on with a range of application programs. For example, software such as Privacy Guardian, My Privacy, etc can protect user's online privacy by erasing browser's cache, surfing history and cookies. To detect and remove spyware specially designed programs like Ad-Aware are present. A data miner application, SahAgent collects and combines Internet browsing history of users and sends it to servers. The battle goes on!

Privacy

Most Electronic Payment Systems knows the identity of the buyer. So it is necessary to protect the identity of a buyer who uses Electronic Payment System.

A privacy issue related to the employees of company is tracking. Monitoring systems are installed in many companies to monitor e-mail and other web activities in order to identify employees who extensively use business hours for non-business activities. The e-commerce

activities performed by a buyer can be tracked by organizations. For example, reserving railway tickets for their personal journey purpose can be tracked. Many employees don't want to be under the monitoring system even while at work.
As far as brokers and some of the company employees are concerned, E-Commerce puts them in danger zone and results in elimination from their jobs. The manner in which employees are treated may raise ethical issues, such as how to handle displacement and whether to offer retraining programs.

Disintermediation and Reintermediation
Intermediation is one of the most important and interesting e-commerce issue related to loss of jobs. The services provided by intermediaries are

(i) Matching and providing information.

(ii) Value added services such as consulting.

The first type of service (matching and providing information) can be fully automated, and this service is likely to be in e-marketplaces and portals that provide free services. The value added service requires expertise and this can only be partially automated. The phenomenon by which Intermediaries, who provide mainly matching and providing information services are eliminated is called Disintermediation.

The brokers who provide value added services or who manage electronic intermediation (also known as infomediation), are not only surviving but may actually prosper, this phenomenon is called Reintermediation.

The traditional sales channel will be negatively affected by disintermediation. The services required to support or complement e-commerce are provided by the web as new opportunities for reintermediation. The factors that should be considered here are the enormous number of participants, extensive information processing, delicate negotiations, etc. They need a computer mediator to be more predictable.

Ten Commandments of Computer Ethics :

1. Do not use a computer to harm other people.
2. Do not interfere with other people's computer work.
3. Do not snoop around in other people's files.
4. Do not use a computer to steal.
5. Do not use a computer to bear false witness.
6. Do not use or copy software for which you have not paid.
7. Do not use other people's computer resources without authorization.
8. Do not appropriate other people's intellectual output.
9. Do think about the social consequences of the program you write.
10. Do use a computer in ways that show consideration and respect.

3.5 M commerce :

3.5.1. Introduction :

While electronic commerce (e-commerce) continues to have a profound impact on the global business environment, technologies and applications have begun to focus more on mobile computing and the wireless Web. With this trend comes a new set of issues and problems specifically related to *wireless* e-commerce. Ultimately, researchers and developers must determine what tasks users really want to perform anytime from anywhere and decide how to ensure that information and functionality to support those tasks are readily available and easily accessible. This paper provides an overview of some of the relevant technologies, applications, and issues in the relatively new field of wireless e-commerce.

Wireless e-commerce (also called mobile commerce or m-commerce) is the promotion, buying, and selling of goods and services through electronic data communication networks that interface with wireless (or mobile) devices. Wireless e-commerce is a subset of wireless computing, which is the accessing of information systems by wireless means. Many of the issues that affect wireless computing in general also affect wireless e-commerce.

The convergence of wireless devices and the Internet is creating an important new channel to business and the next wave of change across industries. Mobile business (or M-business) will enable organizations in every industry to expand their markets, improve their services and reduce their costs. M-business can best be described as the transaction of data between mobile devices. The most significant factor driving M-business is undoubtedly the proliferation of mobile telephones, wireless-enabled personal digital assistants (PDAs) and other devices that enable users to conduct transactions anywhere at any time.

Much of the discussion surrounding M-business has been narrowly focused on m-commerce, a subset of M-business that involves the use of mobile devices for marketing, selling and buying products and services over the Internet, "third generation" (3G) networks, or other supporting technologies. But it is believed that M-business is a far greater one that will build on organizations' e-business transformations and capabilities and provide the backdrop for a further qualitative shift in business operations. M-business will comprise a broad spectrum of applications, from communication and entertainment to consumer transactions and corporate services. These services will not be limited to one particular type of relationship, like business-to-consumer (B2C), but also will include business-to-business (B2B), business-to-employee (B2E), consumer-to-consumer and device-to-device relationships. For this reason, M-business has been dubbed A-A business : anytime, anywhere.

M-business is not just e-business without fixed connections, but it is an entirely new way of designing and deploying a wide range of systems and solutions that are :

- Personal.
- Convenient.
- Easy to use.
- Always available.
- Accessible in real time.
- Location sensitive.

Analysts predict that in the next five years the penetration of mobile devices will outpace that of televisions — and the more users have such devices, the more services they will demand. But behind the scenes, there are other drivers moving this revolution forward, which include :

- **Advancements in network technologies -** Mobile-network operators around the world are investing large sums of money in licenses and in building a new generation of networks. Network technologies that can support always-on connectivity will allow users to immediately send and receive voice and data services. At the same time, business investment is continuing apace in innovation at other levels of the network. Device manufacturers are creating prototypes of the products that might exist in the near future, and the race is on to create new standards for operating platforms.
- **Falling costs for airtime and wireless devices -** The cost of mobile devices and basic services such as voice and short messaging service (SMS) has plummeted. No longer is the mobile device a status symbol. It is becoming an intrinsic part of everyday life for millions of people.

- **The ability to link elements in different value chains, in real time, to provide a dynamic, personalized service -** Businesses those link services, many of which already exist independently, will streamline their customers' transactions. For example, linking aeroplane ticket purchases, car rental bookings and hotel reservations, then communicating all the information via messaging to mobile devices, would make travel planning easier. In order to offer these new services, businesses are beginning to enter into new alliances and partnerships, both within and outside their industries. This process in itself creates new possibilities and new business opportunities. M-business raises critical questions about strategic adaptation for every organization. It will herald the emergence of entirely new value chains and business models, not to mention new levels of personalized service. It will lead to new business alliances and a wave of convergence between industries. At a fundamental level, it will enable organizations to dynamically reconfigure their value chains and develop new relationships with employees, suppliers, customers and competitors.
- **The ability to tailor services for end-users' various needs** — Taking one-to-one marketing to a higher level — will become a new source of competitive advantage. By changing the nature of communication and interaction, customer relationship management will take on a new dimension. M-business will also facilitate efficiency gains through workforce management. Mobile technologies offer the potential for tasks to be scheduled for the right worker, with the right set of tools, at the right location and at the right time. They also increase the likelihood that customer enquiries can be resolved on the first port of call.

Organizations that succeed at M-business will have to do more than simply place supply chain management systems onto mobile devices, or mobile-enable enterprise resource planning (ERP) solutions. They will have to capture business "events" and translate them in real time into whatever format is required. Transaction volumes will be high, and the required service levels will far exceed those delivered by today's technology solutions. M-business is set to make a major difference in all aspects of operations and management, and it opens up a whole avenue of major top-line revenue growth opportunities and bottom-line productivity gains for organizations in all industries. Organizations need to examine where their prospects for efficiency gains and improvements to customer service. This means anticipating changes in all areas of their value chains, which include : Administration, Human resources, Research and development, Production, Purchasing and sourcing, Sales and marketing, Distribution and logistics.

Wireless technologies for mobile commerce can be roughly categorized into mobile client devices for interactivity (or m-commerce terminals) and communications infrastructure.

Mobile Client Device Technologies and Issues

The interactivity devices or mobile client devices currently most important to wireless e-commerce are mobile telephones, handheld computers, laptop computers, and vehicle-mounted interfaces. Hybrid devices are now appearing, such as the crosses between mobile phones and handheld devices (sometimes called smart phones), but the question remains as to what form the devices will ultimately take, which is an important issue for mobile system developers.

Usability will become more critical with handheld and phone devices, which differ from desktop and laptop computers in terms of their smaller screen sizes, less available memory, and limited input devices. Many handheld devices are limited to a few lines of text, and do not have traditional keyboards. One usability issue is the need for organizations to determine how people can best use applications and access information through different devices.

Wireless devices have forced developers to carefully revisit both operating systems and applications software on a variety of platforms. Operating systems such as Microsoft's Pocket PC and Palm's PalmOS have been developed for handheld devices.

Although this software meets some of the current needs, it has limited functionality. The creation of system software with increased functionality for devices with limited capabilities will be an ongoing challenge. Another important building block for this emerging infrastructure landscape may be the Wireless Application Protocol (WAP), which enables wireless devices such as mobile phones to access the Internet. Many WAP-enabled devices have already appeared, although there is doubt as to whether WAP will become a globally accepted standard, especially with the popularity of Japan's i-mode. Developers ultimately face the issue of deciding which set of protocols to accept, or risk the potential problems of working with multiple standards and/or choosing to ignore some.

Communications Infrastructure Technologies and Issues

The communications infrastructure necessary for the wireless Internet environment is quite complex. Wireless devices are likely to remain at a disadvantage over their wired counterparts in terms of bandwidth. Limited bandwidth is a significant problem that requires organizations to rethink how users interact through a wireless device with an information system. An important issue is how to create efficient applications that can realistically work with current technology.

Local Area Network Technologies

IEEE 802.11 and IEEE 802.11b are established wireless standards commonly used with laptops or personal computers for wireless local area networks. This technology provides speeds of 1 to 11 megabits per second (Mbps). Bluetooth is a relatively new, inexpensive short-range wireless standard that allows different devices (such as laptops and mobile phones) to communicate with each other. The maximum distance between devices is about 100 meters, and data exchange rates are 1 to 2 Mbps. HiperLAN is a set of wireless LAN standards, primarily used in Europe, which provides speeds up to 20 Mbps.

Issues that must be addressed concerning local area network technologies include a lack of compatibility between the different standards and the related difficulties involved with devices trying to interface with more than one communications environment. Frequencies used for wireless LANs are expected to become very crowded very fast. There has also been recent concern about possible interference problems between different signals of different standards.

Telecommunications Technology

There are three basic "second-generation" (2G) digital wireless telephone technologies – time division multiple access, Global System for Mobile communication (GSM), and code-division multiple access. All these are circuit-switched services, where a user must dial-in and maintain a connection when data communications are desired. GSM is the most widely used of the three technologies, especially in Europe; its current speed is only 9.6 kilobits per second (Kbps). General Packet Radio Service (GPRS), based on GSM, is a continuous packet data service. Using this technology, network connections are "always-on", and mobile users need not dial into the Internet each time they need to access an application. GPRS promises data rates from 56 to 114 Kbps. GPRS communication channels are used on a shared basis, only sending or receiving packets as needed, rather than maintaining a continuous dedicated line as with circuit-switched services.

UMTS (Universal Mobile Telecommunications System) is a so-called "third-generation" (3G) technology. It offers broadband, packet-based transmission at rates that will exceed 2 Mbps. Based on GSM, UMTS is the planned global standard for mobile users. Once UMTS is fully implemented, computer and phone users can be constantly attached to the Internet and have access to a consistent set of services worldwide.

Many of the issues with telecommunications technologies are similar to those found with LANs. There are distinct bandwidth limitations with the older generation technologies, which make it difficult to develop efficient applications for all technologies.

Standards vary from country to country, making it difficult for devices to interface to networks in different locations. An additional issue is the high initial cost of establishing a wireless network that uses these technologies.

Other Wireless Technology Issues

Security of wireless information is another important technical issue in m-commerce. Users and organizations will want assurance that their wireless communications and transactions are not intercepted. Organizations that set up wireless LANs must realize that there are no physical boundaries limiting their networks, and that people and devices outside the organization may have (inadvertent) access to their systems. Frequency hopping can make it more difficult to intercept data communications. Encryption technologies can also help, but will need to be made more efficient and more foolproof. The increased use of wireless devices for e-commerce makes the issue of positive identity verification even more important yet more difficult to ensure. One consequence of this need is the increasing importance of biometrics. Location technologies, especially the Global Positioning System (GPS), will also play a large part in wireless communications. However, privacy issues must be addressed, such as how personally-identifiable data and location data should be used.

Applications

Some of the applications of wireless technologies to e-commerce activities that have started to appear across the globe are summarized here. Many of these are currently constrained by technology limitations and issues described previously. Two fundamental application issues that researchers and developers must address are what tasks do users want to do without regard for temporal or spatial constraints and how to provide support for these tasks through wireless applications.

E-commerce payment systems can also benefit from wireless technology. One scenario involves a consumer not having to stand in line to make a purchase, but simply paying for an item though a wireless device. Final payments might even be billed to a telephone company. Bluetooth technology may enable a list of available services to be generated automatically on a device when a user walks close to a Bluetooth-equipped cash register.

Wireless technology is well suited for bringing e-commerce to automobiles and other forms of transportation. Traffic advisory systems can warn of impending traffic jams. Cars will eventually be able to report potential problems to service centers themselves. The service center might even make minor adjustments to the car online. Car-mounted devices will eventually allow regular Internet access, although safety issues of “browsing while driving” must be addressed.

While most initial mobile commerce applications seem to be aimed at the business-to-consumer market, business-to-business and intranet applications are also appearing. Service technicians can be dynamically assigned new tasks and sent problem information while they are traveling. Sales people can go literally anywhere in the field and access product information and customer accounts, although the applications right now are still subject to the constraints of current wireless devices. Organizations must address the issue of designing complex, robust applications that work well within these current (and any foreseeable) device limitations. Flexibility can be integrated into designs to enable future functionality.

Global M-Commerce

The global use of wireless technologies and applications adds another layer to the problems and issues in m-commerce. One important issue is the current lack of standardization throughout the world. Mobile phone standards vary from country to country and even within

a country. A global initiative for universal standards would foster greater growth in m-commerce.
A significant issue is the disparity in the adoption of wireless technologies and applications in different regions of the world. Japan will probably be the first to implement 3G technologies, followed by Europe and the United States. The primary reason for the U.S. lag is that the United States has not had the same demand for increased mobile capacity as Europe and Japan. Fewer Americans use wireless devices than individuals living in Asia or Europe, and current American users exhibit lower usage rates than Asians and Europeans. Therefore, the overall demand for 3G will be slower to reach critical levels.

3.5. 2. Features of Mobile Business

(1). Value Propositions for M-business

Value propositions define the relationship between supplier offerings and consumer purchases by identifying how the supplier fulfills the customer's needs across different consumer roles (Porter, 1998). Specifically, it defines the interdependence between the performance attributes of a product or service and the fulfillment of needs. The value proposition furthermore solidifies the relationship between the customer and various dimensions of product value. Thus, customer satisfaction is merely a response to the value proposition offered by a specific product/service bundle. For e-business, the establishment of a value proposition is rudimentary to any consumer-oriented strategy creation.

The mobility afforded wireless devices shapes M-business into a disparate entity from conventional e-business. Consequently, value propositions are likely to be new, different and novel for mobile e-business. The primary advantage of mobile devices is to provide a superior offering of value-for-time to users. That is, by accessing the Internet/SMS through mobile devices, users will be able to realize additional value allowances for any specified period of time, which fixed-line users will not be able to achieve. Information may now truly become available anytime, anyplace and on any wireless device. As such, value propositions of e-business will be forced to change to reflect the underlying dimensions of value-for-time for users. Specifically, M-business differs from e-business on the following value proposition attributes:

1. Ubiquity : Mobile devices offer users the ability to receive information and perform transactions from virtually any location on a real-time basis. M-business users will have a presence everywhere, or in many places simultaneously, with a similar level of access available through fixed-line technology. Communication can take place independent of the user’s location. The advantages presented from the omnipresence of information and continual access to commerce will be exceptionally important to time-critical applications.
Mobile businesses, for example, can leverage this value proposition by providing alert notifications, such as for auctions, betting, and stock price changes, which are specified by the user as an important part of relevant personal content. As such, the real-time, everywhere presence of M-business will offer capabilities uniquely beneficial to users. Industries that are time and location sensitive, such as financial services and travel, are likely to benefit from businesses exploiting this value-added feature of mobile business.

2. Convenience : The ability and accessibility provided from wireless devices will further allow M-business to differentiate its abilities from e-business. People will no longer be constrained by time or place in accessing e-business activities. Rather, M-business could be accessed in a manner which may eliminate some of the labor of life's activities. For example, consumers waiting in line or stuck in traffic will be able to pursue favorite Internet/SMS based activities or handle daily transactions through M-business applications. Consumers may recognize a special comfort which could translate into an improved quality of life. One

opportunity to increase value lies in M-business capabilities that allow consumers to shop at where they are not located. This ability to obtain information and conduct transactions from any location is inherently valuable to consumers. As such, M-business offers tremendous opportunities to expand a client-base by providing value-added services to customers. By making services more convenient, the customer may actually become more loyal. Consequently, communication facilities within M-business are key applications for the delivery of convenience. Consumers will be looking for M-business applications which can deliver functions like : sending and receiving e-mail, voice mail forwarding, conference calling, faxing, document sharing, instant messaging; as well as transactional based activities.

3. Localization : Knowing the location of the Internet/mobile user creates a significant advantage for M-business over wired e-business. Location-based marketing, via global positioning technology, will soon be available in all mobile devices. Through GPS technology, service providers can accurately identify the location of the user. Utilizing this technology, M-business providers will be better able to receive and send information relative to a specific location. Since mobile devices like cell phones are almost always on, vendors will know the location of their customers and can deliver promotions based upon the likely consumer demands for that location. Location-specific information leverages the key value proposition of M-business over traditional e-business by supplying information relevant to the current geographic position of the user. M-business providers will be able to both push and access information relevant to the user's specific location. Mobile web-sites may serve as points of consolidation of consumer information and disseminate the relevant information for a particular location based on profile data built on the user's past behavior, situation, profile and location. As such, real time discounting may become the "killer application" for M-business.

4. Personalization : Mobile devices are typically used by a sole individual, making them ideal for individual-based target marketing. Mobile offers the opportunity to personalize messages to various segments, based upon time and location, by altering both sight and sound. New developments in information technology and data-mining make tailoring messages to individual consumers practical and cost-effective. For example, upon employing mobile Internet device, advertising messages tailored to ones individual preferences can be provided. Relevance of material and the "de-massing" of marketing becomes possible through the personal ownership of mobile devices.

5. Conditions of Usage : The mobile user may be engaged into another activity, like traveling, meeting people, etc., rather than sitting in front of his/her desk top terminal.

6. Adaptability : Mobile business applications should be adapted to the environment of their clients. Adaptability is possible along various dimensions including the type of the device in use, the currently available communication bandwidth as well as location and time.

7. Broadcasting : Some wireless infrastructures, such as cellular architectures and satellite networks, support broadcasting (i.e., simultaneous delivery) of data to all mobile users inside a specific geographical region. Broadcasting offers an efficient means to disseminate information to a large consumer population. This mode of operation can be used to deliver information of common interest to many users such as stock prices, weather information or for advertising.

A value proposition is developed as superior consumer value is created through an increasingly targeted Internet experience for mobile users. For M-business, the technological limitations magnify these value-for-time propositions. It has been estimated that every additional click-through, which a user needs to make in navigating through a commercial online environment with a mobile device, reduces the possibility of a transaction by 50 per cent (Durlacher Research, 2000). Providing the user with the desired, most relevant

information without forcing a complex click-through sequence will significantly improve the effectiveness of any mobile e-business strategy. Value-for time propositions become maximized for those business strategies best able to implement M-business's distinguishing capabilities. M-businesses will become differentiated from traditional e-business based upon their abilities to integrate and actuate the advantages to the mobile devices. Various applications may provide differing value for mobile Internet users.

(2). Implications of the Mobile Devices

Mobile devices that are of interest to mobile communication can be divided into four categories based on their processor, memory and battery capacity, application capabilities (SMS, WAP, Web, I-mode), as well as physical size and weight. These categories are (from weakest to strongest) :

(a) usual voice handsets with SMS capability,
(b) WAP phones,
(c) communicators/PDA with wireless communication capability, and
(d) laptops with wireless communication facilities.

To be easily carried around, mobile devices must be physically light and small. The smaller and lighter the devices are, the *more portable* they are. In addition, a mobile device should be a multipurpose device (voice phone, data transmitter, PDA, etc.) so that the user does not need to carry too many gadgets. Portability considerations, in conjunction with a given cost and level of technology, will keep mobile elements having less resources than static elements.

The devices have small screens and small multifunction keypads; the former fact necessitates the development of appropriate visual user interfaces, different from the PC or laptop. They have comparably less memory, disk capacity and computational power than traditional computing devices. Portable devices rely for their operation on the finite energy provided by batteries. Even with advances in battery technology, this energy concern will not cease to exist. This is because the conserved energy depends primarily on the weight, volume of the battery. There are higher risks to data stored and transactions performed in mobile devices, since it is easier for mobile devices to be accidentally damaged, stolen, or lost than fixed devices.

(3). Implications of the Wireless Networks

The necessary networking infrastructure for wireless mobile computing in general combines various wireless networks including cellular, wireless LAN, private and public radio, satellite services, and paging (Wesel, 1998). As compared with wire-line networks, wireless communications add new challenges:

C-autonomy : The handsets in the wireless radio networks are normally not always communicating with the network infrastructure, i.e., they are unreachable. There are numerous reasons for this behavior that can be described under C(ommunication)-autonomy (Veijalainen, 1990). First, disconnections may be voluntary, e.g., when the user deliberately avoids network access during nighttime, or while in a meeting, or in other places where the user does not want to be disturbed. In cases that the handset does not have voice capabilities, and thus disturbing is not a big issue, it is still often reasonable to cut the wireless communications with the network to reduce cost, power consumption, or bandwidth use. The break in on-going communication or incapability to set up any communication can also happen against the will of the user, e.g., when a user enters a physical area where there is not any or not enough field strength for a successful communication battery becomes suddenly empty, or hand-over between base stations does not succeed and the connection is therefore lost.

Bandwidth restrictions and Network topology : In the case of many wireless networks, such as in cellular or satellite networks, communication channels have much less transfer capacity than wire-line networks. This is caused by the fact that the used modulation and channel allocation schemes designed for voice traffic have rather modest upper bounds. Further, wireless communications are much more error prone than wire-line communications and require much redundancy in the channel coding of the payload.

Asymmetric communications : Some wireless networks offer asymmetric transfer capacity for up- and downlink. The asymmetric transfer capacity on uplink and downlink can be applied in a reasonable way if the network offers broadcast facility. This is unfortunately not a strong side of the telecom networks, because they were designed for connection-oriented point-to-point communications. Wireless LANs are better in this respect, because they apply packet broadcast protocols. GSM networks have broadcast facility on the control channels, but the amount of application data that can be transferred on them is small. The currently very popular short messages (max 160 characters) are an example of such data that is transferred over control channels. If used, e.g., to broadcast multimedia contents over the network, the network would collapse, because controlling the traffic would not be possible any more. Still, the asymmetric transfer capacity is an important asset in cases where the wireless client usually sends a short request and gets a large data set as a response.

***Variant bandwidth and bursty traffic* :** Currently, multi-network terminals are emerging that can use several networks to communicate. Typical forerunners are the dual-band devices that are able to use 900 MHz and 1.8 GHz GSM networks. New products are emerging to the market that are able to also use WLANs and possibly Bluetooth, together with GSM, GPRS, and soon also UMTS network infrastructure. Wireless technologies vary on the degree of bandwidth and reliability they provide. In this respect one can speak of variable bandwidth. Another phenomenon also observable in the wireless world is bursty traffic which is the case with Internet-type networks and this holds in different time scales.

Variant tariffs : For some networks (e.g., in cellular telephones), network access is charged per connection-time, while for others (e.g., in packet radio), it is charged per message (packet). In the WAP environment there is a larger variety of tariffs, e.g., session-based, transaction-based, connection time-based, while in mobile e-commerce the range of tariffs is even wider.

Mobility : GSM infrastructure allows roaming all over the world, i.e., the user can get access to voice and data services basically in any other GSM network. Mobility causes diverse phenomena. The available bandwidth might vary, for instance, a mobile terminal may rely on low-bandwidth networks outdoor, while inside a building it may be offered reliable high-bandwidth connectivity or even operate connected via wire-line connections. Moreover, there may be areas with no adequate coverage resulting in disconnections while on the move. There may be also variability in the provision of specific services, such as in the type of available printers or local weather reports. Furthermore, the services offered by the telecom network used might differ from those at home. This might have drastic consequences for mobile business, if the e-commerce infrastructure used needs them. Finally, the resources available to a mobile element vary, for example, a docked computer or PDA has more memory or is equipped with a larger screen. Mobility also raises very important security and authentication issues.

3.5.3. Mobile business Value Chain

As described by Barnett et al., (2000), transport, basic enabling service, transaction support, presentation service, personalization support, user application, and content aggregators are the seven links in the mobile business value chain (illustrated in Table 1.1).

Table 3.1 : Mobile Business Value Chain

	Link Name	Function
1	Transport	To maintain and operate the infrastructure and equipment to guarantee data communication between mobile users and application providers.
2	Basic enabling service	To provide services such as server hosting, data backup, and system integration.
3	Transaction support	To provide the mechanism for assisting transactions, for security, and for billing users.
4	Presentation service	To convert the content of Internet-based applications to a wireless standard suitable for the screens of mobile devices.
5	Personalization support	To gather users' personal information, which enables personalized applications for individual users.
6	Content aggregators	To provide information in a category or search facilities to help users find their way around the Internet.
7	User applications	To carry out mobile commerce transactions for Mobile consumers.

From the perspective of a transaction, the following entities are the main participants in mobile business:

1. Customer. He or she can initiate a transaction in one place, receive the service in another place, and complete the transaction in a third place. The places can be in different cities, states, and countries.

2. Content provider. It provides customers specific content, which can be transmitted through a WAP Gateway or through a portal.

3. Mobile portal. Different from an Internet portal, it offers customers services with a greater degree of personalization and localization.

4. Mobile network provider. It plays different roles in mobile business varying from a simple mobile network provider to an intermediary, portal or trusted third party, depending on where it stands in the mobile business chain.

3.5.4. Advantages of M-business over E-Business

E-business has conquered the world. Despite the bursting of the dotcom bubble, it is hard to believe today how one managed to transact any business in the early 1990s without the Internet. Whether employed for information, support or advertising, nearly every business in the world of any size has a website. E-business has revolutionized how many companies do business, allowing for new business models and spawning completely new types of businesses. So with e-business less than 10 years old, is the world ready for something new, something with a potential of revolutionizing business practices the way e-business did? The answer is “Yes.”

Like e-business that preceded it, M-business as a transformational force is here to stay. In the next few years, mobile business or M-business will emerge as a powerful new approach for conducting business. It will become as pervasive by 2008 as e-business had become by the late 1990s. While the transformation induced by M-business would be dramatic, it would not necessarily replace e-business. M-business would enhance existing e-business functions and applications and launch new ones, totally mobile instead of being tied to desktop terminals. In

many ways, M-business would establish new patterns of doing electronic transactions, over and beyond what fixed-line e-business is capable of.

E-business happened because of the combined efforts of the personal computer, telecommunications, software, and office technology industries. M-business, similarly, is happening because of the combined efforts of the world's mobile handset manufacturing, telecommunications, computers, software, and office technology industries. In this massive global business, M-business is appearing as a new platform for creating product and service differentiation. Internet and e-business helped drive the supply and demand for multimedia computers. The underlying chip and display technology are upgrading at tremendous speed and as the mobile business matures, it would transform the handset – rendering it as different from its predecessors as today's desktop PC screen is from the green-tinted, non-graphic PC screen of the early 1980s.

The variables that are likely to set M-business apart from e-business are as follows :

User Experience

The biggest differentiator between e-business and M-business is the sensory experience of the user. In e-business, the user is in a stationary position in front of a PC terminal, and interfaces the content using a keyboard and point-and-click devices. In M-business, this is replaced by total mobility and the terminal can be voice or touch activated.

Different Terminals

A disposable terminal is probably the most radical way of describing how different terminals could be. Today's manufacturing technology aided by the unrelenting progress of Moore's law will allow an ever-increasing differentiation of terminal offerings. Terminals that are bendable, so that they can be rolled up, have been demonstrated at trade shows. Miniature sized terminals allow for packaging into ever-changing shapes and forms. Pre-paid phone service is just the introduction to other pre-paid services, complete with 'free' terminals. Multimedia is here to stay and will continue to evolve.

Multi-Transaction Services

M-business services could be scheduled and delivered in multiple ways. Users can choose to have a variety of services delivered at the times and places that they specify. In some cases, the services can be pre-scheduled (for peak hours, late night, birthdays, etc.). In still other cases, the network and the device can make intelligent assessments of what services are needed and proffer such services.

Integration with Enterprise Applications

With M-business, a business enterprise could move most of its capabilities out into the field. Services and applications that required office visits and meetings could now be delivered while moving with full access to all enterprise applications residing on business IT and information systems.

Field Third Party Applications

Terminals that are M-business ready can receive services not just from the primary wireless service providers but also from a variety of third-party providers. Most of these third-party providers would work through the wireless service operators. In some cases, the terminal may be able to communicate directly to third-party wireless service providers, through ad-hoc information exchange set ups or direct connectivity. The source of applications and information therefore becomes transparent to the user.

Geographic Positioning
From a continent to the corner of a street, M-business networks would be able to locate the user and tailor the service mix to the geographical location, keeping in view the constraints and opportunities of the geographical setting as well as the preferences of the user. A service would therefore work differently in India than in Honk Kong, London or New York based on profiles or regional preferences.

Mobile Flexible Configurations
Today's user profiles – whether in e-business or M-business settings – show the way to flexible configurations. But rather than requiring manual setups and changes, the m-services of the future will be automatically configured. So the minute a user leaves the home area, the service will be automatically configured with ring-tones, forwarding information and even downloaded information as the user travels. If the user wants to configure it in a new way, a simple code will download a new configuration.

Integration with Mobile Services
New M-business services would be easy to integrate with preexisting mobile services. For example, M-business offerings could easily incorporate a variety of existing messaging services, SMS and e-mail. They could also use conference bridges, network based calling, voice mail as well as many emerging services like downloadable hand-set applications, Multi-Media Messaging and information services.

Mobile Flexible Services
With easier integration of services, users would be able to avail of pre-packaged as well as programmable service-mixes. Some M-business systems would offer a service bundle from which the users would be able to choose and blend a variety of services.

Flexible Location
With M-business, the user can work, do daily chores, and/or play at work, home, recreational, shopping, and vehicular locations. The coming blurring of roles in the era of M-business will spawn multiple opportunities as well as trigger major social changes.

Network-enabled M-business Services
Extrapolating existing business approaches and paradigms into new areas is the most obvious way of looking into the future. For M-business, the problem with this approach – treating M-business as a simple extrapolation of e-business – is that it fails to take into account the dramatic differences (as well as different capabilities) between the two. Some of the most dramatic differences are screen size and the mobile user experience. But equally important are the fact that M-business services will be built (assembled) from different 'piece-parts' than e-Business. Wireless service operators will deliver some of these 'new' piece-parts and many of these are being discussed and implemented today. Examples include location information Application Programming Interfaces (APIs) and services. Certainly in future, there will be other, as-yet-unknown service piece-parts.

Basic Data Transport Services
At the most basic level, adding data transport capabilities to simple mobile voice telephony opens up some opportunities for M-business. The evolution of Web-browsing from today's slow WAP speeds to higher data rates will revitalize some of this market. Pure data transport to support custom terminal based network applications, like those used by today's package

delivery services, will continue to grow as enterprises start to capitalize on higher speed data transport to develop new business productivity and enhancement applications.

Additional Network Services
Enhancing basic mobile data access and web-browsing capabilities with additional network services and specialized terminals add more value to the M-business concept. Examples of this include the handheld device, which provided mobile email and messaging capabilities. Present day technology provides GPS capabilities in the mobile phone, making it a useful device for navigating in cities as well as in wilderness. Multi-media messaging is certainly positioning itself as a major value added service, replacing today's SMS as a key data service. Some network data services will utilize location information, for example delivering messages only in certain areas.

APIs for Network Services
APIs for network services allow for tighter service integration of Messaging, Location Based Services, Usage monitoring, and Billing. These API's are intended to be used by third parties or business enterprise applications to offer services that are more closely integrated with network services, utilize network billing or deliver services that are based on where the user is located.

Additional Services
As an additional value-adding step, the wireless operator can offer additional M-business oriented services providing complete value added information, tracking, billing or messaging services. These complete service packages can be utilized by business customers in order to develop more complete applications for their users.

Complete Integrated Service Packages
As an ultimate value-adding step, the M-business service provider can design and offer fully integrated service packages that solve complete problems.

3.5. 5. Mobile Business Activities

The essence of mobile business revolves around the idea of reaching customers, suppliers, and employees regardless of where they are located. It is about delivering the right information to the right place at the right time. This flexibility of mobile business is made possible by the convergence of the Internet, enterprise applications, and wireless technology (Clarke, 2001). Mobile business, enabling information exchange and purchases using mobile devices, provide different things to different people: to customers, it represents convenience; merchants associate it with a huge earning potential; and service providers view it as a large unexplored market. Japan and Europe are already witnessing early successes in mobile business. In Japan, NTT DoCoMo's iMode phone has emerged as a great success highlighting the application of wireless technology to a business environment. Introduced in February 1999, NTT DoCoMo iMode provides a continuous Internet connection via mobile phones, and connects users to a wide range of online services, many of which are interactive. All services link directly to the iMode portal Web site, and users can access any service virtually instantly by pressing the mobile phone's dedicated iMode button, iMode has already attracted more than 13 million Japanese consumers, particularly youth. Connected continuously to the Internet, these 13 million users can send e-mail, get stock quotes, and play online games. Soon they will be able to use on-line map guides and even conduct commercial activities by phone. Europe has also embraced a simple mobile data service whole-heartedly. Short Message Service (SMS) technology makes wireless e-mail a reality, and the new Wireless

Application Protocol (WAP) facilitates Web browsing and other Web-based transactions on mobile phones. Bluetooth, another European data initiative, further establishes a common standard for a wide range of appliances and industrial devices to communicate wirelessly. With new developments in technology, it is estimated that more than half of the European mobile business market in the next few years will include financial, advertising, and shopping services (Muller-Veerse, 2000).

3.5.6. Value-Added Applications

As mobile business extends the current Internet sales channel into the more immediate and personalized mobile environment, it also revolutionizes the business world by presenting it tremendous opportunities to provide additional value to hard-to-reach end customers (Keng Siau, 2001). These value-added services include:

1. Easy, timely access to information (e.g., the latest availability of flights) : Delivering a service that not only reaches more people but also is available all of the time, mobile business enables consumers to make purchases from wherever they are, whenever they are ready. This will result in an increase in revenue to the company providing the mobile services.
2. Immediate purchase opportunity (e.g., last minute purchases of tickets or gifts) : Provided with a personalized, immediate opportunity to purchase, the customer will make the purchasing decision on the spot and not go to an alternate source.
3. Wireless coupon based on user profiles : Since a mobile device's location can be determined precisely, the stores around the mobile device user can transmit user-specific information, such as current sales or specials, and alert the user about similar upcoming events. Wireless coupons, which enable an advertiser to deliver a geographically targeted and time-sensitive message to a willing consumer directly with a promotional offer virtually anytime and anywhere, will increase acquisition efficiency and allow direct offers suited to user profiles or stated user's preferences.
4. Beaming money : Some bank transactions such as withdrawals and deposits will be conducted via mobile terminals in the near future. Electronic money can even be transferred to mobile devices allowing the latter to be used for electronic payments.
5. Buddy finding : This location technology will quickly alert a user when his or her friend or colleague is nearby. It will also help the user to locate the nearest restaurant or ATM.

The only limit on the number and types of mobile business applications is our imagination. Varshney et al., (2001) identified a few important classes of applications such as mobile finance applications, mobile advertising, mobile inventory management, and product location shopping. As wireless technology further evolves, its application in business will only be broadened by more and more innovative mobile business possibilities.

3.5.7. Legal Concerns

Apart from its technical and business obstacles, the implementation of mobile business has its legal concerns too. The application of traditional law to the mobile Internet is not always a straightforward process. Legal issues plaguing mobile business are similar to those facing e-business. Some of them are how to maintain privacy, how to deal with defamation, how to protect intellectual property, and how to treat Internet taxation (Deitel et al., 2001). Like the wired Internet, the wireless Internet also poses significant challenges to our legal structure.

3.6. Implications to Application and Service Providers

The prospect and advantages of mobile business may appear obvious to many of us, but the path to success using mobile business is not necessarily so plain. Technical restrictions of mobile devices and wireless communication, business concerns, and legal constraints

complicate the practical use of mobile business. The obstacles confronted by mobile business applications and service providers, and the solutions available to some of the problems are given below :

1. Changes in business strategies : To stay competitive and realize genuine productivity benefits from mobile business, many organizations actually need to be redesigned. They will have to make fundamental changes in organizational behavior, develop new business models, and eliminate the inefficiencies of the old organizational structures. The process of rethinking and redesigning is a demanding task.

2. Investment risk : A major problem faced by mobile business is the huge investment required to implement and operate it. Engineering massive organizational and system changes to reposition the organization strategically is complicated as well as expensive. How can organizations obtain a payoff from their investment in wireless technology? Understanding the costs and benefits of mobile business is difficult.

3. Customer confidence : Customers need to be assured that their financial information is secure, and that wireless transactions are safe. The mobile business service should improve its reliability and stability by providing comprehensive technical and operational support to give users positive experiences and increase their satisfaction, and thus enhance the service provider's reputation and build customers' loyalty.

4. Simplicity in use : Many who try mobile business are frustrated and stop using it after a few attempts. Users need a simple experience, directly relevant to their mobile needs, and to enjoy the benefits of immediacy. Simplicity in use is critical to a successful mobile service.

3.7. Mobile Business - Indian Scenario

India is at a stage where all trends suggest an imminent surge in M-business. The IT Act, convergence, e-governance initiatives, mobile technology and infrastructure, the globalization of the economy, the distinct drive within public and private sector firms for efficiency and the use of technology to achieve this are all good signs. M-business has already started changing the rules of the game on the Indian business front. An integration of mobile technology with e-business offers significant business advantages and opportunities beyond e-business. Global projections are astonishing with Strategy Analytic predicting the total revenue from M-business transactions to reach US$ 500 billion by 2008 (Ozair et al., 2003). Statistical predictions in the Indian context too seem to be optimistic. Remarkable cellular phone penetration, and the increasing Internet subscriber base in India has definitely set a conductive ground for M-business revolution.

Today the Indian consumers have a host of options available and thus can choose a mobile device that suits her/his budget and lifestyle. Further more, cell phone manufacturers, service providers, and software/network providers have started coming together to let the Indian consumer to get a feel of M-business phenomena. Indian cellular players are continuously striving to delight customers by increasing their coverage and introducing value added services. Cellular infrastructure rollout is faster than fixed line and in 2002, it is estimated that the cellular subscriber base will surpass that of the fixed line by 2008. But, due unpredicted growth, cellular subscriber base surpassed that of the fixed line by 2006. In fact the growth of cellular infrastructure in India is fast becoming an index of development of states. States like Maharastra, Gujarat, Andra Pradesh and Karnataka are getting expensive coverage in every district and town. Although early winning M-business applications like mobile messaging, ticketing, stock trading, banking have become widespread in developed countries, it seems to be gaining grounds in Indian market as well. Banks are tying up with cellular service providers to provide a full range of m-banking facilities to its customers.

HDFC bank is the first Indian bank to offer mobile banking services followed by others like ICICI and Global Trust.

In India, the people are not worried about online payment. But they are worried about the security aspects. M-business sites have to be certified by an authority, like Verisign, which helps to build confidence about a site. Instead of online payment, cash on delivery is a very good model for India. Companies forcing their customers to make online payments are not good. Instead, they should look at educating their customers and then asking them to make use of the online payment mode. It was believed that the major hurdle would be posed by an absence of reliable bandwidth backbone and affordable Net access device. But presently the availability of optimum bandwidth as a result of adapting new mobile technology (3G) and the availability of handheld wireless Internet devices in the range of Rs. 1,000 to 3,000 certainly boost the M-business market in India.

The following sectors in India will get benefit under M-business transformation (Computers Today, 2002) :

1. Banking industry : Possible facilities that could be offered include Account Balance Enquiries, Last 'n' transactions, Utility Bills Payment, Cheque clearing notifications, Inter account Transfers, Statement and Cheque book requests, Access to Portfolio management and other share dealing services.
2. Share market industry : Mobile phone-based stock trading allows users to receive instant updates on market information. The system allows users to identify which stock they are interested in and what levels of alert they want. The warnings are then sent to the user's handset, and then they can buy or sell immediately without going to a computer.
3. Shopping : Many mobile service providers have planned to launch services that promote shopping using mobile. Fabmart, Zee marketing are few examples. Customers can pay for their purchases through their mobile phone bills. Text message shopping is already in use to buy books, CD etc., at bargain rate.
4. Building and construction materials industry : The fragmented nature, geographical spread and multiplicity of levels in the distribution structure for most products in this industry offers unique challenges and opportunities for e-business and M-business initiatives. M-business adaptation in this sector would be driven by factors such as improving brand building and customer services, penetrating markets in the semi-urban and rural pockets, improved dealer management, and ensuring timely supplies and services.
5. Metal industry : M-business adaptation in the metal sector would be primarily driven by working with lower inventories and adapting IT techniques and catering the customers through remote devices. This will increase market coverage and widen distribution reach, improved dealer management and controlling cost at every stage of the value chain. Metals, as commodity, also provide considerable scope for on-line tendering and auction applications.
6. Office automation industry : The Indian office automation industry is another potential candidate to adopt M-business strategies to its sales and service. The major benefits would be improved customer service, wider market coverage, and marketing and procurement costs reductions.
7. Packaging industry : The Indian packing industry is another potential sector for adopting M-business. Handling order taking and order placement through mobile, the package industries can improve supply efficiency, customer service and market coverage.
8. Indian engineering industry : Indian engineering industry is another potential candidate for M-business implementation. Front-end activities like enhanced customer service and

receiving new order, and back-end activities like enhanced vendor communication and booking purchases can emerge key priority areas in this industry.

9. Electrical and electronics industry : Implementing e-business and M-business in these industries is expected to result in improved sales and customer service through better information dissemination.

10. Chemical industry : Indian chemical and Petro-chemical industries have considered on-line business as a cost reduction tool. By adopting these strategies they would improve supply chain efficiency and reduce marketing / procurement costs.

11. Hotels and tourism industries : Booking hotel rooms and resorts at any time, at any place can be done through M-business options.

12. Pharmaceutical industry : Indian pharmaceutical industry views M-business as a tool that would aid community building, and to smaller extent, reduce costs through better supply chain management. They also expect to use this medium to provide people with more information on diseases and the products used to cure them.

13. Logistics industries : Both transportation and warehousing parts of logistics are potential candidates for M-business implementation due to the fact of increase in products sold on-line. The need to move a large volume of small parcels and the increase in customer expectations.

14. Auto – components industry : The Indian auto-component industry is another prominent candidate for M-business implementation. Due to the increasing competition in the domestic market and threat of imports, necessitating widening of market reach, and exploring export markets.

15. Lottery and Betting : All on-line lotteries and betting can accept the bets through the message delivered by SMS. The M-business technology allows not only mobile betting but also, using a mobile video-phone, be able to watch the actual race while moving on the road or while traveling in an aeroplane.

16. Mobile positioning services : With mobile positioning services the mobile phone could become a personal tracking device, allowing your family friends and employer to know where you are at all times. Mobile positioning integrates with satellite positioning systems and let people tell others where they are.

3.8. M-business Research Agendas

Research plays a vital role in solving problems in current mobile business applications and directing its future development. The possible research activity to be carried out in mobile business in order to correct or address the challenges are :

Application Level Issues

At the application level, one can find a non-exhaustive list of mobile business applications. Some of them such as mobile news subscriptions, mobile file exchanges, and mobile e-mail services have already been developed and used. Others such as mobile multimedia on demand, mobile distance learning, mobile financial transactions and mobile telemetry are in the development phase. While it is still early to predict how successful the emerging mobile business applications are, one would expect several important research issues to be addressed at the application level to derive useful principles for designing such applications and developing businesses around them. The important application level research issues include:

1. Usability research : The usability of an application generally refers to how well it is designed to enable users to perform their tasks easily and effectively. In mobile business, usability issues are particularly important as primary constraints of the mobile environment. Usability concerns will impel users to demand far better application designs, compared to wired applications. To evaluate the usability of mobile business applications, a comprehensive methodological and comparative framework will have to be developed.

Application case studies should be conducted using the methodology and framework so that new design principles for mobile business applications can be tested.

2. User interface design : Unlike the wired computing environment where large screens are available, mobile business applications have to operate on small and often wearable mobile devices that can only include small screens. In some cases, the mobile business applications may have to exploit the use of voice channels to enhance the efficiency of the user interface. Some studies on the user interface for mobile devices have been reported in the Workshop series on Human Computer Interaction with Mobile Devices (Rock, 2000). The possibility of using Wireless Storage Area Network (WSAN) and Organic Light Emitting Display (OLED) technologies along with voice recognition techniques will certainly change the M-business scenario dramatically.

3. Mobile business models : While electronic commerce within the wired environment has introduced new business models such as e-auction, e-shopping, e-banking etc., the mobile environment in which the mobile business applications reside will require further adaptation of these business models. One reason for this is that mobile business provides opportunities for telecommunication services, e.g., SMS messaging, phone, billing, etc., to be integrated more tightly with the mobile services. In addition to the usual B2B and B2C business applications, one would expect the individually owned mobile devices to make it easier to design and implement C2C (customer-to-customer) or P2P (peer-to-peer) applications such as trading music or video files and financial transactions. In order for mobile business to succeed, it is also vital to ensure that all the related applications and services can be accessed with ease and little cost.

4. Indian Traditional and Cultural Issues :

Indian organizations can benefit from worldwide implementation experiences and apply them after local conditioning. The adaptations will have to be made in the areas of localized business practices, telecom infrastructure, security requirements and local language interfaces. M-business implementation in India has been affected by both external and internal factors. External factors include a low number of customers accessing the Internet/mobile devices for their purchasing needs, poor communications infrastructure, gaps in legal and regulatory frameworks and issues concerning payment gateways. The Indian IT Act is not clear on issues regarding taxation of electronic transactions, and is silent on protection of intellectual property rights in net space. Internal barriers include perceived uncertainties with regard to benefits, territory protection issues and a lukewarm response from business partners. In most business companies IT systems and processes are not geared to maximize the benefits of M-business. The mobile network penetration is very low and less than 10 per cent of internet users presently buy products / services online. Apart from B2B market, B2C market is expected to get more benefit due to the advantage of convenient, speedy and personalized services of M-business. A day will surely come for Indian former to sell his products in C2C market and carryout his financial transactions and payments using mobile business devices in near future.

Assignment Questions :

1. Write a short note on disadvantages of e-commerce.
2. Discuss the reasons for e-commerce not being very successful.
3. Discuss the legal issues/problems encountered in the e-commerce environment.
4. Write a note on Ethical Issues in E commerce.
5. What is m-commerce ? How it is different from e-commerce ?

6. Explain the details of Communications Infrastructure Technologies and Issues in m-commerce ?
7. Explain various features of m-business ?
8. Write a note on Mobile business Value Chain
9. What are the advantages of M-business over E-Business ?
10. Write a note on Mobile Business Activities and Value-Added Applications
11. Analyse Indian Scenario of Mobile Business ?
12. Analyse mobile banking models of ICICI & SBI

CHAPTER 4
Information System Resources

Syllabus : Information System Resources-Computer basics *(H/w* & *S/w)* DBMS, Communication Systems, internet and office automation.

4.1 Computer basics *(H/w)*

Computer hardware is a collective term used to define the various parts of the computer you can see and touch with your hands. The various components of these are the Monitor, Keyboard and Central Processing Unit. One can have additional hardware like printer, scanner attached to the computer too.

PERSONAL COMPUTERS :

As mentioned above, in 1981, IBM introduced the first Personal Computers. The technology used in it was so simple that it took no time for others to copy it and make computers which are known as IBM compatible computers. They are known as IBM clones too. Since then, IBM has brought out different versions/models with variations of floppy disks, hard disks, chips, etc., making them faster and faster.

The various versions of IBM PC compatible computers are shown below:

Model	RAM Chip	Type of Chip	Floopy D	Floopy D	H.D
PC-XT	640 K	8088	2	0	0
PC-XT	640 K	8088	1	0	20 MB
PC-AT/286	1028 K	80286	1	1	40 MB
PC-AT/386	4 MB	80386	1	1	120 MB
PC-AT/486	8 MB	80486	1	1	260 MB
PC-Pentium	16 MB	Pentium	0	1	720 MB
PC-PII	32 MB	Pentium-II	0	1	4 GB
PC-PIII	64 MB	Pentium-III	0	1	10 GB
PC-PIV	128 MB	Pentium-IV	0	1	40 GB

Note :

1 Byte = one character (0 to 9 or a to z or special characters)

Another type *of* computers which are very popular throughout the world but not in India are **Apple Computers.** All the computers are manufactured and sold by the parent company known as Apple Computer Products.

APPLE COMPUTERS :

These computers have other versions also. Version Apple HE was the first one. But later on they came up with a series of computers known as Macintosh (Mac, as is popularly known). These computers have become very popular with those people who have to use the computer for designing and artistic work, since the picture clarity is these computers in very high.

CLASSIFICATION OF COMPUTERS :

Generally, computers can be divided into 3 types.

1. Analog Computers
2. Digital Computers
3. Hybrid Computers

ANALOG COMPUTERS :

In this type of computers, numerical magnitudes are represented by physical quantities such as electric current, voltage, or resistance, mechanical movements, etc. These are machines which are designed to perform arithmetical functions upon numbers where the numbers are represented by physical quantity.

Analog computers are widely used in manufacturing units where temperatures, pressure or flow of liquids are to be monitored continuously. It is also used at petrol pump where petrol pump contains an analog processor that connects fuel flow measurements into quantity and price values.

Among the various drawbacks of using Analog computers are: They do not have the ability to store data in large quantities; They do not have the logical facilities; They can perform only arithmetical functions but are more costlier.

DIGITAL COMPUTERS :

A digital computer operates on data in the form of digits, rather than the physical quantities used in analog computers. That is, its input must be discrete rather than continuous and may consist of combinations of numbers, characters and special symbols, written in appropriate programming language.

Digital computers can be classified into two parts:

General Purpose Digital Computers

They are also known as all purpose digital computers. Theoretically they can be used for any type of applications, e.g., computers that are used for payroll, graphs, analysis, etc.

Special Purpose Digital Computers

A digital computer is 'designed to solve problems of a restricted type. That is, special purpose digital computer is designed to be especially efficient in a certain class of applications, e.g., computers installed in washing machines.

HYBRID COMPUTERS :

This type of computers are hybrid of the above two types. A hybrid computer may use or produce analog data or digital data. It can be obtained either by interconnecting a digital and analog computer via a hybrid interface or the analog unit is integrated as a part of central processor of a digital computer which ultimately helps in getting input/output directly.
Hybrid computers are generally used in scientific applications or in controlling industrial processes, in both situations the user is able to exploit the machine's ability to process both discrete and continuous data using accurate digital subroutines where necessary and the analog machines for fast integration functions.

ClASSIFICATION BY SiZE :

If we classify the computers by their sizes, we would have the following classification

1. Super Computers
2. Mainframe Computers
3. Super Mini Computers
4. Mini Computers
5. Micro Computers or Personal Computer

Super Computers :

A supercomputer contains a number of processing units which operate in parallel to make it faster. They are in fact, very large computers and are thus used for bigger applications. In India, there are many super computers, in which one such computer which is used by the Meteorological department weather forecasting.

Mainfrarne Computer :

It is again a large computer but where it differs from super computer is that it can be connected to various computers to share facilities. For example, a Systern/370 can be attached to several personal computers so that they can share programs and data. Mainframe computers are used in research organizations, large industrial banks, airlines, and railway reservations where large data base is required.

A typical application is the airline reservation system. The airlines have a main frame computer at their head office where information of all the flights is stored. Small computers installed at booking offices, are attached to the central data bank so that upto date information of all the flights is available.

The structural configuration of the main frame consists of :
1. Data communication equipment.
2. Interface equipment for a variety of high speed and low speed input/output devices.
3. Primary storage.
4. Secondary storage.
5. Central processors with multiprogramming facilities.

The main frame computers have following characteristics :

1. They are big general purpose computers capable of handling all kinds of problems whether scientific or commercial.

2. They can accept and transfer data from I/O devices at the rate of millions of bytes per second.
3. They can accept all types of high level languages.
4. They can support a large number of terminals say up to 100 or more.
5. They usually have instruction sets that give them the flexibility to operate automatically on 2 bytes (half-word) or 8 bytes (double word).
6. They have large on-line storage capacities and can support a number and variety of peripheral devices like magnetic tape drives, hard disk drives, visual display units, printers, and telecommunication terminals.
7. They routinely have high speed cache memory, which enables them to process applications faster than mini or micro computers.

The limitations of main frame computers are due to their high cost, large in size, high power consumption, requirement of skilled workers and expensive peripherals like requirement of air-conditioning etc.

Super Mini Computers :

These are cross between minicomputers and super computers. They are commonly used as dedicated computers, for one processing function at a time.

Mini Computers :

They are inferior to mainframe computers both in speed and storage. They can also support various terminals. In fact, they can support upto 100 terminals. Minicomputers have operating systems with multitasking and network capabilities enabling them to serve more than one user. They find applications in organizations having a heavy work load but finding the main-frame expensive to buy.

The most important advantage of a mini computer over the main-frame is that it is cheaper in cost, smaller in size, very rugged and reliable. It does not require air- conditioning and can be operated at room temperatures. The main use of these systems in education, in local government bodies, and also as a front end processors to a main-frame computer. It is also being used in word processing. In business, they are being used for invoicing, stock control, pay roll, sales analysis etc.

The mini computers have following characters :
1. They can accept and transfer data from I/O devices at the maximum speed of 4 MB per second.
2. They can support up to a maximum of 100 terminals.
3. They usually employ micro-processors in the CPU, both for data storage as well as data manipulation.
4. They have operating systems with multitasking and network capabilities enabling them to serve more than one user.
5. As per size, price and capabilities to support the number and variety of perifherals and terminals, they are further subclassified as (a) mini mini computers, (b) midi mini computers, and (c) maxi mini computers.

Compared to main-frame computers, mini computers are comparatively slow and their capabilities are limited.

MICRO COMPUTERS AND PERSONAL COMPUTERS :

Microcomputers are digital computers whose processing unit consist of one or more microprocessors, one or more input/output units and sufficient memory to execute instructions.

They are usually desktop or portable devices with a display, a keyboard and tape disk and diskette storage. They are designed primarily for stand-alone operation but can be used as workstation in terminal emulation mode.
The advantages of micro-computers are :
1. They use very little power.
2. They are less costly.
3. They are portable.
4. They are stable and reliable, once tested and proved to work, they can go on working for years.

Compared to main-frame and mini computers, they are slow and have limited capabilities but they provide good value for money.

Personal computer is a type of microcomputer primarily intended for stand-alone use by an individual. PCs are designed primarily to give independent computing power to a single user and are inexpensively priced for purchase by individuals or small business. IBM introduced the first personal computer called IBM-PC on 12/02/1981.

INTRODUCTION TO MICROPROCESSORS :

Microcomputer is so called because it uses the microprocessor chip. Basically all the microcomputers consist of 3 main chips: microprocessor chip, input/output chip and memory chip. A microprocessor chip can be further divided into control unit and arithmetic logic unit. It is here that all the processing of the computer takes place.

Each personal computer has been based on certain chip of the likes of 8088, 80286, 80386, etc. These chips have been introduced by Intel Corporation.

CENTRAL PROCESSING UNIT (CPU) :

As mentioned above this is the unit where all the processing takes place. It can be further divided into: **Main Memory, Control Unit** and **Arithmetic Logic Unit.**

Memory :

The memory unit can be defined as the brain of the computer. But, it does not store the information for long, It has the information only for the time when it is processing it. Once processed it passes on the information and gets the new information for processing.

There are two types of memory: **Non volatile memory** and **Volatile memory.**

Non Volatile Memory

In it the memory chip always retains the data which holds even when the computer turned off, e.g., ROM. One of the main reason of having ROM is to tell the computer is do when it is turned on. There are two main parts of non volatile memory: **PROM** (Programmable Read Only Memory) and **EPROM** (The Erasable Programmable Read Only Memory).

Volatile Memory
As the name suggests it is volatile in nature and loses its contents when the computer is shut off. It is called RAM (Random Access Memory). The main purpose of this memory is to hold programs and data which are under processing.

Capacity of RAM
The capacity of RAM is stated in terms of the number of bytes it can store. Memory capacity is usually stated in terms of Kilobytes (KB), which is equivalent to 1024 (2^{10}) bytes of storage, and in terms of megabytes (MB) which is 1,048,576 (2^{20}) bytes.

Note that 1 KB is about 1000 and 1 MB is about 1,000,000, thus the origin of the prefixes kilo (thousand) and mega (million). Occasionally you will see memory capacities of individual chips stated in terms of Kilobits (Kb) and megabits (Mb).

There are several types of memory that can be implemented in a given machine. **Dynamic Random Access Memory** (DRAM) is the most common low-cost and flexible RAM available. DRAM is now usually implemented using **SIMM** (Single In-line Modules) packs and SIMM slots. **Static RAM** (SRAM) is much faster, but also much more expensive. DRAM is usually used in the cache portion of the machine because of speed requirements.

Static Memory is made up of flip-flops and it stores a bit as a voltage. Dynamic Memory is made up of MOS transistor gates and it stores a bit as a charge. The advantage of dynamic memory is that a large number of transistor gates can be placed on a memory chip: thus it has high density and is faster than static memory. The disadvantage is that bit information stored gets leaked, so the information needs to be read and written again after every few msec. This is called refreshing the memory.

Function of RAM
RAM provides the processor with temporary storage for programs and data. All programs and data must be transferred to RAM from an input device or from secondary storage before programs can be executed or data can be processed.

RAM space is always at a premium; therefore, after a program has been executed, the storage space it occupied is reallocated to another program awaiting execution. The input message is interpreted and the processor initiates action to retrieve the appropriate program and data from secondary storage.

This is a non-destructive read process, i.e., the program and data that are read, reside in both RAM (temporarily) and secondary storage (permanently). The data are manipulated according to program instructions and an information is received at output.

A program instruction or a piece of data is stored in a specific RAM location called an address. Addresses permit program instructions and data to be located, accessed and processed. The content of each address is constantly changing as different programs are executed and new data are processed.

Bubble Memory
If the surface of a non-magnetic material is coated with a thin layer of magnetic material which is magnestised in the opposite direction away from the surface. These bubbles can be moved around and used to represent the binary digits. Bubble memories can not replace the

main memory (CMOS) because they are too slow. However they can contain a great deal of information in a small space and may be used to replace the magnetic disk eventually, as they have the advantage of no moving parts.

Flash Memory (Flash RAM)

These memory chips are non-volatile and are therefore a true replacement for disk storage. The contents of the flash memory can be altered by the computer, and the data can still be retained when the power is turned off.

Access to data in flash memory is not as fast as a RAM, but is still many times faster than retrieving data using a disk drive (secondary storage). Because flash memory does not use any moving parts that draw power, it is used when power consumption must be kept to a minimum. This is particularly good for portable computers relying on batteries.

The first common application of flash memory will probably be replacing hard disks in laptop and notebook computers. Next, you will be able to plug your laptop's memory card into your PC to transfer programs and data between them easily. Flash chips are currently being used in cellular phones and cockpit flight recorders and they are replacing disks in some handheld computers.

Flash memory chips are being produced in credit-card like packages, which are smaller than a disk drive and require only half the power, that is whey they are being used in notebook computers and handheld personal digital assistants.

FACTORS AFFECTING PROCESSING SPEED

Registers

The size of a register (16-bit register or 32-bit register) which is also called the word size indicate the amount of data with which the computer can work. The bigger the size of register, the faster the computer can process a set of data. Registers retain information on a temporary basis.

They are not considered part of main memory. Registers have the ability to receive information, hold it temporarily and then pass it on as directed by supervisory control unit.

There are several type of registers:

Instruction Register : It holds the instruction which is being executed.

Address Register: It holds the storage location address.

Accumulator: It collects results.

Memory and Computing Power

More RAM make the computer run faster. The computer does not necessarily have to load an entire program into memory to run it, but the more of the program it can fit into memory, the faster the program will run. The computer loads only the most essential parts into memory. When it needs access to other parts of the program on the disk, it can unload, or swap out non essential parts and swap in program code or data it needs.

Computer's Internal Clock

Every microcomputer has a system clock made up of quartz crystal. The molecules in the crystal vibrate millions of times per second which is constant. The system uses the vibration of the crystal (quartz) in the system clock to time its processing operations. The clock speed is measured in hertz. Pentium CPU today have clock speed from 200 MHz to 400 MHz.

Bus

The system bus carries bits between CPU and only one peripheral at a time. In computer terminology bus refers to the paths between the components of a computer.

There are three main **buses:**

1. Data bus
2. Address bus and
3. Control bus.

Data Bus

It is an electrical path that connects the CPU, memory and other devices on the motherboard, tn real sense bus is a group of parallel lines. The number of lines in the bus affects the speed at which data can travel between hardware components. Since each wire can transfer one bit at a time, a 16-wire bus can move 16-bits at a time, which is 2 bytes. Similarly a 32-bit bus can transfer 4-bytes at a time.

In computer industry a data bus with 16-bit wide is called **as Industry Standard Architecture** (ISA) bus. A 32-bit bus is known as **Extended Industry Standard Architecture** (EISA) bus.

Address Bus

It connects only the CPU and memory and helps in locating memory address faster. The number of lines in It determines the maximum number of memory addresses, Today most CPUs have 32-bit address buses that can address 4GB (over 4 billion bytes) of memory.

Control Bus

It controls the direction, flow, origin and destination of data. It comprises of various single tines that carry synchronization signals. Control bus are individual lines that provide a pulse to indicate an CPU operation.

The CPU generates specific control signals for every operation it performs. These signals are used to identify a device type with which the CPU intends to communicate.

Cache Memory

A cache is similar to RAM except that it is extremely faster compared to normal memory. The cache speeds up processing storing frequently used data or instructions in its high-speed memory. Whenever the CPU requests information from RAM, the cache controller intercepts the request and searches its own memory for the requested information. If the information is not there the CPU retrieves the required data from the memory (RAM) and also sends a copy back to the cache. The next time the CPU needs the same information, the cache finds that information and quickly sends it to the CPU leaving RAM out of the loop.

Math Coprocessor

When the computer has to do a lot of floating-point arithmetic (viz; in spreadsheet, drawing programs or CAD programs) the presence of a math coprocessor either built into the CPU (viz: 486 DX-2 or Pentium, onwards) or added on the motherboard (viz; in 286, 386- in these 287 and 387 chip act as math coprocessor) can speed up processing considerably.

So math coprocessor is a chip or part of a chip that is specially designed to handle complicated mathematical operations.

Flash Memory

A long-standing speed problem has been the rate of accessing data from a secondary storage device such as a disk, a rate significantly slower than internal computer speeds. To overcome this, flash memory (non-volatile RAM) can be used. Since data and instructions will be ever-closer to the microprocessor, conversion to flash memory chips would have a pivotal impact on a computer's processing speed.

CONTROL UNIT :

It is the center of all the activities of the computer. The control unit contains circuitry that uses electrical signals to direct the entire computer system to carry out or execute stored program instructions.

The control unit does not execute instructions itself, but it tells others what to do.

Arithmetic Logic Unit :

It executes all the arithmetic and logical operations. The arithmetic operations can be Addition, Subtraction, Multiplication, and Division. The logical operations can be: Equal to, Less than and Greater than.

SEMICONDUCTORS

Consisting *of* very small silicon chips these are mainly used *for* memory of the computer. They are different types varying in terms of speed and reliability.

lNTEGRATED CIRCUIT

They are nothing but the electronic circuits on a small silicon chip. This chip is capable performing a variety of functions as a substitute for different electronic components of the computer.

HARDWARE

Computer hardware is a collective term used to define the various parts of the computer you can see and touch with your hands. The various components of these are the Monitor, Keyboard and Central Processing Unit.

One can have additional hardware like printer, scanner attached to the computer too.

SOFTWARE

A program is a set *of* instructions given to the computer to perform a certain task. It is known as the software of the computer. There are two main types of software:

System Softwore

The software used to operate and maintain a computer system and also used by a programmer to develop application software is known as System Software. Various software under this category are:DOS, Windows, etc. System Software is further classified as (a) Operating system software and (b) language software.

Applicotion Software

The software which performs specific tasks, like railway ticketing, telephone billing, salary and wages calculation, etc., is called the application software.

DATA
It is the raw form of information which is given to the computer for processing. Data is name given to the basic facts such as name, age. address, telephone number, etc.

INFORMATION
It is the collection of data in a meaningful form. So all data which has some meaning is called information. Please remember Data and Information is not the same thing. Data is raw but information is organized form of data.

PROCESSING
When the data is put into the computer to give some results, the work which the computer performs is called Processing.

BIT
It is the smallest storing space in the computer.

BYTE
A group of 8 bits form a Byte. A computer's capacity is measured in terms of bytes. It is required to store a character—numeric (0 to 9), alphabetic (a to z) or (A to Z) and special characters like these: ! @ # £ % h & * f etc.

But certain large computers can perform operation in parallel, i.e., it can process two or more sets of data simultaneously.
Before an instruction can be executed, program instructions and data must be placed into memory from an input device or a secondary storage device.
CPU Performs the following steps for each instructions:
1. The control unit fetches the instruction from memory (RAM) or cache memory and located to the program register and then to decoder.

2. The control unit decodes the instruction and directs that the necessary data to be moved from memory to ALU.

These first two steps together are called instruction time or I-time

3. The ALU executes the arithmetic or logical instruction.
4. The ALU stores the result of this operation in the appropriate memory position or register

These two steps together are called execution time or E-time. Each ALU unit has an internal clock that produces pulses at a fixed rate to synchronize all computer operations. The repetition of the instruction/execution cycle continues until all the instructions have been processed. The speed of processing depends on the clock speed of the computer hardware.

The time taken by control unit to process one instruction is called a machine cycle—a Combination of two cycles, i.e., fetch and decode cycle, and execute cycle.

In the fetch and decode cycle phase the control unit obtains an instruction from primary storage(RAM) and stores it in an instruction register and then it decodes the instruction by looking up the instruction's operation code in a table.

Each type of CPU can only understand a particular type of instruction set.

In the execute cycle phase the supervisor control unit executes the instruction by actually performing the task indicated.

Sometimes the instruction simply requires the transfer of data value from one primary Storage location to another, e.g., increment a particular variable. Such type of task does not require the ALU.

MOTHEBOARD

The most important part of the CPU is Motherboard. As the name suggests it is the mother of all boards. All other boards are secondary to it. All instructions pass through this first.

Various components on the motherboard are:

Memory : These slots are there for putting the memory chips. Most of the new motheboards have capacity for 128 MB of RAM.

CPU : This is the main slot for the PC.

Additional : These are there for putting additional attachments like Video card, etc.

BIOS : Basic Input Output Instructions chip which is fixed on the motherboard to run the PC.

Clock This chip is there for providing the running dock within the PC to give you the time and date.

Ports : Most PCs now-a-days come with 2 parallel and 2 serial ports where j can put your mouse, printer, etc.

IDE : These are used for connections to floppy disk, hard disk, CD-ROM drive, etc

4.2 Computer basics *(S/w)*

The Software is generally classified into two categories on the basis of application suitability of the programs:

1. System Software
2. Application Software

System Software :

System Software referrers to all programs which make the computer work and commonly supplied by the manufacturers of the Hardware. System Software is the Software required for the basic operations of the Computer which consists of a large number of functions which are specific to the hardware devices constituting a particular computer system.

I System Software is further classified as
   1. Operating system Software
   2. Language Software

II Language software comes in four forms
   1. Assembler
   2. Compilers
   3. Interpreters
   4. Editors.

COMPUTER LANGUAGE

A language is a system of communication. A programming language is the language used to communicate with computer. The programming language are part of the Software or programming aids provided by the manufacturer. All computer languages can be classified in following broad categories:

1. Low level Languages
   a. Machine level Language
   b.. Assembly Language
2. High level Languages

MACHINE LANGUAGE

The computer understands nothing but 0s and I s (machine language) is also referred to as an absolute language. These machine instructions are divided into two parts.

1. Operation (code)
2. Operand (address)

In the early stages of programming, the programmer was required to write his program in strings of 0s (zeros) and Is and also calculated and allocated the core storage locations for his data and/or instructions. This was really very tedious and great proportion of his time was wasted in these routine jobs. Later on it was found that the capabilities of the computer can themselves be used to relieve the programmer of these strenuous routine jobs. Operations such as translating a program into detailed machine codes, allocating storage place inside the computer, organising, establishing and accounting for sequences for short jobs are precisely the high grade clerical work the computer can handle. It is therefore, only rational to expect the machine to do it. This provided the motivation for the birth of programming languages.

The instructions to the computer are provided with the help of a programming language by preparing a program. The language whose design is governed by the circuitry and the structure of the machine is known as Machine language consisting of instruction codes in the format.

OPERATION CODE	OPERAND (ADDRESS)

The operation code denotes the operation which is to be performed (e.g. add, multiply; write onto output device etc.), and the power of a computer is the number of operations that it can execute (i.e., the number of instructions in an instruction set). The operand part of the instruction code gives the specific location address of the data to which the operation code is to be applied (remember that the CPU main store is divided into thousands of identifiable address locations). If the \ data requires more than one address location its length is also indicated, thereby identifying (without numbering each one) the next sequential location address(es) that contain the rest of the data.

ADVANTAGES OF MACHINE LANGUAGE

1. Machine Languages make efficient use of storage – language instructions and their storage in computer memory can be controlled.
2. Instructions of a machine language program are immediately executable. They require no compilation or translation steps.

3. Machine language instructions can be used to manipulate the individual bits in a byte of computer storage.

DISADVANTAGES OF MACHINE LANGUAGE

1. machine languages are machine dependent.
2. Although easily used by the computer, machine languages is difficult to program. It is necessary for the programmer either to memorize the dozens of code numbers for the commands in the machine's instruction set or to constantly refer to a reference card.
3. It is difficult to correct or modify machine language programs. Checking machine instructions to locate errors is about as tedious as writing them initially.

ASSEMBLY LANGUAGE:

The language which substitutes letters and symbols for the numbers in the machine program is called an assembly language or symbolic language. A program written in symbolic language that uses symbols instead of numbers is called an assembly code or symbolic program. The translator program that translates an assembly code into the computer's machine code is called an assembler. The assembler is a system program which is upplied by the computer manufacturer. It is written by system programmers with great care. It is so called because an addition to translating the assembly code into machine code, it also assembles the machine code into the main memory of the computer and makes it ready for execution. A symbolic program written by a programmer in assembly language is called ***source program.*** After the source program has been converted into machine language by an assembler, it is referred to as ***object program.***

In the 1950's mnemonic operation codes and symbolic addresses were developed. First introduced in the second generation computers, the word mnemonic (pronounced nemonik) refers to a memory aid. Letter symbol mnemonics were substituted for the numeric machine language operation codes. Each computer has a mnemonic code although the actual symbols vary among different makes. Machine language is still used by the computer as it processes data, but assembly language program first translates the specified operation code symbol into its machine language equivalent.

ADVANTAGES OF ASSEMBLY LANGUAGE

1. It is not required to keep track of memory locations.
2. Insertions and deletions are quite easy.
3. Revision of complete program is quite easy.
4. Requires fewer instructions to accomplish the same result.
5. Assembly language is easier to understand and because mnemonics are used instead of numeric op-codes and suitable names are used as data.
6. While writing programs in assembly language, fewer errors are made, and those that are made are easier to find and correct because of the use of mnemonics and symbolic field names.
7. Assembly language programs are easier for people to modify than machine language programs.

DISADVANTAGES OF ASSEMBLY LANGUAGE

1. Programs based on such languages cannot be executed on small sized computers.
2. Programs take longer to code because of the more complex nature of the language.

3. Lack of portability of programs between computers of different makes.

HIGH LEVEL LANGUAGES

To overcome the low level language difficulty of machine dependency, high level problem-oriented (or machine independent) languages were developed. Such programming languages, with an extensive vocabulary of words and symbols, are used to instruct a computer to carry out the necessary procedures, regardless of the type of machine being used.

High level languages do to have the one instruction to one instruction relationship which is a feature of symbolic languages. Instead one high level language instruction language instruction (a macro instruction) may generate a number of machine code instruction. This allows the programmer to abandon the two part format of low level instructions and as he can work relatively independently of the machine the programming task is considerably eased. High level languages are constantly being developed and improved and as more and more systems capable of on line and real time operation languages were designed for interactive use via a terminal.

Interactive languages provide facilities for the programmer to make corrections and /or changes to his program during its compilation and execution. The increasing availability of mini computers and micro computers has speeded up this process of developing languages that enable the user to obtain maximum use of the computer, without undergoing an extended period of special training or incurring the considerable post of employing a computer programmer.

ADVANTAGES OF HIGH LEVEL LANGUAGES

1. Machine independence: High level languages are machine independent. This is a very valuable advantage because it means that a company changing computers even to one from a different manufacturer will not be required to rewrite ail the programs that it is currently using.

2. Easy to learn and use: These languages are *very* similar to the languages normally used by us in our day lo day life. Hence they are easy to learn and use. The programmer need not learn anything about the computer he is going to use.

3. Easier to maintain: Programs written in high level languages are easier to maintain than assembly language or machine languages program.

4. **Fewer Errors**: In case off high level languages, since the programmer need not write all the small steps carried out by the computer, he is much less likely to make an error.

5. ***Lower program preparation cost****:* Writing programs in high level languages requires less time and effort which ultimately leads to lower program preparation cost.

6. ***Better documentation****:* A high level languages is designed in such a way that its Instructions may be written more like the language of the problem.

7. High-level programs may be used with different makes of computer with little modification. Thus, reprogramming expenses are greatly reduced, when new machines are acquired.

8. Higher-level language programs are much shorter than machine language or assembly language programs. A single line in a higher level language program may translate into five or ten or even hundreds of machine language instructions.
9. Writing of source programs in these languages does not require the knowledge of the internal structure of the computer.
10. Modification, if required, in programs written in these languages are quite easy and straight forward.
11. Prograrnmers can move to different installations using high level languages without having to learn new languages.
12. They are more user friendly.

DISADVANTAGES OF HIGH LEVEL LANGUAGES

The disadvantages of using a high level language as opposed to a low level language are:

1. **Lack of flexibility**: Because the automatic features of high level languages always occur and are not under the control of the programmer, they are less flexible than assembly languages.

2. Runs slower due to the generality of the statements and the fact that they are potable between different machines provided a suitable compiler is available. Such languages are machine independent.

3. A source of program written in a high level language *needs* a complier which is loaded into the main memory of the computer and thus occupies enough of memory space. The memory available for a source program is greatly reduced. Hence these languages are machine independent.

4. Lower efficiency: As the programs written in a high level languages take more time to run and require more main storage, they tried to be less efficient in the use of the CPU and other facilities.

LANGUAGE TRANSLATORS:

As discussed earlier, any program that is not written in machine language has to be translated before it is executed by the computer. Language translators perform the translation of high level languages or assembly language into machine language. In addition they check for some types of errors that may be present in the program being translated.

There are three types of translator programs:

1 compilers
2 Assemblers and
3. Interpreters

COMPILERS

Compiler is a standard program written and supplied by the computer manufacturer translating the program written in a high language (viz. Fortan, Cobol etc.) to the equivalent machine code of the computer. This process of translation called compilation. The compilation process consists of first loading the computer with the compiler and then inputting the source program via punched card called compilation. The compilation process

consists of first loading the computer with the compiler and then inputting *the* source program via punched card magnetic tape. As such, the compiler produces an object program on a deck punched cards or magnetic tapes and also a print out of the program instruction.

The operating system calls a compiler for a particular language from the secondary storage and load if info the primary storage. The compiler checks each coded instruction lo see that It follows the rules for that language, uses proper spelling and syntax. All acceptable Instructions *arc* translated into the machine language and stored. In case of errors in the program, it communicates this information to the programmer in the form of diagnostic messages. These messages appear on the printer or the designated devices along with a listing of program instructions. The program can be executed only after it is found to be error free during the compilation run. Though an assembler also performs the same hob as is done by a compiler, still there is a basic difference between the two. The assembler translates symbolic address into actual core storage locations. Each mnemonic instruction is normally converted into a machine code instruction on a one for one basis. Compiler, on the other hand, is far more complex to design and write as each source program instruction in a high level language such as Cobol generates a number of machine code instructions. Also, compiler occupies more storage space and takes more processing time than an assembler.

The various tasks that the compiler has to accomplish during compilation are as follows:
1. Read each line of the source program and convert it into machine language.
2. Allocate space in memory for the storage location as defined in the pro gram to be executed.
3. Combine the machine code generated with the appropriate subroutines from the library.
4. Identify the proper order of processing, so that execution is as fast as possible and minimum storage space in memory is required.

Complier have been written for many of the commonly used computer languages such as BASIC, FORTRAN, C, AND PASCAL. The complier translates an entire program from the source of code, i.e., the program written in a high level language, to object code, i.e., machine code. These machine instructions can then be run on the computer to perform the particular task as specified in the high level language program.

REMARK: The complier can diagnose the following kinds of errors in a source program:
a. Illegal Characters
b. Illegal combination of characters
c. Improper sequencing of instructions in a program.

A source program containing an error diagnosed by the compiler will not be compiled into an object program. The compiler will print out a suitable message indicating this, along with a list of coded error messages which indicate the type of errors committed. The error diagnostics is an invaluable aid to the programmer.

ASSEMBLER

Assembler translates a program written in assembly language in to machine language. Apart from the fact that it deals with a low level language rather than a high level language, and

thus has less of a gap to bridge in translation, are assembler operates in the same way as the compiler does. It translates complete source program into an object program, identifying any errors along the way. The assembler will list or display these errors as well as the complete source and object programs, If the program is error free, the job control program will let run immediately, or save the object program so that it may run it later without translating it again.

Assembler is supplied by the computer manufacturer.

INTERPRETER :

Interpreter *is* another type of translator used translating high level languages into machine code It takes one statement of a high level language and translates it into a machine instruction which is immediately executed. Translation and execution alternate for each statement encountered in the high level language problem. In other words, are interpreters translates one instruction and the control unit executes the resulting interpreters translates one instruction and the control unit executes the resulting machine code, next instruction is translated, and the control unit executes the resulting machine code instruction, and so on.

INTERPRETER	COMPILER
1. translates the program line by line	Translates the entire program
2. Requires less main memory	Requires more main memory
3. Each time the program is executed every line is checked for syntax and then converted to equivalent machine code	Converts the entire program to machine code, when all the syntax errors are removed and executes the object code directly
4. Source program and the interpreter are required for execution	Neither source nor the complier are required for execution
5. Good for fast debugging and at testing stage	Slow for debugging and testing
6. Execution time is more	Execution time is less
7. No security of source code	Security of source code.

EDITORS:

These programs are used to compose and modifying other programs. They are primarily text editing programs that allow programmers to add, delete, insert and edit the text of instructions which will be subsequently compiled or assembled, depending on the language used. Examples are Turbo 'C' editor, Norton editor Turbo Pascal editor, WordStar, Excel.

Editors are interactive programs that are stored in memory and allow the user to write a program, generate text, or make wide variety of changes and additions inn either of these. If for example, a source program needs correction because it has failed to compile properly, an editor can be used to make the necessary changes to the program. Once the final program is error free, it may be compiled and the editor can be asked to store the final text in a file. The final text can also be stored on an external storage medium such as tape or disk or output to a printer. The editor is normally stored on some external mass storage media and whenever required called into the RAM.

Before a program can be executed, it must be placed on the main storage. Special programs able to read programs from input or storage devices and place them into the main storage are

called loaders. In modern computer, the loader is permanently stored in ROM and is fixed part of the computer itself. Thus, it is easy to load any external program on to the computer's main memory. Closely related to the loader is another utility lo assist the assembly process called the linkage editor. The linkage editor allows independently written assembly language program to share data and variables by linking them together when they are loaded into computer memory and run.

APPLICATION SOFTWARE

An application program is a program written for or by a user to perform a particular job. It can be categorized in to two ways.

a. General purpose application Software
b. Specific purpose application Software

Genera] purpose application Software such as an electronics spread sheet, word processors, graphics have wide variety of applications. Specific purpose application software, such as pay role, sales analysis, Inventory management is used only for the application for which it is designed. Application Programmers write these programs.

4.3. DBMS :

A database is a collection of logically related data that are organized in such a way, so as to facilitate easy accessing and processing of data. Databases contain data, not information. By itself database is meaningless and worthless, but through proper design and use of the database, it can be an essential tool for producing information for making management decisions.

Database is a collection of data designed to be used by different people. It is a collection of interrelated data stored together, with controlled redundancy to serve one or more applications in an optimal fashion. The data are stored in such a fashion that they are independent of the programs of people using data. A common and controlled approach is used in adding new data and modifying and retrieving the existing within the database.

Database management systems (DBMS) are support programs that work in conjunction with the operating system to create, store, process, retrieve, control and manage the data. The DBMS acts as an interface between the application program and the data in the database.

Data are binary computer representations of stored logical entities. Relationships represent a correspondence between the various data elements. Constraints *are* predicates that define the correct database states where the schema describes the Organization of data and relationships within the database. The schema defines the various views of the database for database management system component's use and for applications' security. A schema separates the physical aspects of data storage from the logical aspects of data representation.

The internal schema defines how and where data are organized in a physical data storage. The conceptual schema model defines the stored data structures in term of the database model used.

The external schema defines a view or views of the database for particular users. A database management system provides services for accessing the database while maintaining the required correctness and consistency features of the stored data.

WHY A DATABASE?

Why should an organization choose to use an integrated database to store its operational data? A general answer to this question is that a database system provides the organization with centralized control of its data. This is in sharp contrast to situation that prevails in many enterprises, where typically each application has its private files in its own tapes and disk, so that the data is widely dispersed therefore difficult to control.

Deficiencies of pre-database :

Deficiencies of pre-database information processing include (but not limited to) the following :

- Encoded data (data hard-coded in the application)
- Interdependence between programs and data files
- Data repetition or redundancy
- Data inconsistency
- Lack of data integrity
- Ad hoc representation of relationships
- Ad hoc data management techniques
- Lack of coordination across applications using common data
- Lack of data security mechanisms
- Inability to manage concurrent access to data
- Non-uniform back-up and recovery methods

OBJECTIVES OF DATABASE :

The objectives which management should keep in mind as they design and organise a database are :

(a) Provide for mass storage of relevant data.
(b) Make access to the data easy for the user.
(c) Provide prompt response to the user requests for data.
(d) Make the latest modifications to the database immediately.
(e) Eliminate redundant data.
(f) Allow multiple users to be active at one time.
(g) Allow for growth in the database system.
(h) Protect the data from physical harm and unauthorized access.

ADVANTAGES OF DATABASE :

The advantages of having data in a database is summarized below;

1. Redundancy can be reduced In non-database systems, each application or department has its own private files resulting in a considerable amount of redundancy of the stored data. Thus, storage space is wasted. By having a centralize most of this can be avoided. We do not say or suggest that all redundancy should be eliminated. Sometimes there are sound business and technical reasons for maintaining multiple copies of the same data. In a data base system, however, this redundancy can be controlled.

2. Inconsistency can be avoided This is really a corollary to the above point. When the same data is duplicated and changes are made at one site, which is not propagated, to the other site, it gives rise to inconsistency. Then the two entries regarding the same data will not

agree. At such times, the data is said to be inconsistent. So, if redundancy is removed, the chances of having inconsistent data is also removed.

3. Data can be Shared : The existing applications can share the data in a database.

4. Standards Can be enforced : With the central control of the database, the database administrator can enforce standards.

5. Security : restrictions can be applied with complete authority over the operational data, the database administrator can ensure that the only means of access to the database is through proper channels. He can define authorization checks to be carried out whenever access to sensitive data is attempted. Different checks can be established for each type of access (retrieve, modify, delete, etc.) to each piece of information in the database.

6. Integrity : can be maintained. Integrity means that the data in the database is accurate. Centralized control of the data helps in permitting the administrator to define integrity constraints to the data in the database.

7. Conflicting requirements can be balanced. Knowing the overall requirements as opposed to the individual requirements, the database can be structured to provide an overall service that is best for the organization.

CHARACTERISTICS OF DATA IN A DATABASE

The data in a database should have the following features.

1. Shared - Data in a database are shared among different users and applications.
2. Persistence - Data in a database exist permanently in the sense, the data can live beyond the scope of the process that created it.
3. Validity/Integrity/Correctness - Data should be correct with respect to the real world entity that they represent.
4. Security - Data should be protected from unauthorized access.
5. Consistency - Whenever more than one data element in a database represents related real-world values, the values should be consistent with respect to the relationship.
6. Non-redundancy - No two data items in a database should represent the same real-world entity.
7. Independence - The three levels in the schema (internal, conceptual and external) should be independent of each other so that the changes in the schema at one level should not affect the other levels.

File Pointers :
File pointers establish linkage between records and are a basic part of the file organization of all data base models except the relational model. A pointer is placed in the last field of record. A pointer is the address of another, related record that is “pointed to” and the pointer directs the computer system to that related record. File pointers are used with many database organizations.

Linked Lists :

A linked list is a group of data records arranged in an order, which is based on embedded pointers. An embedded pointer is a specific data field that links one record to another by referring to the other record. The field is embedded in the first record, i.e., it is a data element within the record.

Linked list often have a head, which is a pointer to the first record. It has a tail, which points to the last record. One can start at head and follow the list to the tail, or one can start in the middle and follow the list to the tail. The user can not start in the middle and go back to the head. In other words, the linked list is a one-way street.

The following figure shows a linked list of customer records. Each row is a record. The records are arranged sequentially using customer number as the key. Each record includes a data element, which identifies assigned salesperson. In the right most field of record there is a pointer (a link) that chains together all customers records for a particular salesperson say salesperson 23. It can be assumed that customer 23694 is at the head of the list. The pointer links this record to a record for customer 25410 and so on until the tail for customer 30111 is encountered. The asterisk in the link indicates the tail of the list.

This chaining feature is very powerful. The application program can initiate a search at the beginning of the file looking for first customer assigned to salesperson 23. When that record is found, the salesperson links enable the program to follow the chain and process records only for salesperson 23. It is more convenient method than searching through the entire file.

Customer				Salesperson Number	Salesperson link\
22504					
23694				23	25410
24782					
25409					
25410				23	30102
26713					
28914					
30004					
30102				23	30111*
30111				23	
30417					
31715					

Components of DBMS

A DBMS has 3 main components

(a) Data dictionary system (DDS)

(b) Data definition language (DDL)

(c) Data manipulation language (DML)

(a) Data dictionary system (DDS) : The data dictionary system is an encyclopedia of information concerning each data element. It describes the data and its characteristics, such as location, size and data type. It also identifies the origin, use, ownership and also the methods of data access and data security. When it exists in a file, special software is necessary to create it, maintain it and make it available for use. Such software is called a data dictionary

system. A good data dictionary would ensure consistent definitions of data across different databases. If there were to be a change to the data, it would also identify all the databases affected by the change.

(b) Data Definition Language (DDL) : The data definition language is used to create the data, describe the data and define the schema in the DBMS. It serves as an interface for application programs that use the data. Once the data dictionary has been created, its definitions must be entered into the DBMS. The primary functions of DDL are :

1. Describes the schema and subschemas.
2. Describes the fields in each record and record's logical name.
3. Describe the data type and name of each field.
4. Indicate the keys of the record.
5. Provide for data security restrictions.
6. Provide for logical and physical data independence.
7. Provide means for associating related records or fields.

For example, if a payroll program needs the employment number of an employee, the DDL defines the logical relationship between the employment number and the other data in the database, and acts as an interface between the payroll program and the files that contain the employment numbers.

(c) Data Manipulation Language (DML) : A data manipulation language is a language that processes and manipulates the data in the database. It also allows the user to query the database and receive summary reports and / or customized reports. DML enables the user to access, update, replace, delete and protect database records from unauthorized access.

The functions of DML are :

1. Provide techniques for data manipulation such as deletion, replacement, retrieval, sorting, or insertion of data or records.
2. Allows user and application programs to process data on logical basis rather than physical location basis.
3. Provide access which is independence of programming languages.
4. Provide for use of record relationships.

WHAT IS A DATABASE MANAGEMENT SYSTEM?

A database management system (DBMS) is a software that provides services for access a database, while maintaining all the required features of the data. The major components of a DBMS are shown in the figure (a) & (b).

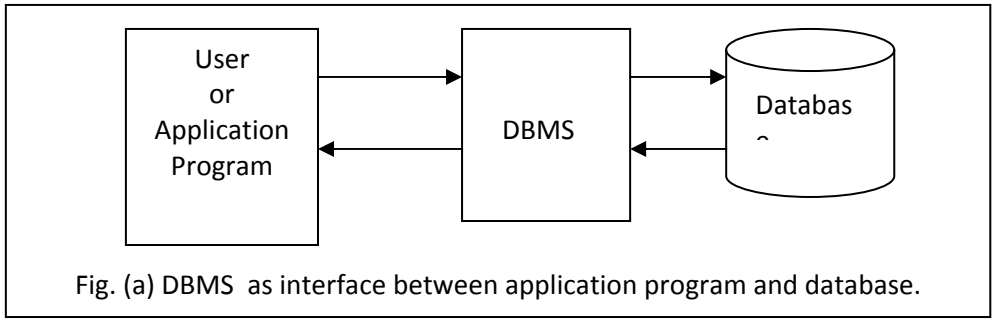


Fig. (a) DBMS as interface between application program and database.

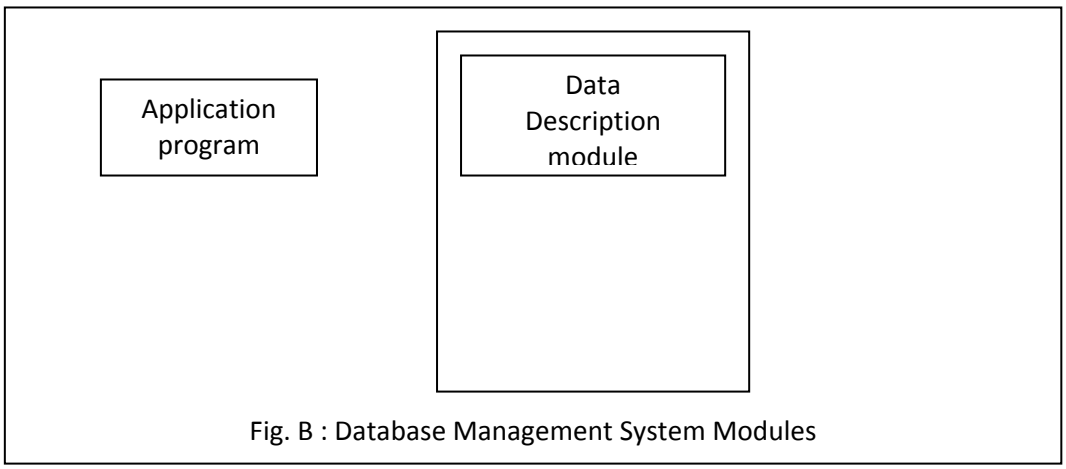


Fig. B : Database Management System Modules

Some of the services provided by a DBMS are given below :
A transaction is a sequence of database operations that represents a logical unit of work. It accesses a database and transforms it from one state to another. A transaction can update a record, delete one, modify a set of records, etc. When the DBMS does a 'commit', the changes made by the transaction are made permanent. If you don't want of make the changes permanent you can rollback the transaction and the database will remain in its original state.

Concurrency *management* Concurrency management is the database management activity of coordinating the actions of database manipulation
that operate concurrency access shared data and can potentially interfere with each other. The goal of an ideal concurrency management mechanism is to allow concurrency while maintaining the consistency of the shared data.

Recovery The objective of recovery in a database is to ensure that the aborted or failed transactions do not create any adverse effects on the database or transactions. Recovery mechanisms in a DBMS make sure that the database returned to a consistent state after a transaction fails or aborts. Recovery is very much related to concurrency in the sense that, the more the more concurrency, the more is the chance of an aborted transaction can affecting many other transactions.

Security :Security refers to the protection of data against unauthorized access. Security mechanisms of a DBMS make sure that only authorized users are given access to the data in the database. The level of access for each user and the operate each user can perform on the data will be monitored and controlled by the DBMS depending on the access privileges of the users.

Language interface The DBMS provides support languages used for the definition and manipulation of the data in the database. The data structures are created using the data definition language commands. The data manipulation is done using the data manipulation commands. By providing language support for data definition manipulation the DBMS create an environment where the users can do their without worrying about the physical implementation.

Data *Catalog:* Data Catalog or Data Dictionary is a system database that contains the descriptions of data in the database (metadata). It contains information about relationships,

constraints and the entire schema that organize these features unified database. The data catalog can be queried to get information about the structure of the database.

Storage management : The DBMS provides a mechanism for the management permanent storage of the data. The internal schema defines how the data should be stored by the storage management mechanism and the storage manager interfaces with the operating system to access the physical storage.

WHY DBMS?

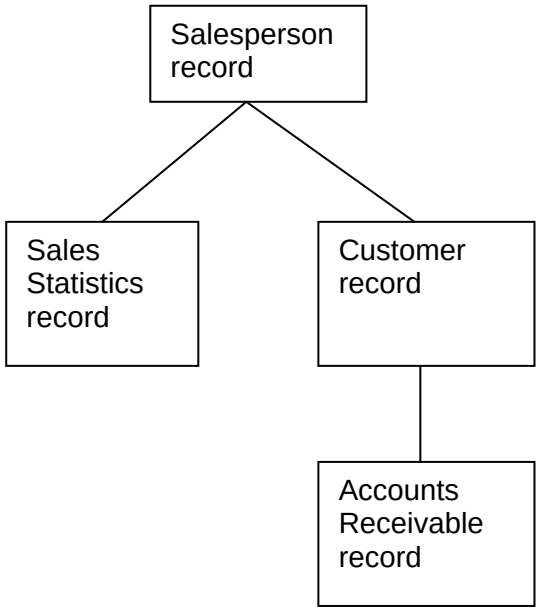
A DBMS provides a secure and survivable medium for the storage and retrieval of data. If the users and applications do not share data among themselves and if the longevity of the data is only till the end of the process or application that created it, then there is not much need for a DBMS. But in real world, the data is shared and is persistent (that a, the data has a life beyond the boundaries of the programs and applications that created it). Also, the real world data have a structure. It is related to one another and has constraints. These features are well represented and can be efficiently managed using a DBMS. Also, the different users of the data need to create, access and manipulate the data. The DBMS provides mechanisms to achieve these objectives without compromising the security and integrity of the data. Therefore, if the data is shared, if it is persistent, if the users want it be secure and easy to access and manipulate, then use of a database management system is the best available alternative.

TYPES OF DATABASE MANAGEMENT SYSTEMS

Database Models

A database model is the method of organizing data and represents the logical relationships among data elements in the database. The most popular database models are

(a) Hierarchical model
(b) Network model
(c) Relational model
(d) Object-oriented model

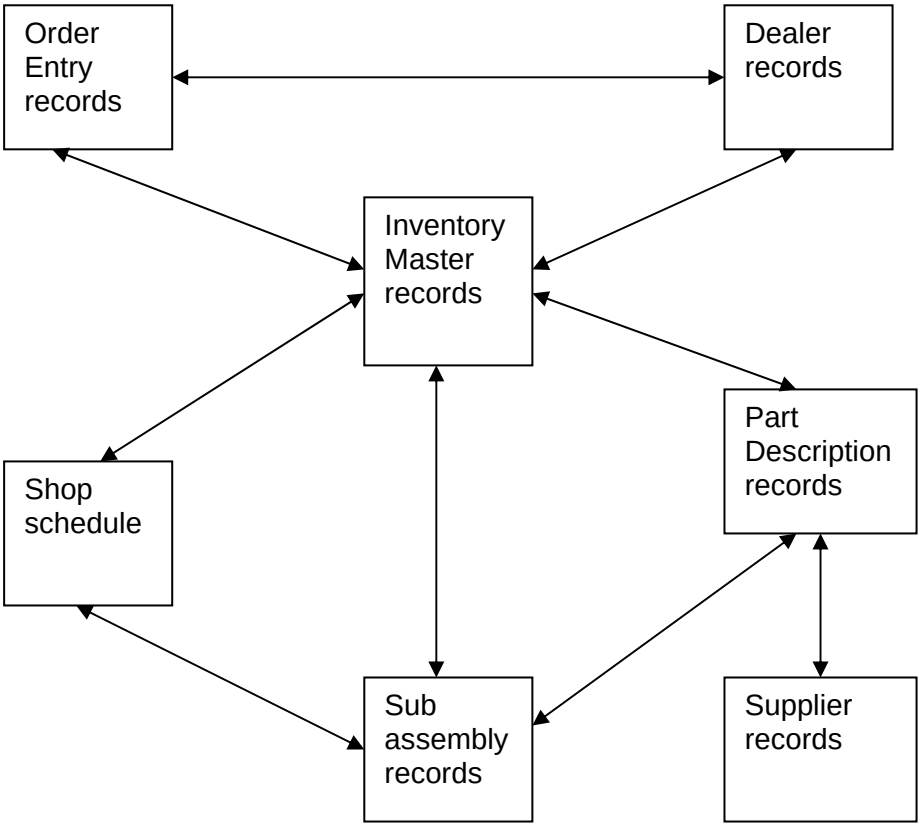


(a) **Hierarchical model** : This structure helps to establish logical relationships among various data elements of multiple files and arrange the elements in a hierarchy. Each box in the model is a record and is sometime referred to as a node. In such a model, each record on one level can be related to multiple records on the next lower level. A record that has subsidiary records is called a parent and the subsidiary records are called children. Data elements in this model are well suited for a one to many relationships with other data elements in the database. The figure below provides an example of the hierarchical model

In the figure above, link fields establish the logical relationships. The links are represented by the thin lines, that connect data elements of the various records in the lower portion. Once a salesperson record is retrieved, the link in that record can lead to another record that is logically related to that salesperson. A link field in the second record leads to the third record and so on, thereby creating a chain reaction through an entire set of files.

This model is ideally suited for problems in which the data elements have a natural hierarchical structure. The disadvantage is that it is necessary to identify the groups of files that must be logically integrated before the database. Hence, a hierarchical data model may not always be flexible enough to accommodate the dynamic needs of an organisation.

(b) **Network model** : In the network model, each record in the database can have multiple parents, ie; the relationships among data elements can have a many to many relationship. The figure below shows a network model for an inventory system.



In the network model, databases can be translated from hierarchical model to network and vice versa. The main difference between the network model and hierarchical model is that in a network model, a child can have a number of parents whereas in a hierarchical model, a child can have only one parent.

The advantage of the network model is that it promotes flexibility and data accessibility, since data elements at a lower level can be accessed without accessing the data elements above them. This model is efficient, easy to understand and can be applied to many real world problems that require routine transactions. The disadvantage is that

(i) it is complex to design and develop
(ii) it has to be fine tuned frequently so that relationships among different pieces of data are true representations of the real world.
(iii) it requires that the relationships among all the data elements be defined before development starts, and changes often demand a major programming efforts
(iv) for large databases, operations and maintenance of the network model are time consuming and expensive

(c) **Relational model** : In this model, data is represented using two dimensional tables called relations, which are made of columns and rows. Each column represents a field, also referred to as an attribute, each row represent a record, also referred to as a tuple. Relational databases are a popular way of organizing data for business needs because of their flexibility. Relational databases use three fundamental operations : select, project and join. The select operation is a horizontal cut so that only selected rows (records) are included in the query results. The project operation creates a subset of columns (or a new table) designed to meet the information needs of the user. The join operation joins, or links two or more tables, if the information requested by the user is not found in one table.

The advantages of a relational model are that it enables a computer system to accommodate a variety of file inquiries in an efficient manner. Also additional indexes can be constructed at a later point of time as new data processing requirements dictate. The major disadvantages of the relational model are that the index portion of the file must be created and maintained along with the file records. In some cases the index portion of the file may be larger than the file itself resulting in wastage of storage space. Also the file index must be searched sequentially before the actual file records are obtained, resulting in wastage of time.

Relationships within a data model

To understand the relationships concepts, we have to understand the terms used in explaining the same. They are : entity, attributes, values, key attributes and records

(a) **Entity** : The entity is a place, person, thing, event etc about which the information is recorded. Examples are customer, bank account etc
(b) **Attributes** : The attribute characterize the entity or describe the entity meaningfully. Example is that if house is an entity, then its attributes are color, number, owner etc
(c) **Values** : Each attribute of an entity has a value and is known as a data value. The data value could be quantitative or descriptive, depending upon the attributes. That is, the size of the house will be the area and hence quantitative while the construction quality would be qualitative. The attributes could have a single value or multiple values.
(d) **Key attributes** : Some attributes can be a key attributes of an entity. Using this key attribute, we can find the values of other attributes. For example, customer number is

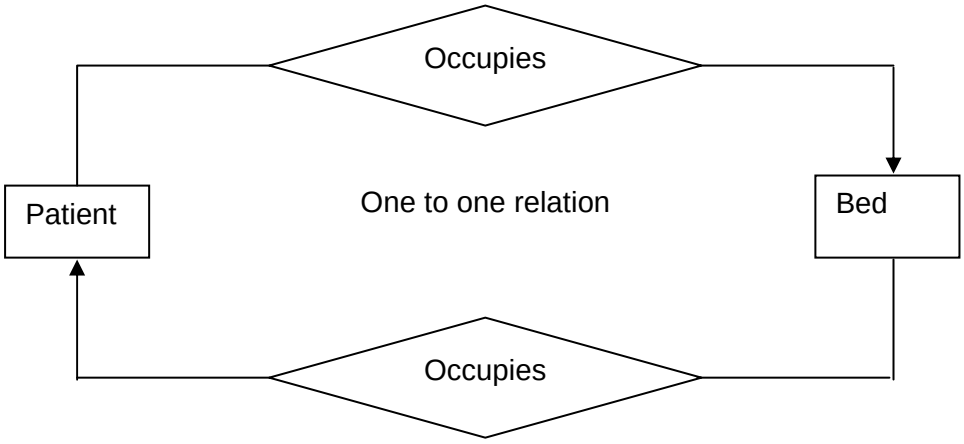
an attribute of an entity "customer". From this key, we can find the name of the customer, his address and account balance.

(e) **Record** : The record is a collection of the attributes of an entity. The set of the attribute values is called as a record.

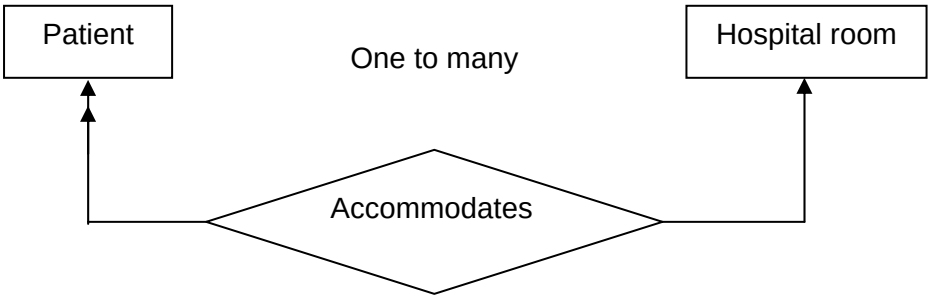
There are 3 types of relationships between entities. They can be shown in an entity-relation diagram. Also known as E-R diagram.

(a) one-to-one
(b) one to many
(c) many to many

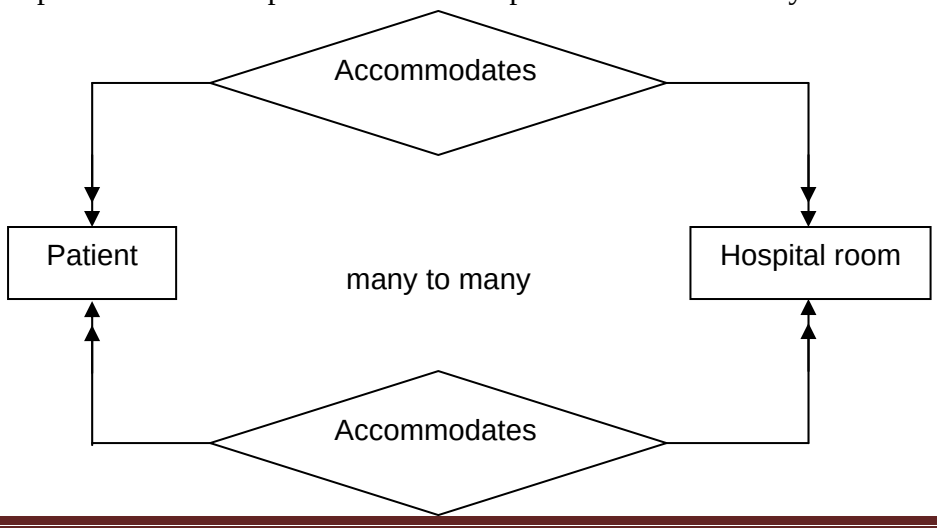
Let us take the hospital environment to understand the relation types. The patient, bed, hospital room and surgeon are the entities in the environment and their relations are as shown below :



At a given point of time, a patient occupies a bed or a bed is assigned to a patient. Since the patient cannot occupy more than one bed, the relationship is one to one.



At a given point of time, one or more patients are assigned to a hospital room, hence the relationship between the hospital room and the patients is one to many.



A surgeon operates on many patients or a patient may have been operated upon by many surgeons. Hence, the relationships both ways is many to many.
The relationships are built on the assumption that the patient, hospital room, surgeon and hospital bed have unique key as the identifiers.

Recent developments in databases
The recent developments in database technology are
(a) Distributed databases
(b) Client server architecture
(c) Object oriented databases
(d) Multi media databases

(a) **Distributed databases** : A distributed database is a database distributed over single or multi vendor computer hardware located in different geographic areas. Some examples are network of libraries, network of corporate offices in the country etc. The distributed databases have become popular because of two main reasons. First, in the earlier days, many organisations created individual databases for different applications such as payroll, personnel data, employee benefits etc Unfortunately, many of these databases could not communicate with each other because they were created on different systems. Distributed databases provide a way to overcome this problem. Second, the business units of an enterprise may be geographically dispersed and the information needs and demands of each location may be different. Distributed databases help to store the data where it is most needed or used, and help to customize the data to meet the needs of individual business units.

(b) **Client server architecture** : A computing paradigm based on client server architecture makes it possible to inter operate among different database management systems, among a network of heterogeneous hardware and software platform. Here the load is optimally distributed among clients and servers. Typically, servers are high end performance machines supporting heavy transaction processing processes called server processes, the clients are likely to be low end PC class machines with rich graphical user interface and end user driven. With client server architecture, a network user can initiate several client processes in many windows among many servers; they could be heterogeneous hardware and a software running on machines that are geographically dispersed. Yet the user feels that he is being served by all the servers.

(c) Object oriented databases :
Object-oriented model represents an entity as a class. A class represents both object attributes as well as the behavior of the entity. For example a book class will have not only the book attributes such as ISBN, Title, Author, Publisher, Year of Publishing, Distributor Price, etc. but also procedures that imitate actions expected of a book such as Update price, etc.

Instances of the class - object - corresponds to individual books. Within an object, the class attributes takes specific values, which distinguish one book from another. However the behavior patterns of the class is shared by all the objects belonging to the class.

The object-oriented model does not restrict attribute values to the small set of native data *types* usually associated with databases and programming languages, such as integer, numeric, character, etc. Instead the values can be other objects. For example, one of the attributes of a book can be distributor and the value of that attribute can be a distributor object corresponding to the distributor who is distributing the book.

The object-oriented model maintains relationships through logical containment. Consider the book-distributor example. You find the distributor of a particular book as one of its attributes. Since distributor is an object in its own right, you can recursively examine its attributes. The distributor object can have a title attribute.

(d) **Multimedia databases** : The traditional databases were limited to a few data types like numeric (integer and real) and character string. However, the increasing complexity of database applications calls for handling more complex data objects like scanned images (maps, pictures, photographs etc), audio and video images. Databases to handle such complex data objects are known as multimedia databases. Until recently, databases were limited to hold ASCII data only. Most of the real life applications however need an ability to handle information, which is rich, such as images, audio images, video clippings etc. A new generation of databases is being built to accommodate multimedia. OOP is a promising technique to handle multimedia databases.

Three Types of Data Descriptions : (Three types of schema) :

In DBMS, the data is described in three ways :
1. From the application programmers view point – a description of subschema.
2. From the global logical view point – a description of the schema.
3. From the physical view point – a description of the physical records and their linkages.

Subschema is the application programmer's view of the data in a database.

Schema is an overall conceptual or logical view of relationships between the data in a database.

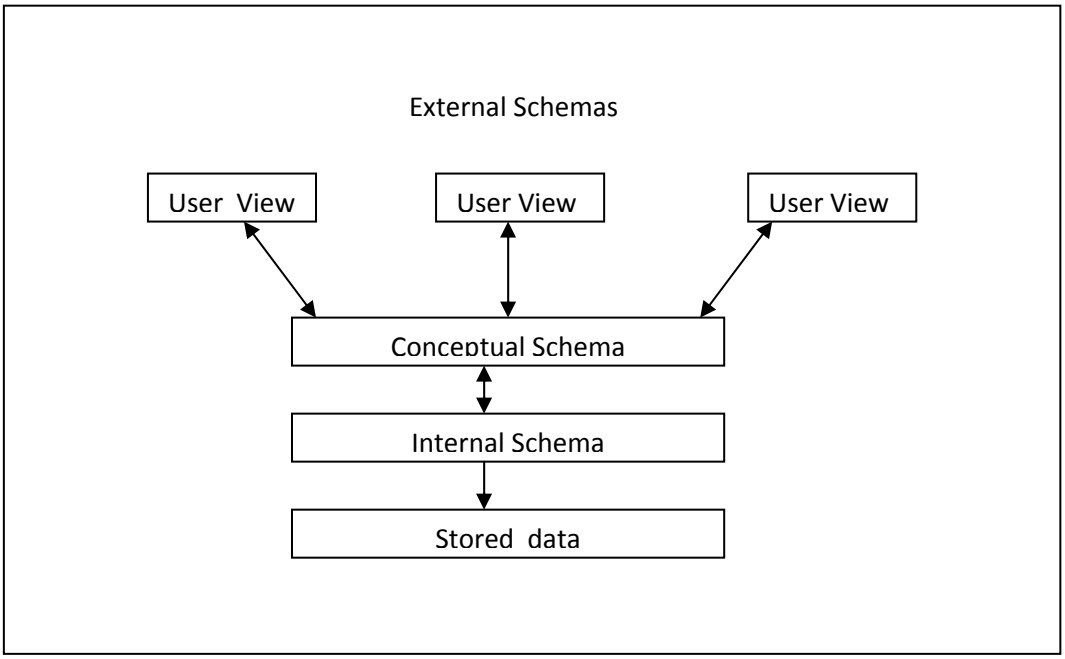
The different schemas used to reflect different views of the database are :
1. External schema or user schema is user's view of a part of database.
2. Conceptual schema is the overall logical view of the database.
3. Internal schema or data storage definition is the way the data is physically organized in a database.

Each user of a database is concerned with only a small portion of the database. Each user is interested in only a part of the entities in the database, only a part of the attributes of those entities, and certain relationships among them.

The conceptual schema represents the real entities and their relationships. It contains integrity rules and authorization rules, but it does not contain information about how the data items are stored.

The internal schema (or physical data model) describes how the database is organized for physical storage and access. It includes information on ordering of records, block sizes, storage indexes, use of pointers, and access strategies being used.

Following figure shows the general model of database system.



Normalization :

It is a process of simplifying the relationship between data elements in a record. Through normalisation, a collection of data in a record structure is replaced by successive record structures that are simpler and more predictable and therefore more manageable. The reasons why it is carried out are :

(i) To structure the data so that any pertinent relationships between entities can be represented.
(ii) To permit simple retrieval of data in response to query and report requests.
(iii) To simplify the maintenance of the data through updated inventories and deletions.
(iv) To reduce the need to restructure or recognize data when new application requirements arise.

Normal forms are groups of mathematical rules that can be used to test decisions, when arranging attributes to form entities and when selecting keys during the database design process. The process of applying rules of normal form is called Normalisation.

As a part of designing database, systems analysis and design techniques include “Data Analysis”. Data analysis uses the **normalization** procedure which simplifies entities, removes redundancies from the system data and finally builds a data model, which is both flexible and adaptable to the future requirements of the organization.

The degree of Normalization includes :

1.First Normalization Form (1NF)
2.Second Normalization Form (2NF)
3.Third Normal Form (3NF)
4.Boyce –Codd Normal form which include
    1. Fourth Normal Form (4NF)
    2. Fifth Normal Form (5NF).

Each greater degree of normalization includes the lesser degrees. For example, data that is in the Third Normal Form is also in the Second Normal Form and the First Normal Form. However, it may or may not follow the values of the Boyce-Codd Normal Form.

1. First Normal Form :

This is the lowest level of normalisation. It states that data is in first normal form, if the pool of valid values that may appear in an attribute contains only Atomic Values (Atomic values can not be decomposed into smaller values).

2. Second Normal Form :

Data is in Second Normal Form if it is in 1NF and every non-key is functionally dependent on the primary key. (An attribute is a non-key if it is not part of the primary key). The purpose of 2NF is to eliminate repeating groups and to ensure that the remaining attributes belong to this entity.

An attribute is functionally dependent on a key if the attribute contains only one value which depends on that key. For example, the attribute SALARY contains only one value which depends on the key NAME. One way to eliminate repeating groups is to create a new attribute (field) for each value expected as shown in following figure. However, this has two disadvantages :

1. It limits number of groups that may be stored.
2. It uses too much space.

If an arbitrary limit of five dependents is made in this example, we can not handle an employee who has six or more dependents. On other hand, if an employee does not have any dependents, the space allocated is wasted.

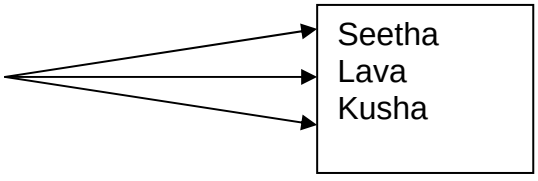
Name	Salary	Dependent
Rama	10,000	Seetha
		Lava
		Kusha

Unnormailsed data representing group

Name	Salary	Dependent 1	Dependent 2	Dependent 3
Rama	10,000	Seetha	Lava	Kusha

1 NF – Separate entities

Name	Salary (Rs.)
Rama	10,000



Third Normal Form (3NF) :

Data is in Third Normal Form (3NF) if and only if it is in 2NF and every non-key attribute is non-transitively dependent on the primary key. The purpose of 3NF is to ensure that attributes directly belong to the entity.

Transitivity is a mathematical principle that states that if a relation is true between the first value and the second and the third, then the relationship must also be true between the first and the third.

The following are the examples of transitivity :
If A < B and B < C, then A < C
If A > B and B > C, then A > C
If A = B and B = C, then A = C

Or

If A is functionally dependent on B and If B is functionally dependent on C, then A is functionally dependent on C.

For example, an employee record may have the name and salary of the supervisor as attributes. The supervisor's salary is functionally dependent on the supervisor's name and the supervisor's name is functionally dependent on the employee's name. Therefore, the supervisor's salary is transitively dependent on the employee's name. To correct this problem, the attributes directly dependent on the supervisor should kept as a separate entity.

Name	Salary	Supervisor	Sup. Salary
Rama	15,000	NARAYANA	30,000
Krishna	18,000	NARAYANA	30,000
Hari	22,000	NARAYANA	30,000

2 N F but not in 3 N F transitively dependent

NAME	SALARY
NARAYANA	30,000

Supervisor

NAME	SALARY
RAMA	15,000
KRISHNA	18,000
HARI	22,000

Comparison between File Management and Database Management :

File management means traditional approach to managing data stored in files. It involves application programs using input / output routines to open, read, write and close data files. The difference between file management and database management are listed in following table. Neither approach is better than the other. Thus trade offs are involved in selecting an approach.

TOPIC	*File Management*	*Database Management*
Data redundancy	High	Low
Data independence	Low	High
Application maintenance	Higher maintenance cost	Low maintenance cost
Integrity control	Provided by programmer	Provided by DBMS
Unanticipated queries	A custom program has to be written	A query language can be used.
Data relationship	Handled by application	An integral part of DBMS
Overhead	Little CPU and storage overhead	More processing power and storage is needed
Database ownership	Applications may have their own private data	All data belongs to the DBMS
Database design	More files may be designed as needed	More time and effort is spent to develop database
Database administrator	Not needed	Needed to coordinate user community.
Availability of trained programmers	Most programmers are trained to use file management	The average programmer needs training to use database.

4.4 Communication Systems :

A communication system is a way of transferring information from one source to another. Transference can occur between two humans, a human and an animal or a human and a machine.

The term 'data communication' can be understood by breaking the word into two parts. Here, *data* means facts and concepts presented in an agreed format by the sender and the receiver and *communication* means exchanging the data.

Data communication, therefore, implies the transfer of data or information between the sender (generates information) and the receiver (consumes information).

To facilitate data exchange between computers with different operating systems, components from different vendors, different types of cables, and distant locations, data communication provides a set of rules and regulations often known as protocols. Figure 4.4.1 shows the different entities involved in data communication.

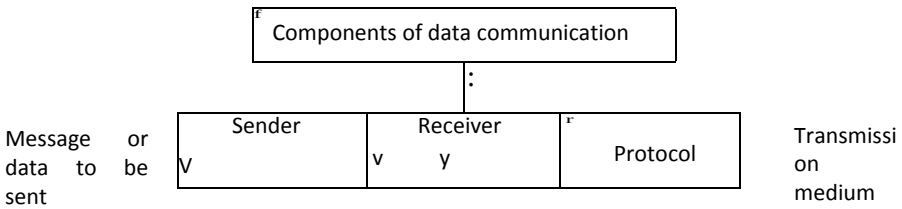


Figure 4.4.1 : Components of data communication

An effective data communication system depends on the following characteristics.
Delivery The data communication system must deliver data to the correct destination.

Data communication is concerned only with data transfer. It has nothing to do with how information is generated and how it is being used. **Accuracy** The system should not only deliver data to the correct receiver but also ensure that it is received intact. If the data gets modified during transmission, its accuracy will be compromised and the whole purpose of transmitting the data goes in vain. In continuation with the aforementioned characteristics, the data communication system must deliver data accurately to the intended receiver in a timely manner as late delivery may be of no use for users.

4.5 Internet :

The internet is a worldwide collection of networks which allows a subscriber to send and receive emails, chat (using text or voice) or browse the world wide web.
The **world wide web (WWW** or **web)** is the part of the internet which the user can access by way of a **web browser** (e.g. Microsoft Internet Explorer). A web browser is software that allows the user to display and interact with pages and files from the web.

Websites

The web is made up of millions of these **websites** (e.g. www.hoddereducation.com) and millions of **web pages**. Web pages are documents on a computer screen which may consist of text, pictures, sounds, animation or video (i.e. multimedia). A website consists of many of these pages linked together.
The website shows these **hyperlinks** to allow users to **navigate** between web pages. These hyperlinks are often shown as blue underlined text or sometimes a small hand appears _ under a picture or under some text indicating the link to another page or website. The user clicks on these hyperlinks using a mouse (or other pointing device) to move to another page.
Web browsers use uniform resource locations (URLs) to retrieve files. URLs are a standard way of locating a resource on the internet; they are usually a set of four numbers, e.g. 194.106.220.19. However, as this can be difficult to remember, an alphanumeric form is usually used which has the format:
protocol://site address/path/filename where:
_ **protocol** is usually http
_ **site address** consists of: host computer name, domain name, domain type and (very often) the country code:
_ **computer name** is usually www
_ **domain name** is the name of the website
_ **domain type** is commonly one of the following: .com, .org, .co, .net, .gov
_ examples of **country code** include .uk, .us, .de, .cy
_ **path** is the web page
_ **filename** is the item on the webpage.
Thus, a full URL could be http://www.urlexamples.co.cy/pages/example1

Accessing the internet :

An ISP is a company that provides users with access to the internet, usually for a fee. When a user registers with an ISP, an account is set up and they are given **login** details, which include a **username** and a **password**. The user connects to the internet via the user account which also allows the provider to monitor usage. Most ISPs also provide an **email** account.
Emails are an electronic way of sending documents (etc.) from one computer to another. They allow **attachments**, which can be word-processed documents, spreadsheets, data files,

music files, movie files, etc. An email address contains two parts: example1@yahoo.co.uk OR example2@yahoo.com
The first part is the user name e.g. **example1** or **example2** and the second part is @ followed by host name e.g. **@yahoo.co.uk** or **@yahoo.com**.
There are three common ways of accessing the internet offered by service providers:
*_ dial-up internet access
*_ cable internet access
*_ digital subscriber line (DSL) (broadband) internet access.
These were discussed in Section 4.3 as part of modems and are summarised in Table 4.1.

Table 4.1 Methods of accessing the internet

Type of access	Description
Dial-up internet access (dial-up modem)	This is the slowest type of connection (about 60 kbps). The user connects to the internet via the telephone line by dialling one of the numbers supplied by the ISP. They are therefore not on all the time; ISP contracts are usually for a number of hours per month of internet access time and additional charges are incurred if this is exceeded. A big disadvantage is that the telephone line is tied up while a dial up modem is in operation.
Cable internet access (cable modem)	Local cable television operators give a user access to the internet through their own cable networks using a cable network modem.
Internet access via DSL (broadband modem)	The fastest download speeds can be obtained by using DSL broadband connections (at least 11,000 kbps). This is often offered with wireless interface which requires an AP and a router. ISPs usually have a download/upload limit (e.g. 20 Gbyte of data) as part of the contact. This is not a problem unless the user is often downloading music or movie files which can quickly use up the memory allocation. Broadband has the advantage of always being on, since it doesn't tie up the telephone line. The fast transfer rate allows systems such as **voice over IP (VOIP)** and online chat rooms to be used effectively.

4.6 : Office Automation :

The history of modern office automation began with the typewriter and the copy machine, which mechanized previously manual tasks. Today, however, office automation is increasingly understood as a term that refers not just to the mechanization of tasks but to the conversion of information to electronic form as well. The advent of the personal computer revolutionized office automation, and today, popular operating systems and user interfaces dominate office computer systems. This revolution has been so complete, and has infiltrated so many areas of business, that almost all businesses use at least one commercial computer business application in the course of daily activity. Even the smallest companies commonly utilize computer technology to maintain financial records, inventory information, payroll records, and other pertinent business information. "Workplace technology that started as handy (but still optional) business tools in the 1980s evolved into a high-priority requirement in the 1990s,
The integration of office information functions, including word processing, data processing, graphics, desktop publishing and e-mail. Office automation was a popular term in the 1970s and 1980s as the desktop computer exploded onto the scene. The backbone of office automation is the company's local area network (LAN). All office functions, including dictation, typing, filing, copying, fax, microfilm and records management and the telephone

switchboard, fall into this category. Office automation refers to the varied computer machinery and software used to digitally create, collect, store, manipulate, and relay office information needed for accomplishing basic tasks .Raw data storage, electronic transfer, and the management of electronic business information comprises the basic activities of an office automation system. Office automation helps in optimizing or automating existing office procedures.

Office automation refers to the varied computer machinery and software used to digitally create, collect, store, manipulate, and relay office information needed for accomplishing basic tasks. Raw data storage, electronic transfer, and the management of electronic business information comprise the basic activities of an office automation system. Office automation helps in optimizing or automating existing office procedures.

The backbone of office automation is a LAN, which allows users to transmit data, mail and even voice across the network. All office functions, including dictation, typing, filing, copying, fax, Telex, microfilm and records management, telephone and telephone switchboard operations, fall into this category. Office automation was a popular term in the 1970s and 1980s as the desktop computer exploded onto the scene.

Definition

Application of information technology to the typical clerical and secretarial tasks such as communication, correspondence, documenting, and filing. The use of computer systems to execute a variety of office operations, such as word processing, accounting, and e-mail. Office automation almost always implies a network of computers with a variety of available programs. A general technology term that is used to describe any process being automated through the use of computers and computer software. Processes that have been automated require less human intervention and less human time to deliver.

Objectives of Office Automation

1. To improve customer relation
2. To achieve better management control
3. To simplify operations and minimize computational errors
4. To improve quality of output in terms of presentation and reduction in processing time
5. Documents preparation
6. Data management
7. planning of activities
8. Presentation
9. Dissemination of Information
10. Communication

Features of Office Automation

1. Improvement in quality of output
2. Improved productivity/ efficiency
3. Optimal utilization of resources
4. Reduction in time taken in execution of activities
5. Better Information sharing/ Transparency
6. Better way of delivery of information to user at a place convenient to him/her
7. Reduction in dependency on human beings
8. Look for simplification of procedures
9. Better customer support etc

Document generation and facilitating equipments

A document is a written statement giving information, proof, evidence etc. document is a written or printed paper that bears the original, official, or legal form of something and can be used to furnish decisive evidence or information. It is writing that provides information (especially information of an official nature)

Document processing is the creation, handling, labeling, and modification of text documents, such as in word processing and in the indexing of documents for retrieval based on their content. Following are the important equipment concerned with document generation.

Dictation system

Dictation system records voice inputs. This system has a microphone to capture voice inputs. Executive can use it to speed up document generation and to save their time since they are not going to dictate to their secretaries. **Digital dictation** is a method of recording and editing the spoken word in real-time for transcription and maximum intelligibility in a digital audio format. In some cases speech is recorded where sound quality is paramount and transcription unnecessary.

Digital dictation offers several advantages over traditional cassette tape based dictation:

1. The user can instantly rewind or fast forward to any point within the dictation file to review or edit.
2. The random access ability of digital audio allows inserting audio at any point without overwriting the following text.
3. Dictation produces a file which can be transferred electronically, e.g. via WAN, LAN, USB, e-mail, telephony, BlackBerry, FTP, etc.
4. Large dictation files can be shared with multiple typists.
5. Sound may be CD quality and can improve transcription accuracy and speed [citation needed].
6. Digital dictation provides the ability to report on the volume or type of dictation and transcription outstanding or completed within an organization.

Electronic typewriter

Typewriter is an instrument for writing by means of type, a type wheel, or the like, in which the operator makes use of a sort of keyboard, in order to obtain printed impressions of the characters upon paper. A typewriter whose operation is enhanced through the use of microprocessor technology to provide many of the functions of a word-processing system but which has at most a partial-line visual display. Also known as memory typewriter. Today‘s world typewriters have been replaced by inexpensive personal computers which have the advantage of having word processing software and can be used with a variety of printers available.

Document distribution and related Equipments

Following are the important equipments in connection with document distribution;

Copier

Copier is a machine that makes copies of printed or graphic matter. This is a machine which makes exact copies of writing or pictures on paper, usually by a photographic process. It is an apparatus that makes copies of typed, written or drawn material.

A xerographic copier is duplicator that copies graphic matter by the action of light on an electrically charged photoconductive insulating surface in which the latent image is developed with a resinous powder. It is also called as Xerox machine

Telex

A telex is a teletypewriter. They are to consoles (or more, in a network), sitting at opposite ends of a phone line. What is typed on one machine is automatically relayed, and typed by the machine on the other one. The machines can be in the same building, or at opposite ends of the globe. In other words it is a character printer connected to a telegraph that operates like a typewriter.

Facsimile

Facsimile is duplicator that transmits the copy by wire or radio. This is a system of telecommunication for the transmission of fixed images with a view to their reception in a permanent form.

Fax is a process by which fixed graphic material including pictures, text, or images is scanned and the information converted into electrical signals which are transmitted via telephone to produce a paper copy of the graphics on the receiving fax machine.

Personal computers

A small, relatively inexpensive computer designed for an individual user. All are based on the microprocessor technology that enables manufacturers to put an entire CPU on one chip. Businesses use personal computers for word processing, accounting, desktop publishing, and for running spreadsheet and database management applications. At home, the most popular use for personal computers is for playing games. Personal computers first appeared in the late 1970s. One of the first and most popular personal computers was the Apple II, introduced in 1977 by Apple Computer. During the late 1970s and early 1980s, new models and competing operating systems seemed to appear daily. Then, in 1981, IBM entered the fray with its first personal computer, known as the IBM PC.

Work station for PC

A workstation is a place where work gets done. It refers to a computer (and often the surrounding area) that has been configured to perform a certain set of tasks, such as photo editing, audio recording, or video production. An office may have several workstations for different purposes, which may be assigned to certain employees. For example, one workstation may be used for scanning and importing images, while another is used for editing images. While workstations are often part of a network, they can be standalone machines as well. Even a home computer can be a workstation if it is used for certain kinds of work. So if you want to sound professional, the next time you send an e-mail to a friend from your home PC, you can let him know you are sending it from your home workstation.

Printers

A printer is an output device that produces text and graphics on paper. Printers can be divided into two main groups, impact printer and non-impact printer. Impact printer produces text and images when tiny wire pins on print head strike the ink ribbon by physically contacting the paper. Non-impact printer produces text and graphics on paper without actually striking the paper.

Printers can also be categorized based on the print method or print technology. The most popular ones are inkjet printer, laser printer, dot-matrix printer and thermal printer. Among these, only dot-matrix printer is impact printer and the others are non-impact printers.

Some printers are named because they are designed for specific functions, such as photo printers, portable printers and all-in-one / multifunction printers. Photo printers and portable printers usually use inkjet print method whereas multifunction printers may use inkjet or laser print method.

Inkjet printers and laser printers are the most popular printer types for home and business use. Dot matrix printer was popular in 70‘s and 80‘s but has been gradually replaced by inkjet printers for home use. However, they are still being used to print multi-part forms and carbon copies for some businesses. The use of thermal printers is limited to ATM, cash registers and point-of-sales terminals. Some label printers and portable printers also use thermal printing.

Due to the popularity of digital camera, laptop and SoHo office (small office / home office), the demand for photo printers, portable printers and multifunction printers has also increased substantially in recent years.

Popular Printers: Inkjet printer, Laser printer

Less Popular Printers: Dot matrix printer, Thermal printer

Specialty Printers: Photo printer, Portable printer, Multifunction printer

Storage technologies

A computer storage device is any type of hardware that stores data. The most common type of storage device, which nearly all computers have, is a hard drive (hard disk). The computer's primary hard drive stores the operating system, applications, and files and folders for users of the computer. While the hard drive is the most ubiquitous of all storage devices, several other types are common as well. Flash memory devices, such as USB keychain drives and iPod nanos are popular ways to store data in a small, mobile format. Other types of flash memory, such as compact flash and SD cards are popular ways to store images taken by digital cameras.

External hard drives that connect via Fire wire and USB are also common. These types of drives are often used for backing up internal hard drives, storing video or photo libraries, or for simply adding extra storage. Finally, tape drives which use reels of tape to store data are another type of storage device and are typically used for backing up data.

The most common storage devices are:

Floppy Disk – They are plastic square disks, usually with a silver or black sliding piece going across the top. These disks come in a variety of colors and they hold about 144 million bytes. (Bytes are characters, symbols and letters).

Zip Disk – They look like a floppy disk, but they are a little thicker. This disk also comes in a variety of colors and holds about 200 MB of data.

CD + RW Disc (Compact Disc Rewriteable) – This disc looks like a regular CD. The only difference is that you can write on this disc and erase it as many times as you want. It works just like a floppy disk or a zip disk. A CD + RW disc holds about 650 MB.

CD + R Disc (Compact Disc Recordable) – This one is a CD that you can record on. It‘s mostly used to record audio and once it‘s been written on, you cannot rewrite or erase anything off of it. This compact disc comes in different sizes, but they are usually silver in color. (Some CDs are black in color and they actually don‘t get as many scratches on them as the silver ones do. They are also a lot less fragile).

A DVD – R Disc (Digital Video Recordable) – These discs hold the space of about 4.7 GB and are used to record movies on.

The more uncommon storage devices are:

Removable Hard Drive – This is a disk drive in which a plastic or metal case surrounds the hard drive. It can be inserted and removed just like a floppy disk. It holds about 2 GB of data.

Internet Hard Drive – This one is a service on the Internet that provides storage space to computer users. This service offers about 25 MB of space, but it could be more, depending on the service type.

Flash Drive – This a storage device that comes in many colors and has a stick shape to it. They are very small in size, but they can hold anywhere between 256 MB and 3 GB of material on them. **PC Card** – This is a thin credit card size device that fits into a PC card slot, usually on a notebook computer. This card simply adds storage to most notebooks.

Smart Cards – These are the size of an ATM card. When inserted into a smart card reader, they can read and update data for you.

Storage Tape – This one is a magnetically coated ribbon of plastic, capable of storing large amounts of data at a very low cost. Usually, storage tapes are a little bigger than audio tapes. Older computers used tape and tape drives, but even today, some people still back their systems up with storage tape. These tapes hold between 20 GB to about 110 GB of data. An external tape drive can be purchased separately as well, but those are even harder to find.

Miniature Mobile Storage Media – This is used mostly with handheld computers and digital cameras.

Memory Stick – This is a rectangular shaped disk that is used mostly with digital cameras and notebook computers. They hold approximately 128 MB as well.

Micro Drive – This is a square disk that has 1 GB of space and is used with digital cameras and handheld computers.

Smart Media Disc – This is a square disk that has 2 MB to about 128 MB of space on it. It's used with digital cameras, handheld computers and photo printers

4.7. Assignment :

1. Write a historical note on evolution of computers ?
2. Write a note on various generations of computers with example ?
3. How computers are classified based on (i) nature of electronic circuits involved ? (ii) by their size ?
4. What are the different blocks of a computer explain the functions of each block ?
5. What is a computer language ? How it is classified ? Explain the features, advantages and disadvantages of each type ?
6. What are the different types of language translators ? Explain each in detail ?
7. What is software ? How it is classified ? Give any four differences between interpreter and compiler ?
8. What is a database? Why it is used ? Give the objectives, characteristics, and advantages of database in database Management system ?
9. What is a database management system ? Why it is used ? What are its components ? What are different types of databases used in practice ?
10. What are the three types of data descriptions in a database management system ? Differentiate between conventional file management system and database management system ?

CHAPTER 5
Word processing with MS word

Syllabus : Word processing with MS word - starting MS word - MS Environment - working with word documents - working with text - working with tables - checking spelling and grammar - printing document - creating mailing lists- mail and merge.

5.1 Starting MS word :

MS Word is a word processor developed by Microsoft Corporation. Using this you can create, edit and print the documents according to your requirement. You can also use features like auto correct, spelling and grammar checking, text formatting, mail merge, graphics, table etc.

The minimum system requirement to run MS Word are 80486 or higher microprocessor, Hard disk with minimum 100 MB, minimum 16 MB RAM, VGA monitor, Keyboard and Mouse.

To start MS Word 95/97/2000, select Start → Microsoft Word. Word opens an empty document after displaying the Logo.

PARTS OF MS Word Screen :

Identify the following parts in MS Word Screen.

Control box, Title bar, Minimize, Maximize, Restore and Close buttons, Menu bar, Standard Toolbar, Formatting Tool bar, Ruler lines (Horizontal and vertical), View bar (4-Normal view, Online layout view, Page layout view, and outline view), Drawing toolbar, Status bar and Task bar.

1.1 **Creating a Document** :

When you load the MS Word, a blank window will display automatically. Type the text in this document window. Note the following tips.

- Type the text at inserting point. While typing, when the right margin is encountered, the insertion point will automatically return to the next line with out entering Enter key.
- To change the paragraph, press Enter key.
- To start a new line without considering it as a new paragraph, press Shift+Enter.
- In case of mistakes, to delete backwards, press Backspace. To delete character at the cursor (insertion point), press Delete key.
- To edit a word, the cursor must be moved to that word by clicking the left mouse button on that place.
- By using Arrows keys, Page up, Page down keys, Home, End, and Ctrl + these keys, you can move the cursor to different places in the document.

Ex: Type a 3 paragraph text and study various cursor movements.

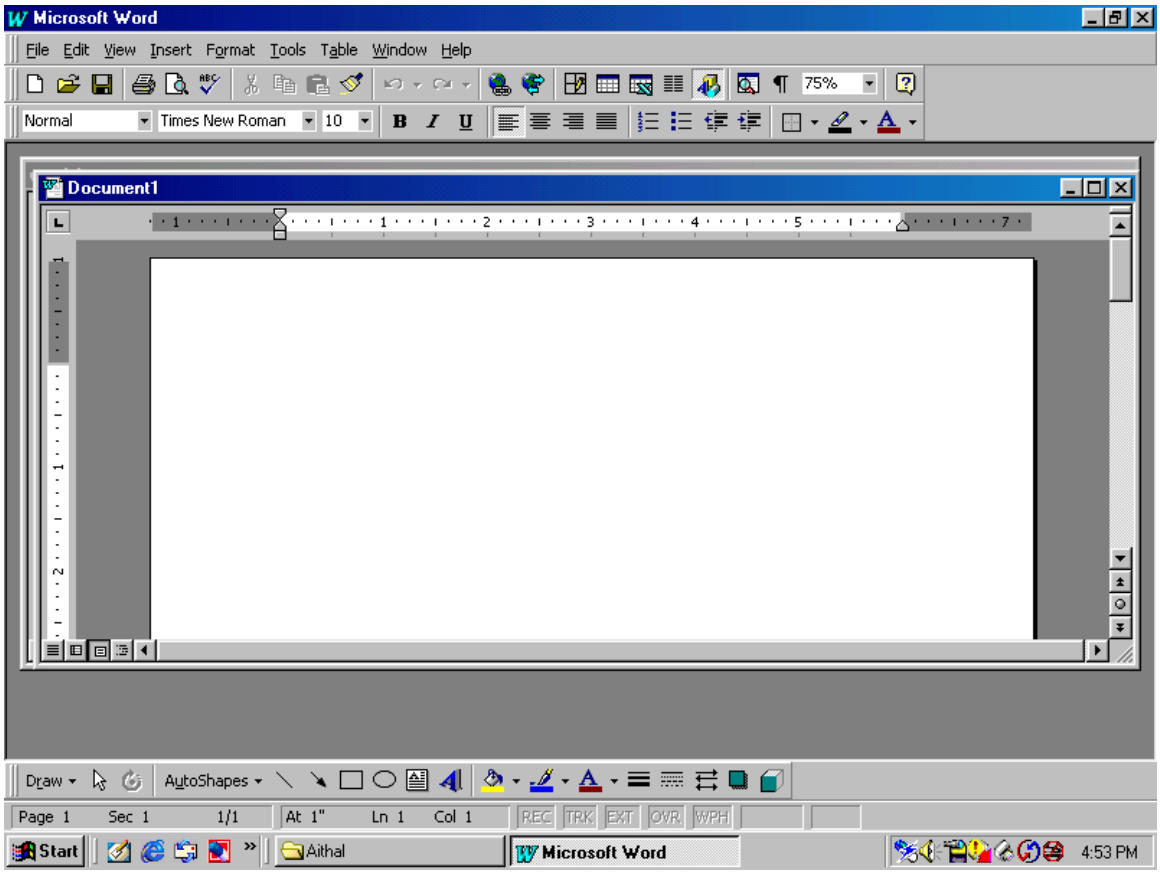
1.2 File operations :

Study the following File Operations.

1. Saving the File> Using File → Save and Save As or Save icon
2. Creating a new File > Using File → New or icon
3. opening a File> Using File → Open or icon
4. Closing a File > Using File → Close or icon

1.3 Editing the Text :

Editing a process of changing the appearance of the text by deleting, duplicating or moving a part of it. For this, you must first select a portion of text, which needs the change.
Ex: use following methods to select a portion of the text.
1. Click and drag 2. Click and Shift Click 3. Double Click on the word.
4. Click on line from outside 5. Ctrl+ Click 6. Double click on a line
7. Ctrl + Click to block entire document 8. Alt + click and drag to block Column wise



1.4 Simple formatting the text :
Study various formatting features, like – font, font size, fold, italics, underline, text color, text background and text border by blocking a portion of text and clicking on appropriate icon on formatting toolbar.
Study how to remove them.
Study the advanced formatting features like - different types of underlines, Subscript, Superscript, Spacing between characters, and Animation by using Format.
→ Font →Font dialog box.
1.5 Changing the Case of the Text :
You can change the case of the text to Upper case, Lower case or Toggle case by selecting Format and then Change Case.
1.6 Moving the Text :
Following steps can be used to move the piece of text from one place to another place or from one file to another file.
- Block the text to be moved.
- Select Edit → Cut.

- Click on new place where the blocked text should appear.
- Select Edit → Paste.

1.7 Copying the Text :

The steps required are

- Block the text to be copied.
- Select Edit → Cut.
- Click on the new place where the blocked text should copied.
- Select Edit → Paste.

1.8 Undo, Redo and Repeat :

For this, either go through Edit or click the corresponding icons.

1.9 Existing the Word :

To exist from MS Word, do one of the following.

- Click on Close button.
- Select File → Exit.

5.2. MS Environment - working with word documents :

2. Paragraph Formatting

In MS Word, a paragraph may be a text, graphics or other items that is followed by a paragraph mark. Paragraph mark is not displayed unless the Show/hide icon in standard toolbar is selected. This paragraph mark is inserted every time after Enter key is pressed.

To make any changes in the paragraph, first select the paragraph, then use Format → paragraph option. To gives a Paragraph option. This gives a Paragraph dialog box. From this you can align paragraphs, create line spacing, indent the paragraph, and specify line and page breaks.

2.1 Paragraph Alignment:

Study Left alignment, Center, Right alignment and Justified from Formatting toolbar as well as Format → Paragraph option.

2.2 line Spacing :

Study various types of line spacing from Format → paragraph option.

2.3 Spacing between Paragraphs:

Set different spacing before and after a paragraph using Format → Paragraph option.

2.4 Paragraph Indents :

In a letter You may wish to start the first line of every paragraph after some space.

These extra spaces are called indents.

Study the 4 types of indents → left, Right, First line, and Hanging (Which leaves a gap at the left side of paragraph except for first line). For this use Format → Paragraph option.

2.5 Drop Cap :

Drop cap is used to drop the first character of a paragraph to spread over more than one line (i.e., larger in size.) Drop cap can be specified using following steps.

- Select Format → Drop cap… option
- Select the position – Dropped or In Margin.
- Select the font of the word to be dropped.
- Specified the number of lines to be dropped.
- Specify the distance to be maintained between dropped text and the remaining text.

2.6 Borders and Shading :

Borders can be specified for paragraphs and pages. Also to emphasize the paragraph, the text can be shaded.

1. Paragraph Borders :

Various borders can be applied to a single paragraph or a group of paragraphs. Different styles of borders, like - thin, thick line, double or doted lines are available with different colors. Shadow can be also selected for right side or left side of a paragraph. To apply borders to a paragraph perform following steps.

- Click on the paragraph.
- Select Format → Borders and Shading.
- In borders tab, from settings select Box, Shadow 3-D or Custom.
- Select the line style of border.
- Select the line color of border
- Select the width of the line and click on OK.

Ex: Check how to remove paragraphs borders.

2. Page Borders :

You can also apply border to the full page. The steps required are

- Click on any page in the document.
- Select Format → Borders and Shading.
- Select the second tab Page Border.
- Select the type of the boarded from the settings or select an Art from drop down list.
- Under apply to : drop down list, whether page boarder is to be applied to the whole document etc., and click on OK.

Ex: Check how to remove the page boarder.

3. Paragraph Shading :

The paragraph shading can be done on one or any selected number of paragraphs using different colors. The steps required are

- Block one or more paragraphs.
- Select Format → Borders and Shading.
- From the shading tab, choose the desired color for filling, select the file style if required and click on OK.

Ex: Check how to remove paragraph shading.

2.7 Bullets and Numbering :

You can create Bulleted and Numbered list at the beginning of each paragraph using Bullets and Numbering icons or select Format → Bullets and Numbering. Also you can change the style of bullets from Bulleted tab.

Ex: Study more about it. Study also Outline numbering using Decrease Indent and Increase indent icons.

2.8 Tab Stops :

Tabs are used to type the text in columns. MS Word has tab stops set to every 0.5 inch by default. You can see these tab stops as gray thick marks that appear at the bottom of the ruler. There are 5 types of Tabs as left, right, center, decimal and bar (thin vertical bar appears to separate the columns). The typed text can be aligned on the basis of these tabs. To set the tab stops perform the following steps.

- Select Format → Tabs to open the Tabs dialog box.
- Type the tan stop position number in inches.

- Select the type of leader if required.
- Click on Set.
- Repeat the above steps to set other tab positions.
- To remove the tab position, click on the tab stop number and click on Clear.
- To remove entire tab stops that are set, click on Clear All.
- Click on PK to come put.

Ex: Set different Tab stops using Ruler.

2.9 Checking Spelling & Grammar :

You can check the spelling of the words used in the document and also possible grammar and style errors.

In window 95 and above, the spelling errors are underlined with red color and grammar mistakes are underlined with green color.

Ex: Study these things in detail either using short cut menu (ABC) or selecting them in Tools menu. To correct the grammar, right click on such words.

2.10 Auto Text :

Frequently used words can be stored as Auto Text entries and can be inserted using few short cut keys. For example, Thanking you, Yours sincerely etc.

To store an Auto Text entry, type the text, and block it, then select Insert → Auto Text → New. A dialog box named Create Auto Text → New. A dialog box named Create Auto Text will appear. Type a short cut name to the Auto Text entry and click on OK. For example, You can give short cut name foe yours faithfully as YF.

To insert Auto text into the document, select Insert →Auto Text → Auto Text, click on the

required shortcut name and click on Insert. You can also insert Auto text just by typing short

cut name and pressing Function Key F3.

To delete the Auto Text entry, select Insert→Auto Text → Auto Text, click on the Auto Text short cut name to be deleted and click on Delete. To come out from dialog box, click on Close.

2.11 Auto Correct :

This is a facility used to correct the spelling of frequently typing word like Pandeshwar. This facility can be also used to get entire text just after typing its short cut without pressing any key further (unlike Auto Text). For example, by typing SRINIVAS you will get Srinivas College of P.G. Management Studies.

To create an Auto Correct entry, select Tool → Auto Correct. A dialog box will be displayed. Type the spelling of the word that we generally type e.g., SRINIVAS in Replace box. In With box, type the correct spelling of the word and click on Add on click on OK. Now onwards, if SRINIVAS is typed,. it will automatically convert to Srinivas Institute of Management Studies.

To delete the Auto Correct entry, select Tool → Auto Correct, click on the name of Auto Correct to be deleted and click on delete.

2.12 Word Count :

In MS Word, you can count the number o f pages, words, characters, paragraphs, and lines in the document. For this, select Tool → word Count, A dialog box will be displayed with the results.

2.13 Text Background :

Any pattern or picture can be displayed behind the text by selecting Format → Background. From the dialog box, select any color or select Fill effects… to select a design from gradient, texture, pattern or picture. If picture tab is selected from fill effects, click on Select picture button and select the name of the file that contains the picture (generally BMP file).

To remove the background, select Format → Background and click on No Fill.

Note: The background is visible in only Online layout view.

2.14 Breaks:

MS Word provides 3 types of breaks. They are, Page Break, Column Break, and Section Break. To insert any one, select Insert → Break. A dialog box appears.

Ex: study these things in detail.

2.15 Columns:

Columns are used to type the text in different columns. Text can be typed into the columns after defining the columns or the existing text can be converted into columns.

1. Typing the text by defining the columns:

perform following steps.

- Click on place where the text has to be in columns.
- Select insert → Break → Continuous, click on OK.
- Select Format → Columns. The columns dialog box will be displayed.
- Specify the number of columns required (two, three etc.)
- Specify whether a separator line is required in between the columns. If required, select the check box line Between.
- By default, the width of each column will be equal. If you want to have columns with different widths, change the width and spacing between the columns after deselecting Equal Column Width and click on OK.
- Type the text in the first column. When you have finished typing in first column and want to go to the next column, select Insert → Break → Column Break. Type the text in other columns.
- At the end of last column, select Insert →Break→Continuous.
- To end the columns and start typing the text as regular paragraphs, select Format → Columns and from Presets, select the number of columns as one.

Ex: Study how to create 3 equal columns and two unequal columns?

2. Converting existing text to columns text :

For this two methods available.

(a) To convert the existing text into columns text using Section breaks, include the continuous breaks at the beginning and at the end of the text. By clicking inside the text you can define the number of columns and its width etc.

(b) To convert the existing text into columns using the Block, block the text and define the columns by specifying the number of columns, width etc. This is preferred method of converting the text to columns because the number of lines in all columns will be equally distributed by including section breaks automatically.

3. Converting columns text to regular paragraph :

For this block the text written in columns and define the columns with number of columns 1.

5.3 Working with text :

Inserting objects

You can insert date and time, symbol, pictures and word art.

1. Inserting Date and Time:
For this, click on the place where the system date and time to be inserted and select on required format. If the date insert into the file has to be changed automatically, every time the file is opened, click the check box Update automatically.

2. Insert Symbol :

For this, select Insert → Symbol. A dialog box will appear. Select symbol or special characters. Select required Font and click on desired Symbol, click on Insert and Click on Close.

3. Insert Drawings :

MS Word allows you to draw, resize, and reposition the graphics in the page layout view. To draw the designs, display the drawing tool bar if it is not visible. For this select View → Toolbars →Drawing. A drawing object can be selected using Shift + click. Selected objects can be rotated, flipped etc.

Ex: 1. Draw object and type text on it and select Draw → Order →Send behind text and also other commands.

2. Draw objects using Auto shapes.

4. Creation of Callout :

A callout is a text with the line that points to an area of interest in an illustration. Callout allows the user to type the text directly inside it. But, to type the text inside any other auto shape, right click on object and select Add text. To edit the text, simply click on text inside the object.

5. Insert Picture :
A number of pictures are available in MS Word that can be inserted into any document. To insert a picture into a word document perform following steps.

a. Click on the place, where the picture is to be inserted.
b. Select Insert → Picture → Clipart.
c. Select the required category and click on required picture from the selected category.
d. Select Insert and Click on Close.

To insert a BMP file into word document, select Insert → Picture → From File.

Select the file name to be inserted an click on Insert.

6. To type the word Art Text:
Do the following steps.

e. Click on the place where Word Art text is to be placed.
f. Select Insert → Picture → WordArt … WordArt Gallery will be displayed on the screen.
g. Click on required Word Art Style and click on OK.

h. Now Edit Word Art Text dialog box will appear.
i. In place of "Your Text Here", type the required text. Select the required font type, size, bold or italic and click on OK.
j. The text will be inserted into the document and Word Art tool bar will be displayed to make necessary changes.

7. Page Design

1. Header / Footer :
Header is a text that will be printed at the top of the page and Footer is the text that will be printed at the bottom of the page. The header and footer can include text or graphics such as page numbers, date, the logo, file name, authors name etc.

To add a Header or Footer to a document, select View → Header and Footer. A box will be displayed to type the header text along with Header and Footer toolbar displayed below the box.

Ex: Work more on Header and Footer. Insert page number, date , time etc. Align the text.

2. Footnotes and Endnotes:
These are the reference notes written at the end of the same page or at the end of the document. Footnotes will be printed at the end of same page and Endnote will be printed at the end of the document.

For this, place the cursor at a position where the note mark has to appear and select Insert → Footnote. A dialog box will appear. Select whether Footnote or Endnote has to be written and style of numbering. Instead of number, if any symbol by selecting appropriate font. To start typing the footnote or endnote text, click on OK.

If Footnote is selected the cursor will appear at the bottom of the page by displaying the footnote number or symbol where footnote text can be typed. If Endnote is selected. The cursor point will appear at the end of the document. To return to the text click outside the footnote area.

5.4 Working with tables :

In MS Word, table is any information arranged in rows and columns. Each intersection of row and column is considered as a cell. Any data especially numbers, is more presentable and easier to type in the tabular form.

1. Creating a Table :
To draw a table, you can use Draw a Table feature. For this, click on the Tables and Borders icon, or select, Table → Draw Table. With the help of a pencil tool, draw the table with any number of rows and columns.

To draw a table, you can also use, Insert table feature. For this, use following steps.

- Click on the portion of the text where the table must be created.
- Select Table → Insert Table.
- Enter the number of columns (between 1 to 63) and rows (between 1 to 32767) and click on OK.
- You can also insert a table by clicking Insert Table icon from the standard toolbar.
- This produces a grid containing 5 columns and 4 rows. Click on the box containing the table to specify number of rows and columns. For example, if you need a table having 4

columns and 3 rows, Click on the box of 3rd line 4th column. A blank table will be inserted in to the document.

2. Moving around the Table :

To move to any cell click inside that cell. You can use following keyboards for further movement.

TAB → To the next cell: Shift + Tab → To the previous cell.

→ Forward one character ← Backward one character

↑ To the previous row ↓ To the next row

Alt + Home → to the first cell in the row; Alt+End → To the last cell in the row.

Alt + PgUp → To first cell in the column; Alt + PgDn → To last line in column.

3. Typing in the Table :

Move to the appropriate cell and type next or number. You can go to next cell by pressing TAB key. Pressing Tab at the end of the row will move the insertion point to the next row and pressing Tab at the end of the table, will add a new row at the bottom of the table.

4. Selecting the Table :

1. To select entire table, click on any cell inside the table and select Table → Select Table.
2. To select a row, click inside any cell in that row and select Table → Select Row.
3. A row can also be selected by clicking in the selection area (space before first column in the left side) of the row to be selected. To select many rows, click and drag in the selection area of the rows.
4. To select a column, click on any cell in the column and select Table → Select Column. To select many columns, click and drag in the selection area (space above first row in the table) of the column.
5. To select a cell, click on the selection area of the cell (left side of the cell before to the cell content.

5. Inserting and Deleting a row or column :

To insert a row at the end of the table, click inside the last cell of the table and press tab key. A blank row will be inserted. To insert a row at the middle of a table, click inside any cell in the row, where a new row has to be inserted and select Table → Insert Rows. A blank row will be inserted.

To delete a row in the table, click on any cell in that row and select Table → Select row to select the entire row, then select Table → Delete Rows.

Ex: Study how to insert and delete a column?

6. Setting the row height and column width:

To align the table, i.e., to bring it to center or to the right side, select Center or Right from Alignment in Row of Cell Height and Width in Table menu.

7. Applying the borders:

Borders can be applied to any part of the table or entire table. For this select the cells (select the table for full border), and select Format → Borders and Shading. Select Grid (for inside boarders only) or Box (for outer boarder only) or All (for outer and gridline boarders), select the color and width , click on OK.

8. Sorting a table:

To sort the contents of a table, perform following steps.

1. Click on any cell inside the table, Select Table → Sort.

2. In the table, if there are column headings that should not be sorted, then select the option button My list has Header Row.

3. From the Sort by drop down list, select the column on which the table is to be sorted.

4. From the type drop down list, choose the type of content such as Text, Number or Date and select Ascending or Descending order.

5. Click on OK button to sort the data.

Note: When the table is created, generally the table will be displayed with gridlines. If the gridlines are not displayed, select Show Gridlines from Table menu.

9. Table Auto Format :

This can be used to format the table, using pre-defined table formats. For this, click inside the table and select Table → Table Auto Format. A dialog box of Table Auto Format will be displayed. Select the type of format like sample 1, Classic 1 etc and click on OK.

10. Merging the Cells :

To merge two or more cells and make them into one cell, select the cells to be merged and select Table → merge Cells. To split a cell into two or more columns or rows, click on the cell to be split and select Table → Split cells. Specify the required number of columns and rows and click on OK.

11. Converting table into text and text into table :

(a) To convert the table to text by removing the gridlines, click inside the table and select Table → Select Table. Then select Table → Convert Table to text. Select how the text must be separated i.e., paragraph marks, commas, or other characters and click on OK. The table border will be removed automatically and the contents of the table will be converted into text.

(b) To convert a text written using spaces, Tabs, Commas or any other special character, block the text and select Table → Convert Text to Table. A dialog box will appear. Specify how many columns and rows are required, what is the text separator character used when typing the text and click on OK. The selected text will be converted into a table.

5.5 Checking spelling and grammar :

You can check the spelling of the words used in the document and also possible grammar and style errors.

In window 95 and above, the spelling errors are underlined with red color and grammar mistakes are underlined with green color.

Ex: Study these things in detail either using short cut menu (ABC) or selecting them in Tools menu. To correct the grammar, right click on such words.

5.6. Printing document :

1. Page Setup :

☞ Using Page Setup, you can set margins for the document, paper size, text alignment for printing etc. For this, select File → Page Setup. You will get Page Setup dialog box with 4 tabs – Margins, Paper size, Paper Source, and Layout.

☞ Margin tab can be used to specify the top, bottom, left and right margins of the document. Default top and bottom margins will be 1 inch and left and right margins will be 1.25 inch.

An extra place at the left edge called gutter can be given. The position of Header and Footer margins can also be specified. By selecting Mirror Margin button, two pages (even and odd) can be displayed to type inside and outside margins, instead of left and right margins. Finally, by selecting Apply to the settings can be applied to entire document or portion of it.

☞ Paper size tab can be used to specify the size of the printing paper. Default paper width is 8.5 inch and height is 11 inch. You can change this setting according to the size of the paper is used for printing. The orientation, Portrait (default, with less width and more height) or landscape (with more width an less height) specifies the manner of printing on the paper.

☞ Paper source tab can be used to specify the place where (manual feed or upper tray) the paper is to be taken by the printer for printing.

☞ Layout tab is used to specify header and footer. Vertical alignment can be used to specify whether the text must be printed starting from the top (default) or from center or from justified. Line number option is available to specify whether to print line numbers or not.

2. Print preview :

Print preview, chosen from File menu is use d to view how the document will actually appear on the printed paper. There is a facility to view one or more pages the text can also be edited in print preview screen.

3. Printing the document :

In MS word, an open file can be printed by selecting File → Print. A print dialog box will be displayed to select the name of the printer, Print range, No. of copies etc.

Ex: Study each more detail.

4. Protecting the document :

☞ A document can be protected from being opening or editing by others by giving a password. You can type two types of passwords : One to open the document and another to make changes in the document. A password can be given to an already existing document or a new document.

☞ To give the password to a file, select File → Saves As. From Save As dialog box, select options to display the save options in the form of Save dialog box.

☞ Here, the text box password to Open allows you to open the document only after typing the password correctly. The password is case sensitive. If the password is not known, the document cannot be opened or edited.

☞ The text box, Password to Modify allows you to save the modifications made in the document only if the password is known. You can open the document for Read Only and you can make some changes I the file but, you can not save Read Only and you can make some changes in the file but, you can not save under same name. If any changes are made after opening a document, save it under a new name.

5. Inserting a File into another File :

Any existing word document can be inserted into the opened document at the insertion point position, by selecting Insert → File. Select the name of the document to be inserted and click on OK.

6. Style & Templates :

1. Style :

Style is a collection of character formatting and paragraph formatting settings. Style reduces the time required for text formatting.

- For example, if the heading of the text is to be boldfaced, underlined, centered, with a required font size, color etc., the heading must be first blocked, then boldfaced, then underlined etc. On the other hand, by using required style, you can automatically boldface, underline, center the heading.

☞ Word has a number of built-in styles, which can be applied to different portions of document. You can also create your own style if it is not available in built – in styles.

☞ To see or to select the available styles, click on the drop down style list on the lower side of the Formatting Toolbar. Default style name is Normal.

2. Template :

Template is a pre-defined format of a document. Using templates is an easy way of creating documents. A template contains the format of the document which can be filled in blank places to create good documents. Generally templates are used to do repetitive work such as certificates, letters, circulars, bio-data etc.

To create a template of certificate, perform following steps.

☞ Open a blank document and type as shown in fig.1.

☞ The format of the document can contain text, drawing objects, WordArt text etc. The information to be entered must be left blank.

☞ When designing a template, it is better to view the screen small in size, say 50 % zoom control. After design is completed, to type the text, return to normal 100%

Srinivas College of Management

This is to certify that, Mr./Ms.----------

Is completed a short term course on Window Based

Applications successfully in 2003.

Principal

The Fig.1 is the template of a certificate that can be anybody who completes the course. After creating such document of the certificate, save it by selecting File → Save As… This will display Save As dialog box. Type a file name (say, Certificate) and from the Save As Type drop down list, select Document Template. Click on Save. Close the document.

- To use the template, select File → New. A list of template will be displayed. Click on the required template name (for example, Certificate) and click on OK. Displaying the

information typed in the template will open a new document. Fill in the details (name and month) and print it. The original template will not be affected by typing the text (name & month) because the text is not actually written in the template, instead, it is written in the document.

5.7 Creating mailing lists- mail and merge :

Mail Merge

Using Mail Merge facility, you can quickly create from letters, mailing labels, envelopes and catalogs by merging the information from two different files. Mail merge is used to print multiple copies of a particular letter addressed to many members. Mail Merge requires 3 steps.

1. Creating a Main Document.
2. Creating a Data Source
3. Merging two files.

Main document contains subject matter to the letter to be printed. It may contain, text, graphic objects, data etc. It has to be specified that, where the data from Data Source is to be inserted into it.

Data Source file contains information in the form of records, to be inserted into the main document. Each record contains one member information (say address).

1. Creating Main Document

Open a new document first to create a Main document. For this select File → New. Then select Tools → Mail Merge. A mail merge helper dialog box will be displayed on the screen.

Click on Create button to display the available formats (form letter, mailing labels, envelope or catalog) of the main document. A List will be displayed.

From the list, click on Form Letters.

Then one more dialog box will be displayed asking the place to create the main document (whether in the Active Window (current file) or in a New Document). Click on Active Window to create the main document in active window. An Edit button will be displayed to the right of Create button. Before selecting Edit in Main document, you have to specify the address of members to whom the letters must be sent by creating Data Source.

2. Creating Data Source :

2.1 To create a data file which contains address, click on Get Data Source. A data source button with Get Data List will be displayed.
2.2 Click on Create Data Source, which display a Create Data Source dialog box. Here you can retain only required Field name in header row, by removing others using Field name and Remove field name buttons. Then click on OK.
2.3 A dialog box will be displayed to specify a name for the data source. Type a name and click on Save.
2.4 Another dialog box will be displayed asking to Edit the Data Source or Edit the Main Document. Click on Edit Data Source, which display another Data Form Dialog box. Type the addresses of each record. Type the details by pressing Enter after typing the name, address etc.
2.5 To type the other addresses, click on Add New button. After the typing is completed click on OK.

2.6 Data form dialog will end and a blank screen will be displayed to type the subject matter of the letter.
2.7 Type content of the letter. Wherever the content of data source is to be included, click on Insert Merge Field icon available in Mail Merge Toolbar.
2.8 This will display a list of available fields in the data source. Click on desired field name to insert into the file.
2.9 After typing the letter, save it under any name.
2.10 To merge the data source with the main document and to print it for every address in the data source, select Tools → Mail Merge.

2.11 Mail Merge Helper dialog will be displayed. Click on Merge displayed at the bottom of the dialog box. This display a Merge dialog box.
2.12 By default the merging will be done in a new document and a letter will be printed for every address in the data source.
2.13 If the letter has to be printed for only few address in the data source, specify From and To for address numbers in Merge dialog box.

2.14 In merge dialog box, by selecting Merge button, you can merge the addresses with the letter.
The merged letters can be saved in a file and printed later.

3. Editing the Data Source :

To edit the addresses already entered in the data source, do the following steps.

1. Open the Main document.

3 Select Tools → Mail Merge. Mail Merge dialog box will be displayed.
4 Click on Edit in the Data Source. The data source name will be displayed below it. Click on the data source name to open it.
5 Addresses will be displayed one after another. Go to the address to be edited by changing the record number displaying the address, edit it and select OK.
Note: The data source can also be edited by clicking on Edit Data Source icon (last icon) in the mail merge toolbar.

Views and Zooming :

1. Views :

In MS Word, a document can be edited by displaying it in different ways on the screen. This process is called View. There are 6 different views. They are normal View, Online Layout View, Page layout View, Print Preview, Outline View, and Master Document. Except Print Preview, others can be selected from view menu.

Ex: Study all these views in detail.

2. Full Screen :

The command View → Full Screen allows the user to view the text on the entire screen by removing the toolbars, menus, rulers, scroll bars and status line. After choosing this option, the menu bar will disappear. To return to the document, click on Close Full screen icon.

3. Ruler :

Ruler is used to quickly change the paragraph indents, to adjust page margins, to change width of table columns and newspaper style columns and set the tab stops.

To view or hide ruler, select View → Ruler. Both horizontal and vertical rulers will be displayed .

4. Zooming :

You can use zoom facility to change the display size of text on the screen. For this, select View → Zoom. A zoom dialog box will be displayed from which you can choose require zoom. The default is 100% . The Zoom control icon in the standard Toolbar can be also used for the same purpose.

5. Summary Information :

Summary Information of a file helps to search the files related to particular subject or created by a particular author. The extra information of a file like, the Title, Subject, Author, Keywords, and comments can be entered in Summary information.

To type the summary information, select File → Properties. Summary Information dialog will be displayed to type the title, subject etc. Type the required details and click on OK.

5.8. Assignment Questions :

1. Open a document in MS-Word. Select the appropriate font (Times New Roman) and font size (12). Type some text based on the selected font and font size. Insert page numbers.
2. Open a document in MS-Word. Select the appropriate font (Arial Black) and font size (10). Type some text based on the selected font and font size. Insert a bulleted list in the document.
3. Open a document in MS-Word. Select the appropriate font (Calibri (Body)) and font size (11). Type some text based on the selected font and font size. Insert a numbered list in the document.
4. Open a document in MS-Word. Select the appropriate font (Algerian) and font size (16). Type a paragraph based on the selected font and font size. Increase the indent of the paragraph.
5. Open a document in MS-Word. Insert a picture in the word file. Send the picture behind the text—the text should appear over the inserted picture.
6. Open a document in MS-Word. Insert shapes used in flow charts in the document.
7. Open a document in MS-Word. Insert shapes used from SmartArt in the document.
8. Open a document in MS-Word. Insert a chart in the document.
9. Open a document in MS-Word. Type some text in it. Use the Drop Cap feature. Mark the first paragraph of the text in yellow and left align the entire text.
10. Open a document in MS-Word. Type some text in it. Insert an Excel worksheet in the document.
11. Open a document in MS-Word. Type some text in it using the Word Art feature.
12. Open a document in MS-Word. Type some text in it using the text box.
13. Open a document in MS-Word. Type some text in it. Make it bold and italics, and underline the text. Find a particular word in the document and replace it with another word in the entire document.
14. Open a document in MS-Word. Type some text in it. Strike through the entire document.
15. Open a document in MS-Word. Type some text in it. Convert the entire document to lower case.
16. Open a document in MS-Word. Type some text in it. Use Text Highlight Colour for the entire document.
17. Open a document in MS-Word. Insert a table in it. Insert some records in the table. Insert a row in the table. Using table properties, give a border to the table. Insert a header with a relevant title.
18. Open a document in MS-Word. Prepare a mark sheet after drawing a table. Insert a header with a relevant title.
19. Open a document in MS-Word. Insert a table in it. Specify the row height to exactly 0.8 cm.

20. Open a document in MS-Word. Prepare a salary statement after drawing a table. Make the table right-aligned.

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CHAPTER 6

Concept of spreadsheet and MS Excel

Syllabus : Starting MS Excel - MS Excel Environment - working with Excel - workbook. Preparation of charts and graph with excel – working with workbook. Working with functions - Summery statistics, correlations, regression, t-test, z-test, Chi square test, Macros. Sort and filter commands. Introduction to SQL.

6.1 Concept of spread sheet :

Every business has numerical tasks to be performed, be it related to accounts, taxes, sales or budgeting. Businesses also need graphs and charts for analysis and projections. At homes, we track our own budgets and investments. Mathematics and Engineering students deal with big numbers, formulas and calculations. Almost all of us deal with tables, data and calculations in some or the other form. There are many software packages available to assists us in all these number based functions. Electronic spreadsheet is most common of them.

WHAT IS A SPREADSHEET ?

Spreadsheet is basically a grid consisting of horizontal rows and vertical columns. This format has traditionally been used in accounting to present book-keeping ledgers.

Electronic spreadsheet is a computer application that simulates the paper worksheet to organize data into rows and columns and stores various types of data.

Each intersection of rows and columns is called a cell where the data is stored to be used in calculations within the spreadsheet. Electronic spreadsheets have lot of in built features and tools such as functions, formulas, charts, and data analysis tools that make it easier to work with large amount of data. It provides ability to perform mathematical calculations quickly and has flexibility to perform quick recalculation in case of any data change.

Electronic spreadsheets can be used in any area or field that works with numbers and are commonly found in the accounting, budgeting, sales forecasting, financial analysis and scientific fields. It can be used to create and maintain a list, store database records, create charts or graphs, compare numerical or financial data.

There are quite a few electronic spreadsheet programs available like Excel, OpenOfficeCalc or Google spreadsheets. We will consider MS Excel 2007 for our study. It comes bundled in MS Office which is an office automation tool.

6.2 Starting MS Excel - MS Excel Environment - working with Excel – workbook :

Starting EXCEL

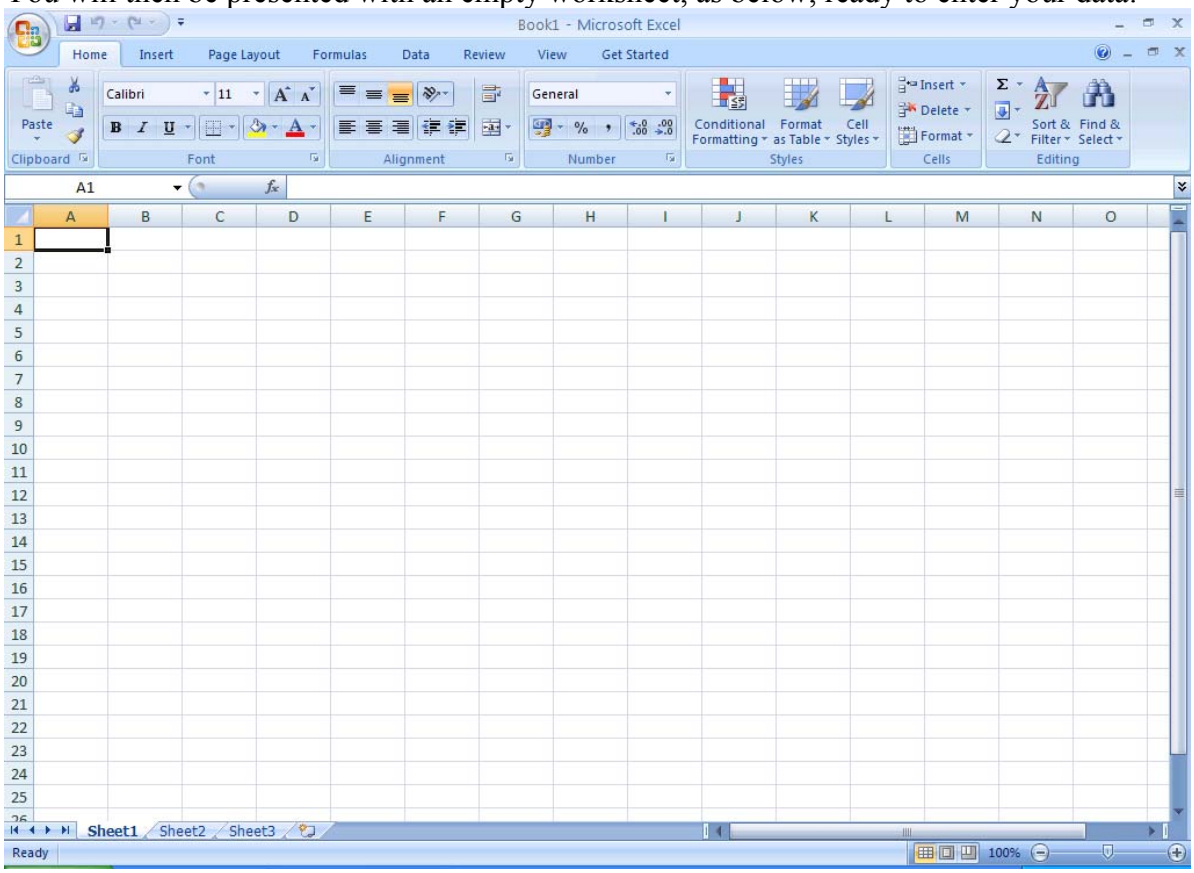
To start up the program:

1. Open the Windows **Start** menu
2. Choose **All Programs** then **Microsoft Office** followed by **Microsoft Office Excel 2007**

Tip: To create a *shortcut* to this software on the *Desktop*, right click on **Microsoft Office Excel 2007** then choose **Send To** followed by **Desktop (create shortcut)**. You'll then be able to load Excel using the icon on the Desktop.

The Excel Screen

You will then be presented with an empty worksheet, as below, ready to enter your data:



Let us familiarize some of the key commands and resources in Excel Window

The Microsoft Office Button

It is the button in the upper-left corner of the Excel Window. When you click on the button, it displays a menu that can be used to create a new workbook, open an existing workbook, save a workbook, print and perform many other tasks.

The Quick Access Toolbar

It is present next to the Microsoft Office Button on the top. It provides you access to the commands you frequently use. By default Following appear on the Quick Access Toolbar:

- **Save:** To save your file (you may also press keyboard button (Ctrl+S).
- **Undo:** To rollback the action that you last took (Ctrl+Z).
- **Redo:** To reapply the action you rolled back or to repeat an action (Ctrl+Y).

The Title Bar

It is next to the Quick Access toolbar at the top. It displays the title of the workbook on which you are currently working. By default, the first new workbook is named as Book1. For each additional workbook you open, the number increases by one. You may save the workbooks by any legal filename you want.

The Ribbon

The Ribbon is the panel at the top portion of the document, right below the Title Bar. To begin with it has following seven tabs:

Home: It has basic commands for creating, formatting and editing the spreadsheets. It has controls for working with the clipboard, fonts, alignment, number, styles, cells and editing.
Insert: It has commands for inserting tables, pictures, shapes, other illustrations, links, charts, header, footer, etc.
Page Layout: The commands here help to set the layout of the spreadsheet, apply a theme to set the overall look, set the margins, orientation, size, backgrounds, etc.
Formulas: It has commands that help you use different formulas and functions.
Data: Has commands to import, query, view data from external sources, sort, filter or manage data.
Review: Has commands to add comments, protect sheet, protect workbook, share workbook, etc.
View: Helps to change the display of the worksheet area.

Besides these basic tabs, additional tabs appear from time to time, depending on the context we are working in. These tabs are called contextual tabs. For example, if you select a chart, a Chart Tools contextual tab appears that has commands to help you design and format the chart. These contextual tabs appear in a different colour to make them easy to spot.

The commands on each tab are organized into groups. Hence, a group is a collection of logically related command buttons that you can use to manage a Worksheet. Commonly used features are displayed on the Ribbon and additional options can be accessed through the dialog box launcher at the bottom-right corner of each group.

The Formula Bar
The formula bar is divided into three sections:

Name Box: Located on the left most side of the formula bar, it displays the address of the current cell

Formula Bar Buttons: Middle section of the formula bar with indented circle on the left (to increase or decrease the size of the name box) and **function wizard** (labeled fx) on the right. When you start entering data in the cell, **Cancel** (*) and **Enter** (^) buttons also appear.

Cell Contents: Right side of the formula bar displays the cell entries.
The Worksheet Area: The worksheet area displays all the cells. It is in the cells that you enter, format or edit your data.

The Status Bar

The Status bar appears at the very bottom of the Excel window and provides such information as the sum, average, minimum, and maximum value of selected numbers. You can change what displays on the Status bar by right-clicking on the Status bar and selecting the options you want from the Customize Status Bar menu. You click a menu item to select it. You click it again to deselect it. A check mark next to an item means the item is selected.

Creating a New Workbook
You can create a new workbook as follows:

- Click the **Microsoft Office Button**
- Select **New.** The New Workbook dialog box appears.
- Select **Blank Workbook** under 'Blank and Recent' section. It will be highlighted by default.
- Click **Create.** A new, blank workbook appears in the Excel window.

You may also use keyboard shortcut Ctrl+N to create a new workbook. Please note that when you first open Excel, it open with a blank new workbook.

Opening an Existing Workbook

You can open an existing document in one of the following ways:
Click the **Microsoft Office Button.**
Select **Open.** Select the required workbook in the dialog box.

OR

Use keyboard shortcut Ctrl+O to select and open an existing document.

OR

If you have recently used workbook then Click the **Microsoft Office Button.** Choose from the Recent Documents section.

OR

Go to Windows Explorer. Find your document. Right mouse click on the document and select **Open.**

Saving a Existing Document

- Click the **Microsoft Office Button**

Select **Save** from the menu.

OR
Use keyboard shortcut Ctrl+S
OR
Use Save on the Quick Access Toolbar

On using any of these options, the workbook is saved in its current location with the same file name. If you are saving the workbook for the first time, then **Save As** dialog box appears which accepts the workbook name and location where it is to be saved.

Using Save As Option

You may use Save As option as below: Click the

Microsoft Office Button.

Select **Save As** from the menu. The Save As dialog box appears. Select the location where you wish to save the workbook. Enter the name for the workbook. Click the Save button The **Save As** option can be used to:

Create a backup copy of the workbook by saving it at another location or by different name.

- Save the workbook in a format that is fully compatible with Excel97-2003 Save the workbook as macro-enabled or binary workbook.

Working with Multiple Workbooks

Multiple workbooks can be opened simultaneously if there is such a need. To see the list of open workbooks:

- Click on **View** tab of the Ribbon
- Click on **Switch Windows** in the Window group. A drop down list of all open workbooks is displayed.

The current workbook has a checkmark besides its name. You may select any workbook from the list to make it current.

Closing a Workbook

To close a workbook:

- Click the **Microsoft Office Button** Select **Close** from the menu.

The current workbook closes. The next document in the list becomes current. If there is no other open document, then only Excel window is there.

Closing Microsoft Excel

Click the **Microsoft Office Button.** A menu appears. Click **Close.**

Excel closes.

ENTERING, EDITING AND FORMATTING DATA

Excel treats different types of data differently. You enter all kinds of data in a **cell** in the worksheet. An Excel workbook can hold any number of worksheets and each worksheet is made up of more than seventeen billion cells. Each cell can hold any of the following three **types of data:**

- **A numeric value :**It can be numbers (example 300.40), dates (example 5-Jan-2011) or times (example 3:35 am). There are many different format options available in Excel for the display of numerical values.
- **Text :**Text in Excel can be used as labels for values, headings for columns or worksheet or for any kind of instructions. Text that begins with a number is still considered as text.
- **A Formula** : Formulas can be entered in a cell where eventually the result of the formula is displayed. We will study more about formulas later in this unit.

A worksheet can also hold charts, diagrams, pictures and other objects. These objects aren't contained in cells. Rather, they reside on the worksheet's draw layer, which is an invisible layer on top of each worksheet.

In order to enter or edit data in a cell, that **cell must be current.** Excel indicates that a cell is current in following ways:

A dark black border (called the cell cursor) appears around the cell.

The cell address appears in the Name box of the formula bar. A **cell address** is combination of Column Letter(s) and Row number that intersect at that cell position. For example, if the cell address is A3, it means it is at the intersection of column A and row 3.

The cell column heading (letters) and row heading (number) is shaded for that particular cell.

Entering Data

There are different ways to enter data in Excel: in an active cell or in the formula bar.

To enter data in an **active cell:**

Click in the cell where you want the data.

Begin typing. Note that the text appears in formula bar also.

To enter data into the **formula bar:**

Click the cell where you would like the data Place the cursor in the Formula Bar Type in the data in the formula bar

Please note that you can use **Alt+Enter**to go to next line within a cell. **Alt+Enter**in a cell works similar to Enter key in a word document.

Deleting Data

- Select the cell(s).
- Press the **Delete** key to delete the entire contents of a cell(s).

OR

- Double click in a cell. The insertion point appears in the cell.

Press **Backspace** to delete one character at a time. Press **Enter** to confirm changes.
You can also make changes to and delete text from the formula bar. Just select the cell and place your insertion point in the formula bar and use backspace or select the whole text and use delete.

Editing Data
To change entire contents of a cell:

Select the cell and start typing the new data.

• Press Enter to confirm the change.

To modify a part of the cell,
Select the cell and switch to **edit mode.** You can switch to edit mode by following ways:

- Press F3 once you have selected the cell. The Status changes to 'Edit' from 'Ready' in the status bar.

OR

- Double click in the cell to switch to edit mode.

Once you have made your changes, press Enter to confirm changes or press Esc to cancel changes.

You can also make changes in the **Formula bar.** Select cell. Click in the formula bar. Make the required changes. Press Enter to confirm or press Esc to cancel changes.

Working with Cells, Rows and Columns Copy/ Cut and Paste

If you need to duplicate data in some cell(s), you can use copy & paste option. In case you need to move the data from one cell to another, then you use cut & paste option.

To copy data:

Select the cell(s) that you wish to copy. This is the source location.

On the **Clipboard** group of the Home tab, click **Copy** OR use Ctrl+C OR select **Copy** option from menu that appears when you right mouse click on the selected cell(s). The border of the selected cell(s) will change appearance and the data from the selected cell(s) is copied onto the clipboard.

To cut data:

- Select the cell(s) that you wish to cut. This is the source location.
- On the **Clipboard** group of the Home tab, click **Cut** OR use Ctrl+X OR select **Cut** option from menu that appears when you right mouse click on the selected cell(s). The border of the selected cell(s) will change appearance and the data from the selected cell(s) is copied onto the clipboard.

To paste data:

Once you have copied or cut data from the source location, you paste it to the destination location.

- Select the cell(s) where you would like to paste the data. This is the destination location.

On the Clipboard group of the Home tab, click **Paste** OR use Ctrl+V OR use right mouse click menu option. The source information will now appear in the new destination cells.

If you use **cut,** then the information at the source location is removed automatically after the paste operation has been performed. If you use **copy,** then you have same information at both source and destination locations. Also, in case of copy, the copied information remains selected with changed border (even after the paste operation), until you perform next action or press Esc or double click the selection to deselect it.

Drag and Drop

Drag and drop works similar to cut and paste that you move information from one cell(s) to another. To drag and drop data from one point to another:

Select the cell(s) that you wish to move.

Position your mouse pointer near one of the **outside edges** of the selected cells. The mouse pointer should change from a **white, block cross** to a **black, thin cross with 4 arrows.**

Click and hold the mouse button and **drag** the cells to the new location. As you drag the selected cells, the outline of the cells will change. Release the mouse button and the information appears in the new location. Please note that for drag and drop to work, it should be enabled in Excel Options.

Undo and Redo

Undo and **Redo** buttons are present in the Quick Access Toolbar. You can also use keyboard shortcuts Ctrl+Z and Ctrl+Y for undo and redo respectively.

The undo command allows you to correct your mistakes in the worksheet. The redo button becomes active when you use undo. It lets you undo what you have undone. If you want to undo last action, then click on the Undo button. You can also click the arrow key next to the Undo button to open a list of previous actions. You can choose from the list to undo multiple actions at the same time. Please note that once you have saved the file and made a change to the worksheet, then you cannot undo any action performed before the save.

Insert Cell

You can insert a cell either **above a cell** or to the **left of a cell.** Keeping this in mind,

Select the appropriate cell.

Click **arrow** on **Insert** command from **Cells** group in the Home tab. If you click on the Insert button, a cell is inserted above the selected cell. But, if you click the arrow then a menu opens.

Choose Insert Cells option. **Insert dialog** box opens.

Choose the appropriate option.

OR
Select the appropriate cell. Right mouse click on the cell. A menu opens. Select **Insert...** option from the menu. **Insert dialog** box opens. Choose the appropriate option.

Insert Row or Column

You can insert a row **above** a particular row or a column to the **left** of a particular column. While keeping this in mind,

- Select a cell in the appropriate row/ column.

Either use right mouse click OR Insert command in Cells group of the Home tab on the Ribbon (as done to insert a cell above).

In the Insert dialog box choose the appropriate option for row/ column.

OR
Press right mouse button on the row number (above which you want to insert a row) in row heading on left of the worksheet OR press right mouse button on the column letter in column heading (left of which you want to insert the column) at the top of the worksheet. A menu opens.
Choose insert option from the menu. A row is added above the selected row OR a column is added to the left of the selected column.

Delete Cell, Row or Column
delete cells, rows, and columns:

- Place the cursor in the cell, row, or column that you want to delete Click the Delete button on the Cells group of the Home tab Click the appropriate choice: Cell, Row, or Column

OR

- Use right mouse click on the cell, row number in row heading or column letter(s) in column heading.
- Choose Delete option from the menu.

Modify Column Width
There are various ways that you can use to modify column width:

- Position the cursor over the **column line** (line that divides the two columns) in the column heading. A horizontal double arrow will appear
- Click the mouse and **drag** the cursor to the right to increase the column width or to the left to decrease the column width.
- Release the mouse button.

OR

- Click the column heading of a column you wish to modify. The entire column will be highlighted.
- Click the **Format** command in the **Cells** group on the Home tab. A menu will appear.
- Select **Column Width** to enter a specific column measurement

OR

- select**AutoFit Column Width** to automatically adjust the column so all the text will fit.

OR

- Right mouse click the column heading. A menu will appear.
- Select **Column Width.**.. from the menu. Enter the specific column measurement.

Modify Row Height

There are multiple ways that you can use to modify row height:

- Position the cursor over the **row line** (line that divides the two rows) in the row heading for the row you want to modify. A vertical double arrow will appear.
- Click the mouse and drag the cursor upward to decrease the row height or downward to increase the row height.
- Release the mouse button.

OR

- Click the row heading of a row you wish to modify. The entire row will be highlighted.
- Click the **Format** command in the **Cells** group on the Home tab. A menu will appear.
- Select **Row Height** to enter a specific row measurement OR select **AutoFit Row Height** to automatically adjust the column so all the text will fit.

OR

- Right mouse click the row heading. A menu will appear.
- Select **Row Height.**.. from the menu.

Enter the specific row measurement.

Hide or Unhide Rows or Columns

To hide or unhide rows or columns:

- Select the row or column you wish to hide or unhide.
- Click the **Format** button on the **Cells** group of the Home tab. A menu appears.
- Under **Visibility** heading, click on Hide & Unhide option.
- Choose the appropriate option from sub menu that appears: Hide Rows or Hide Columns or UnhideRows or Unhide Columns as per the requirements.

Data and Formatting Auto Fill

Auto Fill feature fills cell data or series of data in a worksheet into a selected range of cells. If you want the same data copied into the other cells, you only need to enter data in one cell. If you want to have a series of data (for example, serial number) fill in the first two cells in the series and then use the auto fill feature. To use the Auto Fill feature:

Enter the required data in the cell. For example, if you wish to enter 1 in all cells from A1 to A10, then just type 1 in cell A1. Similarly, if you wish to enter numbers 1 to 10 in cells A1 to A10 then enter 1 in A1 and 3 in A3.

- Now select the cell(s) with value(s) (just A1 OR both A1 and A3 depending on the case)
- Bring your cursor at the bottom right corner of the selection so that it changes from large white cross to a small, thin, black cross. Now the cursor is positioned over the fill handle.
- Click your mouse at the fill handle and drag it till all the cells you want to fill are selected (till A10 in our example).
- Release the mouse button and all the selected cells are automatically filled. You can use the fill handle to fill cells horizontally or vertically.

Aligning Values

In Excel, the data in a cell can be aligned both horizontally and vertically. The default horizontal alignment is left for the text data and right for the numerical data. Vertically, both text and numerical data are bottom aligned. You can change the default alignments as per your requirement:

The steps to change alignment are:

- Select the cell(s) for which alignment needs to be changed.
- Choose horizontal/ vertical alignment command from the **Alignment** group in the Home tab.

Wrap Text

Wrap text command enable multiple text line inside a single cell. When you type text that is too long to fit in the cell, either the text is not displayed completely or it overlaps the next cell if it is empty. If you do not want it to overlap the next cell, you can wrap the text.

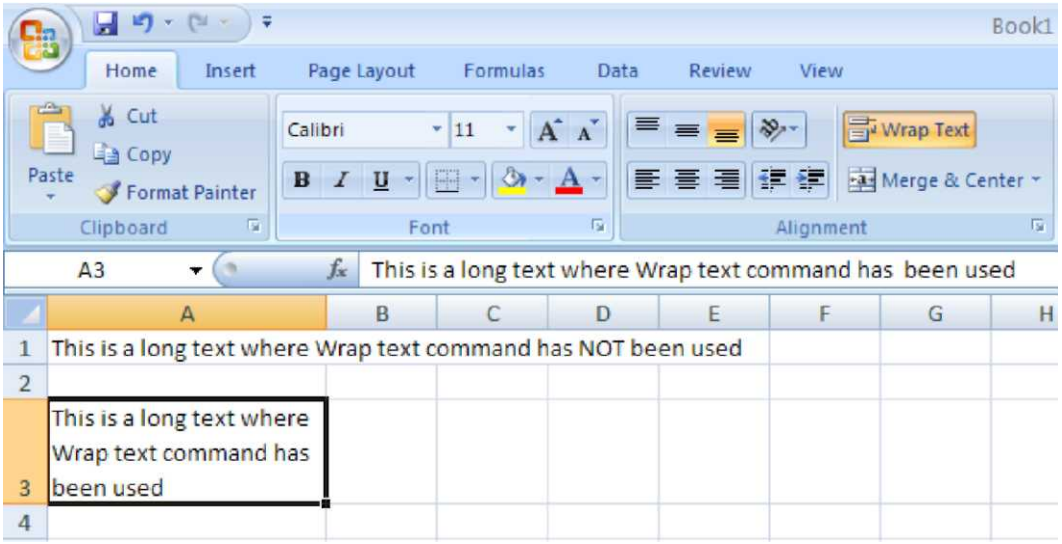


Figure 6.1: Text Wrapping

- Select the cell(s) where you wish to wrap the text.

Click on **Wrap Text** command from **Alignment** Group in Home Tab. The text would change to multiline text.

- Set the column width and row height as needed.

Sometimes, you may want to center a piece of text over several columns or rows. This is specially the case when you want to give a title to a section of your worksheet. This can be done through merging the cells

Select the cell you want to merge.

Click **Merge and Center** Command in **Alignment** group of Home tab. The selected cell will be merged together to become one cell.

In case, you want to unmerge the merged cell for any reason:

- Select the merged cell.
- Click the arrow for Merge and Center command. The menu opens. Choose **Unmerge Cells** option from the menu. The cells will be unmerged.

Format Data as Bold, Italicized, Underlined or Double Underlined

data in the spreadsheet can be formatted to make it more presentable. For formatting:
Select the cell(s).

Either click the appropriate command(s) (**Bold**, Italic, Underline, Double Underline) in **Font** group of the Home tab OR use keyboard shortcuts as below:

Command	**Keyboard Shortcut**
Bold	Ctrl+B
Italicize	Ctrl+I
Underline	Ctrl+U

For double underline format, click the down arrow next to Underline command. Choose **Double Underline** from the menu that opens.

Change Font Style

To change the font style,

- Select the cell(s).
- Click the drop-down arrow next to the **Font Style** box on the Home tab.
- Select a **font style** from the list.

As you move over the font list, the Live Preview feature previews the font for you in the spreadsheet.

Change the Font Size

To change the font size,

- Select the cell(s) you want to format.
- Click the drop-down arrow next to the **Font Size** box on the Home tab.
- Select a **font size** from the list.

Change the Text Colour

To change the Text Colour,

- Select the cell(s) you want to format.

Click the drop-down arrow next to the **Font Color** command. A color palette will appear.

- Select a color from the palette.

OR

- Select **More Colors....** A dialog box will appear.
- Select a color.
- Click **OK**

Add a Border

To add border(s),
Select the cell or cells you want to format.
Click the **drop-down arrow** next to the **Borders** command on the Home tab. A menu will appear with border options.
Click an option from the list to select it.
You can change the **line style** and **color** of the border.

Add a Fill Color
To change the Text Colour,

- Select the cell or cells you want to format.
- Click the **Fill command.**
- A color palette will appear. Select a color.

OR

- Select **More Colors....** A dialog box will appear.
- Select a color.
- Click **OK.**

You can use the **fill color feature** to format columns and rows, and format a worksheet so that it is easier to read.

Format Numbers, Dates and Times

Excel treats dates and times as special type of numeric value. You can format any of these data as per your requirements:

Select the cell(s) you wish to format.
Click the drop-down arrow next to the **Number Format box** in **Number Group** in Home tab.

- Select one of the options for formatting numbers

By default, the numbers appear in the General category, which means there is no special formatting. In the Number group, you have some other options. For example, you can change the another currency format, set numbers to percents, add commas, and change the decimal location. When you click on the dialog box launcher (arrow at the bottom right corner of the group), the Number tab of the **Format Cells** dialog box opens as in Figure 3.13. From here you can choose the specific format for number, date or time.

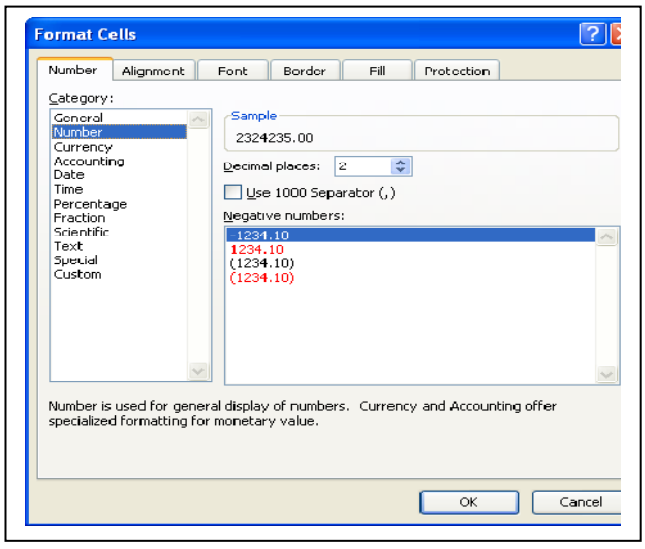


Figure 6.2: Number Tab of Format Cells Dialog box

Please Note: For any of the above formatting options, you can also right mouse click in the selected cell(s) and then choose **Format Cells...** option from the menu that opens. The Format Cells dialog box will appear with different tabs for number formatting, alignment, font, border, fill and protection.

You can also use **Format Painter** in Clipboard group of Home Tab to copy format from one cell to another.

FORMULAS

Formulas and Functions enhance Excels capability calculating and manipulating data for analytical purposes.

Formulas

A formula is a set of mathematical instructions that can be used to perform calculations. Formulas are started in the formula box with an = sign. A Formula may consist of:

• **Operators** : Symbols (+, -, *, /, etc.) that specify the calculation to be performed.

References : The cell or range of cells that you want to use in your calculation.

Constants : Numbers or text values that do not change.

Functions : Predefined formulas in Excel.

Create a Simple Formula

We will learn to create a **formula to add two numbers:**

- Click the cell where you want the formula to be defined (for example cell A3).
- Type = sign to let Excel know that a formula is being defined.
- Type the two numbers to be added with the operator. For example type 35+1330 in cell A3 (after = sign). Press Enter.
- The result of the above addition operation is displayed in the cell A3, instead of the formula that we had typed. If you select A3, the formula appears in the formula bar.
- We can now modify the above formula to **add contents of two cells** instead of the constant values:
- Click the cell where you want the formula to be defined and the answer will appear (for example cell A3).
- Type = sign to let Excel know that a formula is being defined.
- Type the cell number (example A1) that contains the first number to be added. Then type + operator and then the cell number (example A3) that contains the second number to be added. For example type A1+A3 in cell A3 (after = sign). Please note, if a cell does not contain a number then it is treated as containing zero.

Press Enter.

- The result of the above addition operation is displayed in the cell A3. Cell A3 will display the value 333.
- **Change** the value in cell A1 to 300, and notice that the value in cell A3 automatically changes to 334.

Create a Simple Formula using Point and Click Method

To create a formula using mouse:

Click the cell where the answer will appear (B3, for example).

Type the equal sign (=).

- Click on the first cell to be included in the formula (Bl, for example).
- Type the operator sign (+ for addition or - for subtraction or * for multiplication or / for division) .

Click on the next cell in the formula (B3, for example).

Press Enter or click Enter button on the formula bar.

Using Cell References
When a cell address is used as part of a formula, it is called a **cell reference** because instead of entering specific numbers into a formula, the cell address referring to a specific cell is being used.

You have used Fill Handle in the auto fill feature in previous section. The same feature can be used to copy formulas from one cell to another. For example, if you have the formula =A1+B1 in cell C1, and you can use the fill handle to fill the formula into cell C3. Note that the formula won't appear the same in C3 as it does
in C1. Instead of =A1+B1, you will see =A3+B3 in cell C3. This is called**Relative Reference** where cell references in formulas has changed cell addresses relative to the row and column they are moved to. In relative reference, formulas **automatically adjust** to new locations when they are pasted into different cells. Sometimes, our requirement is such that we don't want this change of cell address on pasting. To achieve this, cells must be addressed by **Absolute Reference.**

In **Absolute cell references,** a formula **always** refers to the **same cell** or cell range used in it. If a formula is copied to a different location, then the cell address remains the same. An absolute reference is designated in the formula by the addition of a **dollar sign** ($). It can precede the column reference or the row reference, or both. Examples of absolute referencing are:

$A1 - here the column will not change when copied.
A$1 - here the row will not change when copied.
$A$1 - here both row and column will not change when copied.

In the above example, if we have formula as =$A$1+$B$1 in cell C1 and we copy this formula in cell C3, then you will still see =$A$1+$B$1 in cell C3.

Linking Worksheets
Sometimes, you may want to use the value from a cell in another worksheet within the same workbook in a formula. For example, the value of cell A1 in the current worksheet and cell A3 in the second worksheet can be added using the format "sheetname!celladdress". The formula for this example would be "=A1+Sheet3!A3" where the value of cell A1 in the current worksheet is added to the value of cell A3 in the worksheet named "Sheet3".

6.3 Preparation of charts and graph with excel – working with workbook :

Creating a Chart
Now that you have some data, you can draw a simple chart. In this first exercise you'll see exactly how Excel uses this data to do this:

1. Check that the data (cells *A1* to A12) is still selected - it's a good idea to select the data first
2. Move to the **Insert** tab and note the different types of chart available in the *Charts* group
3. Click on the first type **[Column]** and choose the first sub-type **(2-D Clustered Column)**

A chart should appear on the current worksheet (centrally placed). You'll see later how to place charts on their own separate sheets. Note the following:

a. All twelve values are plotted
b. The data is called *Series 1* in the *legend* because Excel couldn't find a name for the data set
c. The horizontal (x-) axis is labelled *1,2,3 ... 12* (reflecting the row numbers) and is equally spaced
d. The columns are drawn in the centre of each division and only occupy part of the space
e. The vertical (y-) axis is labelled from *-2* to *12* in steps of *2*
You'll see later how to change some of these settings. First, change the data to give the series a heading:

4. Type **xxx** into cell A1 (and press **<Enter>)**

You'll find that xxx is interpreted as another zero value (the first two column divisions are both empty) and that the vertical axis is automatically redrawn as there are no longer any negative values.

5. Press **<Ctrl a>**to select the data again then repeat steps **2 & 3**

A second chart appears (placed over the old one) but this time:
a. Only eleven values are plotted
b. The value in cell *A1* is used both for a *chart title* and as a label in the *legend* on the right
c. The vertical (y) axis starts at *0*
To see both charts:

6. Move the mouse cursor into the chart and then hold down the mouse button
7. Drag the new chart to a new position on the right of the screen
8. Drag the old chart to the left, so you can compare the two, then **<Delete>**it

Next, try deleting and adding some data:

9. Click on cell *A2* then *right click* and choose **Delete...** - press **<Enter>**for **[OK]** to *Shift, cells up* - only 10 values are plotted and the horizontal axis changes accordingly
10. Select cells *A4* to *A6* then *right click* and choose **Insert...**
11. Choose **Shift cells down** then press **<Enter>**for **[OK]** - three new (zero) values are added to the chart
12. Press **<Ctrl z>**to **[Undo]** the last command and remove the new values
13. Click on cell *A11* and, using the cell handle, drag down to cell A14 to add three extra values - this time, the new values are not added to the chart

14. Press **<Ctrl z>**to **[Undo]** the last command and remove the new values

This last exercise demonstrated that Excel knows which cells contain the cell range being plotted and that only changes made within that range are reflected in the chart.
Next, try adding a second set of data:

15. Click on cell *B1* and type **yyy**(press **<Enter>)**
16. In cells *B2* to *B11* type the values **10** to **1** in *reverse order*
17. Drag through cells *B1* to *B11* then *right click* and **Copy** them
*Right click*on the chart background (near the edge) and **Paste** in the new values
You'll find that the horizontal axis is still labelled *1* to *10* but that a second column has been added to each division and that a new *yyy*label has been added to the *legend.* Another change is that the *chart title* has disappeared (and will have to be added manually).

19. Repeat step **18** and you'll find that a third column appears - a second set of *yyy*values
20. Press **<Ctrl z>**to **[Undo]** the last action - you don't need these but it's useful to know that you can plot the same data twice (as you'll see later)

Modifying the Chart Settings
A chart is composed of various elements, any of which can be modified to your own requirements. These include:

- The Chart Area and Plot Area
- The Chart Title
- The Legend
- The Axes and Axis Titles
- The Series (and Data Values)
- The Gridlines

To see exactly where these elements are:

1. Move to the **Chart Tools Format** tab (buttons identical to those you need are also on the **Layout** tab)
2. Click on the *list arrow* attached to the right of the **[Chart Elements]** button - the top one in the far left *Current Selection* group
3. Select each element in turn, noting the area of the chart covered

Tip: You can also move between the elements using the <***up/down arrow***>keys.

Area and Line Settings

The following instructions apply to both the *Chart Area* and *Plot Area* (and, indeed, to any area on a chart -here, the coloured columns, for example).

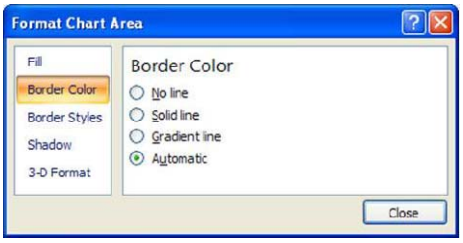
1. Click on the **[Chart Elements]** button, select **Chart Area,** then click on the **[Format Selection]** button below (you can also *right click* on an element to **Format** it) - a dialog box appears:

An equivalent dialog box appears for all the other elements too, with similar options from which you can choose. In fact the options for any area (eg the *Plot Area)* are exactly the same. If you use the *Drawing Tools,* the instructions which follow should be very familiar to you (most are exactly the same). Starting with *Fill:*

2. Drag the dialog box to the left so you can see most or all of the chart
3. Change the fill option to **Solid fill** - the areas are coloured blue and further options appear
4. Click on **Color** and select a different *Standard color* - your can access *More colors...* if necessary
5. Use the sliding **Transparency** scale to make the colour more/less intense - note that the cell gridlines show through (they wouldn't if the chart was on its own chart sheet)
6. Change the fill option to **Gradient fill** - a different set of options appear
7. Try changing the **Preset colors:, Type:** and **Direction:** - the **Gradient Stops** settings let you change the width, colour and transparency of any multi-band fill
8. Change the fill option to **Picture or texture fill** - here you can use any clip or your own icture for the chart area, or a pre-defined texture
9. Click on **Texture:** and explore what's provided
10. Explore the **Tiling options** which let you move the texture around and rescale it
11. Turn off *Tile picture as texture* and the *tiling options* become *stretch options*
12. End this section by changing the fill option back to **Automatic**

Next, look at the *Border Color* and *Style*. Again, these settings can be applied to any line (eg an axis).

13. Click on **Border Color** on the left of the *Format Chart Area* dialog box - the options change as below:



14. **Solid line** is very similar to the *Solid fill* you saw earlier, and **Gradient line** matches *Gradient fill*
15. End by setting the border colour back to **Automatic** (if you have made any changes)
16. Click on **Border Styles** on the left of the *Format Chart. Area* dialog box - the following options appear:

17. Experiment by changing the **Width:, Compound type:** and **Dash type:**
18. The **Cap type:, Join type:** and **Arrow settings** aren't really applicable here, but try **Rounded corners**

The other settings **(Shadow** and **3-D Format)** also don't really apply here, so:

19. Press **<Esc>**to **[Close]** the *Format Chart Area* dialog box
20. Press **<Ctrl z>**to **[Undo]** any changes you don't like

Next, look at the axis settings:

Axis settings

1. Click on **[Chart Elements]** and choose **Horizontal (Category) Axis** then on **[Format Selection]**

Three new sets of options appear, *Axis Options, Number* and *Alignment.* Starting with the **Axis Options:**

2. The *Interval between tick marks* affects the number of little lines denoting the divisions - there's no need to change this here
3. Under *Interval between labels:* set **Specify interval unit:** to **2** -

click on another option and the axis is now labelled1 , 3, 5 …

4. Turn on **Categories in reverse order** - the series swap places and the axis is labelled 9, 7, 5 … (the other moves to the right)
5. **Vertical axis crosses:** lets you move the vertical axis so that it crosses at a value other than 0 - try **At maximum category**
6. Try **At category number** and set a value then reset *Vertical axis crosses:* to **Automatic** and turn off **Categories in reverse order**

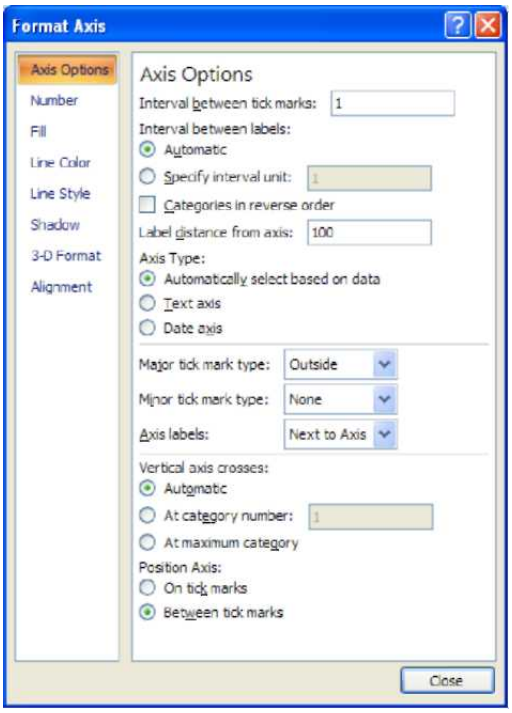
The other options aren't so useful. *Label distance from axis:* moves the labels closer to or further away from the axis. *Axis Type:* has no effect here (but you might need it for dates). *Major/Minor tick mark type:* lets you position the tick marks relative to the axis. *Axis labels:* lets you move the labels away from the axis or hide them completely (None)
The *Position Axis:* option *On tick marks* isn't particularly useful either, but would allow you to label a single set of columns with the axis label against each column (currently the columns are in the centre of each division).

7. Click on **Number** on the left of the *Format Axis* dialog box to see the options here - these let you set the number of decimal places etc, just like formatting inside a cell
8. Click on **Alignment** on the left of the *Format Axis* dialog box - here you can change the direction of the labels to read up/down or, indeed, at any angle between these settings
9. Press **<Esc>**to **[Close]** the *Format Axis* dialog box

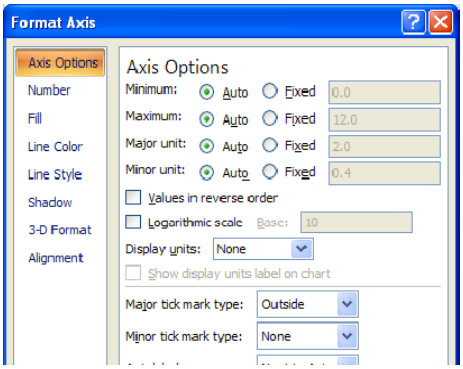
Moving to the vertical (y- or value) axis:

10. Click on **[Chart Elements]** and choose **Vertical (Value) Axis** then on **[Format Selection]**
The options here are the same as before except for the *Axis Options.* These are significantly different because the values aren't fixed by Excel but are determined by the data. To change the settings:

11. For *Maximum:* click on **Fixed** and set this to **10**
12. For *Major unit:* click on **Fixed** and set this to **2**



13. For *Minor unit:* click on **Fixed** and set this to **1**



To see the effect of fixing the minor units:

14. Change *Minor tick mark type:* from *None*to **Outside**

Tick marks should now appear at values of 1 , 3, 5 etc

15. Press **<Esc>**to **[Close]** the *Format Axis* dialog box

16. Next, change the data value in *B7* to **15** - the chart shows it as 1 0 (the maximum axis value)

17. Click on the chart, move to the **Chart Tools Format** tab and repeat step **10**

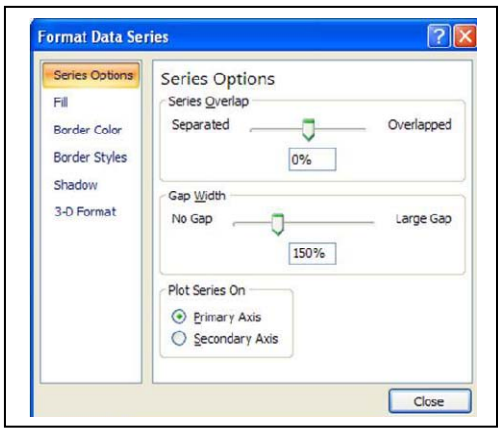
18. Repeat step **11** setting *Maximum* back to **Auto** to cater for any larger values automatically

19. Press **<Enter>**to **[Close]** the *Format Axis* dialog box, then reset the data value in *B7* to **5**

Next have a look at the options associated with the data:

1. Click on the chart then move to the **Format** tab and click on **[Chart Elements]**

2. Choose **Series "xxx"** then on **[Format Selection]** - the *Format Data Series* dialog box appears:



3. Set *Series Overlap* to **Overlapped** (100%) and the two columns are drawn on top of each other
4. Set *Series Overlap* to **Separated** (-100%) and the columns are separated by a gap
5. Set *Gap Width:* to **Large Gap** (500%) and the columns become very thin
6. Set *Gap Width:* to **No Gap** (0%) and the columns again touch each other
7. Set *Series Overlap* to **0%** (you can also type in values) and the columns completely fill the axis
8. Finally, set *Plot Series On* to **Secondary Axis** - a second axis (0 to 12) appears on the right and the one set of columns is partly hidden by the other (but you could change the transparency to see the values)
9. Set *Gap Width:* back to **150%** and reset *Plot Series On* to **Primary Axis**
10. Press **<Esc>**to **[Close]** the *Format Data Series* dialog box

As well as being able to format a whole data series, you can also do the same with a single data point:

11. Use the ***<right_arrow>***key to move along the series to a particular point (you could also click on it with the mouse) - the handles are now showing on just the one column
12. Click on **[Format Selection]** to display the *Format Data Point* dialog box
13. View the **Fill** options and change the colour of the column by choosing **Solid fill** and a **Color**
14. **[Close]** the *Format Data Series* dialog box then press **<Ctrl z>**to **[Undo]** the colour change

The final element which you've yet to explore is the set of *gridlines:*

1. Click on **[Chart Elements]** and choose **Vertical (Value) Axis Major Gridlines**
2. Click on **[Format Selection]** - the *Format Major Gridlines* dialog box appears
3. Move to the **Line Style** options and change **Dash type:** to a *dashed line*
4. Press **<Esc>**to **[Close]** the *Format Major Gridlines* dialog box
5. Press **<Delete>**and the gridlines disappear - press **<Ctrl z>**to **[Undo]** the deletion There are other elements, not present on this particular chart, which will be looked at later.

The Chart tools format tab

1. Click on any area element of the chart (the *Plot Area* is probably best)
2. Next, click on the *list arrow* at the foot of the scroll bar on the right of the **[Style]** (Abc) buttons
3. Move the mouse cursor around the styles - the element changes to match the current selection
4. If you have chosen a style, press **<Ctrl z>**to **[Undo]** it

If you want to set your own style, you do so using the three buttons to the right:

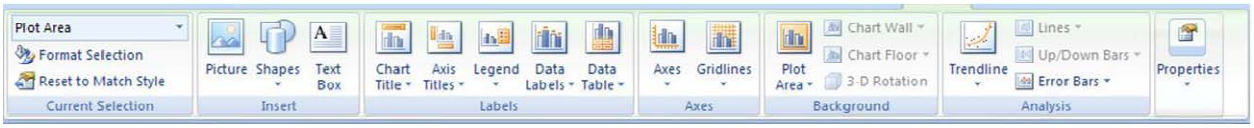
5. Click on the words **[Shape Fill]** and explore what's available - there's no need to change anything
6. Next, do the same with the **[Shape Outline]** button
7. Finally, try out the **[Shape Effects]** button - here you can also set a *Glow, Soft. Edges* etc
8. If you have made any changes, press **<Ctrl z>**to **[Undo]** them

The buttons in the *WordArt Styles* group are all greyed out, as you aren't using any WordArt here. Similarly, the *Arrange* group is largely irrelevant here (if you had two or more charts overlapping then you could use the buttons here to bring one to the front or send it backward). The final group is *Size:*

9. Use the **[Shape Height]** and **[Shape Width]** buttons to set the exact size of the chart
10. Click on the *group arrow* on the right of the *Size* group to display the *Size and Properties* dialog box
11. Move to the *Properties* tab and note the *Object Positioning* - the default is to *Move and size with cells*
12. Press **<Esc>**to **[Close]** the *Size and Properties* dialog box
13. Finally, *right click* on the column ***M*** heading (or any of those behind the chart) and choose **Delete** - the chart becomes narrower - press **<Ctrl z>**to **[Undo]** the column deletion

To stop this happening, the *Object Positioning* (step 1 1) needs setting to *Move but don't size with cells.*

The Chart Tools Layout Tab



The labels group

1. Click on the chart and move to the **Chart Tools Layout** tab

Note that the first group, *Current Selection,* is the same as on the *Format* tab. The second group gives you access to the various shapes and text boxes (if you want to annotate your chart). The next group, *Labels,* lets you add labels to your chart (if they aren't there already). Your current chart has no labels, so:

2. Click on the **[Chart Title]** button and choose **Above Chart** - a *Chart Title* placeholder is added
3. Type **Test Title** then press **<Enter>**- your typing is now shown in the placeholder

Note that you can use the mouse to drag the title (and some other elements) to any position you like.

4. Click on the **[Chart Title]** button again and choose **More Title Options...** - the *Format Chart Title* dialog box appears (similar to those seen previously) but note that it has no font settings
5. Press **<Esc>**to **[Close]** the dialog box then *right click* on the title to display the *Font* buttons
6. Use the **[Grow Font]** and/or **[Shrink Font]** buttons to change the size of the font title

The buttons here can also be used to change the font, font colour, bold/italic etc. Next, add axis titles:

1. Click on the **[Axis Title]** button and choose **Primary Horizontal Axis Title** then **Title Below Axis** - an
Axis Title placeholder is added below the x-axis

2. Type **Row Number** then press **<Enter>**- your typing is now shown in the placeholder
7

3. Repeat step **1** but choose **Primary Vertical Axis Title** then **Rotated Title**
4. Type **Data Values** then press **<Enter>**

There's no need to try out the other options (unless you want to) and the *More Primary Vertical Axis Title Options...* are identical to those you saw for the *Chart Title.*

5. *Right click* on either or both of your axis titles to change any font settings (using the local *Font* buttons)

The next button controls the *Legend:*

1. Click on the **[Legend]** button and note the preset alternative positions **-Show Legend at Right** is the
default and doesn't need to be changed

2. Choose **More Legend Options...** and the *Format Legend* dialog box appears
3. Press **<Esc>**to **[Close]** the dialog box then *right click* to change any *Font* settings

Excel lets you format not just the whole legend but individual entries within it:

4. Move the mouse over the *Series "xxx" Legend Entry* and click the mouse button to select it.
5. *Right click* and choose **Format Legend Entry...** - the *Format Legend Entry* dialog box appears
6. Press **<Esc>**to **[Close]** the dialog box then *right click* again to display the local *Font* buttons
7. Click on the **[Fill Color]** button and choose **No Fill** - the columns disappear from the chart
8. Press **<Ctrl z>**to **[Undo]** the fill colour change and redisplay the columns

The next button lets you add *Data Labels:*

1. Click on the **[Data Labels]** button and choose **Outside End** - numbers appear above the top of each
column showing the data values in cells *A2* to *B11*

Again, each set of labels can be positioned (or formatted) differently:

2. *Right click* on any data label and choose **Format Data Labels...** - a dialog box appears
3. Change the *Label Position* to **Inside End** then press **<Esc>**to **[Close]** the *Format Data Labels* dialog box

You can even position (or format) an individual label:

4. Click on any of the currently-selected data labels to select just that one
5. Now, repeat steps **2** and **3,** changing the *Label Position* to **Center**
6. *Right click* on the data label again and, this time, change the **[Font Color]** to match that of the column - the label disappears

7. *Press* **<Ctrl z>***twice* to undo the changes to the colour and position of the label

If you want to display the data in tabular form on the chart, add a *Data Table:*

1. Click on the **[Data Table]** button and choose **Show Data Table** - the values appear below the chart
2. Click on **[Data Table]** again but choose **More Data Table Options...** a dialog box appears
3. Note the extra settings then turn on **Show Legend Keys** - press **<Enter>**to **[Close]** the dialog box
4. End by hiding the *Data Table* - click on the **[Data Table]** button and choose **None**

The axes group

The buttons in the *Axes* group control both the axes and gridlines:

1. Click on the **[Axes]** button, choose **Primary Horizontal Axis** then **Show Axis without labelling**– the numbers disappear - press **<Ctrl z>**to reinstate them

You've seen **Show Right to Left Axis** before, while **More Primary Horizontal Axis Options** just displays the *Format Axis* dialog box. Instead, have a look at the vertical axis settings:

2. Click on the **[Axes]** button again, but choose **Primary Vertical Axis** then **Show Axis with Log Scale**
3. Having noted the effect, press **<Ctrl z>**to undo the log scale

Next, have a look at what changes you can make to the gridlines:

1. Click on the **[Gridlines]** button, choose **Primary Horizontal Gridlines** then **None** - the lines disappear
2. Repeat step **1** but choose **Primary Vertical Gridlines** then **Major Gridlines** - vertical lines appear
3. Press **<Ctrl z>***twice* to undo the changes to the gridlines

Note that you can also display the *Format Gridlines* dialog box (seen earlier) by choosing **More Gridline Options....** The major and minor gridlines can be formatted separately by selecting them before issuing the command. Single gridlines cannot be formatted differently from the rest.

The background group

Most of the buttons in this group are currently greyed out. You really need a 3-D chart to see the options here. The only active button, **[Plot Area],** lets you clear the fill from the *Plot Area.* To see this:

1. First, *right click* on the *Chart Area,* choose **Format Chart Area...** and a **Solid fill** - press **<Esc>**
2. Now, click on **[Plot Area]** and choose **None** - the plot area is coloured the same as the chart area
3. Press **<Ctrl z>***twice* to **[Undo]** the changes

The Analysis Group

The buttons in the *Analysis* group let you add trendlines (best fit lines) and error bars to your chart.

1. Click on the **[Trendline]** button and choose **Linear Trendline**
2. A dialog box asks whether you want a trendline for the xxx or yyy data - choose **xxx** (and click on

[OK])

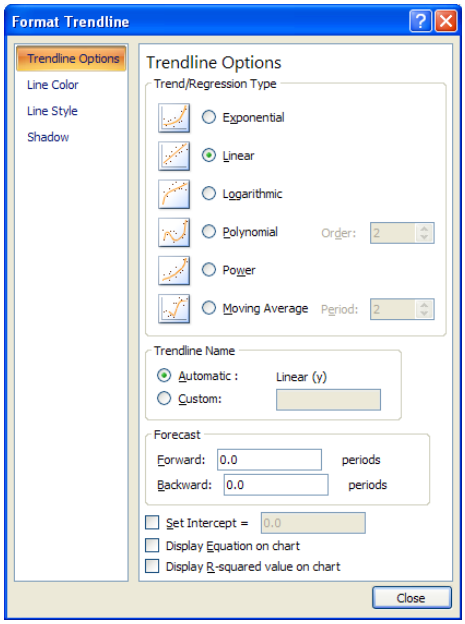
A line is now drawn through the top of each column. Here, the line fits perfectly as the data values increase regularly by one each time. A trendline is calculated using the statistical technique called *regression.* Don't worry if you know nothing about this - just be aware that regression works out the best fit, based on the data.

3. Change the data value in cell *A2* to **5** - note how the line moves to best fit the new value
4. Press **<Ctrl z>**to **[Undo]** the change to the data.

Such lines can even be used for forecasting extra values:

5. Click on the chart then on **[Trendline]** again but choose **Linear Forecast Trendline** (for **xxx)** - two extra values are added to the chart
6. Press **<Ctrlz>**to **[Undo]** the extra values
7. Click on **[Trendline]** again and choose **More Trendline**

Options.(based on **xxx)** – the *Format Trendline* dialog box appears:



As you can see, there are many other types of trend/regression lines that you can fit to your data. You can also forecast both backwards and forwards and you can display the equation of the line:

8. Try out the different *Trend/Regression Types* then reset to **Linear**
9. Under *Forecast,* set *Forward:* to **4** periods
10. Turn on **Display Equation on Chart**
11. Also turn on **Display R-squared value on chart**
12. Press **<Esc>**to **[Close]** the *Format Trendline* dialog box
13. Press **<Ctrl z>**to **[Undo]** the changes

The other active button in the *Analysis* group is for error bars. Again, these will be well-known to some users but a complete mystery to others.

1. Click on the **[Error Bars]** button and choose **Error Bars with Standard Error** - up and down bars are added at the top of each column

By choosing *Standard Error,* you have equal-sized bars on each column (the *Standard Error* is a fixed value).

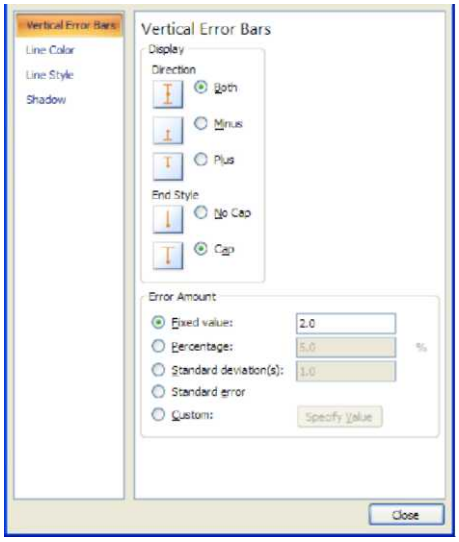
2. Repeat step **1** but choose **Error Bars with Percentage** - the bars are different sizes this time, each being 5% of the data value (ie for 10 both the up and down bar is 0.5, giving an overall bar 1 unit high).

3. Repeat step **1** but choose **More Error Bars Options...** for the **xxx Series** - the *Format Error Bars* dialog box appears

Here you can choose exactly how you want your error bars shown. Usually you want both *Minus* and *Plus* but you don't have to. The default here is to have a *Fixed value:* but another option is *Custom:*

4. Choose the option **Custom** then on **[Specify Value]** - another dialog box appears
5. Drag through cells *C2* to *C11* to set the **Positive Error Value**
6. Repeat step **5** for the **Negative Error Value** (deleting the current setting) then press **<Enter>**for **[OK]**
7. Press **<Esc>**to **[Close]** the *Format Error Bars* dialog box
8. Now type the following data into cells *C2* to *C11:* **1 1 2 2 1 3 2 0 1 0**

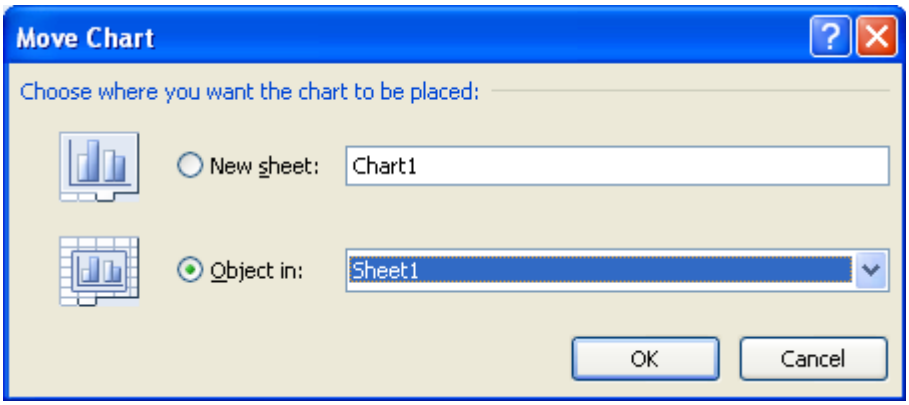
You'll find these values are used for the error bars.



The Chart Tools Design Tab

The third extra tab which appears when you create a chart is the *Design* tab. Here you can choose a different sort of chart and can make use of built-in styles. You can also move a chart onto its own chart sheet:

1. First, click on the chart then on the **Design** tab to view the available buttons
2. This time, start on the far right - click on the **[Move Chart]** button - a dialog box appears:



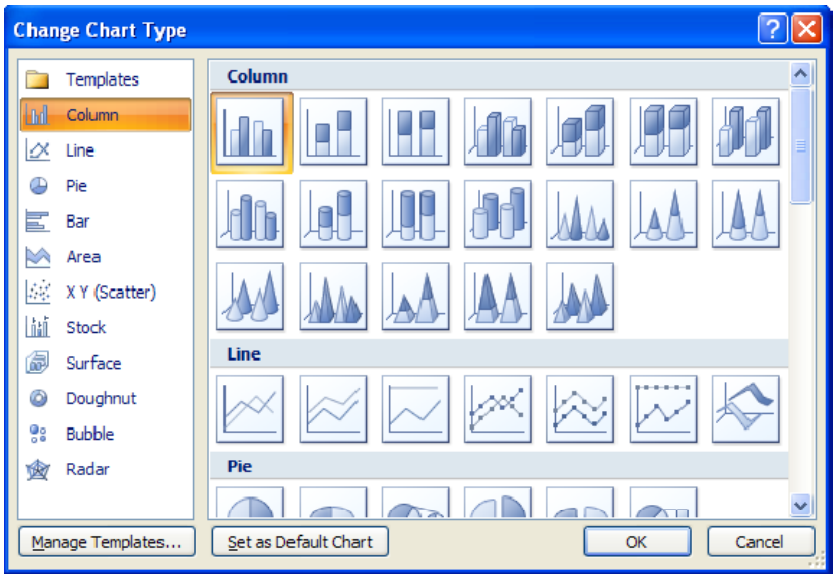
3. Choose **New Sheet** and change the name from *Chart!* to**My Chart** - press **<Enter>**for **[OK]**

Your chart is moved to a separate sheet, filling the whole screen, which makes it much easier to see what's going on.

The Type Group

Moving back to the left of the *Ribbon,* the *Type* group has buttons to change the chart type. This lets you change the type if you selected the wrong type when you first created the chart.

1. Click on the **[Change Chart Type]** button - the following dialog box appears:



2. Choose the **[3-D Column]** chart - the one in the top row on the far right (press **<Enter>**for **[OK])**

3. Move to the **Layout** tab and click on the **[Chart Elements]** on the far left - note how the list has grown

4. Note in the *Background* group that the **[Chart Wall], [Chart Floor]** and **[3-D Rotation]** buttons are now active - click on **[3-D Rotation]** and, under *Rotation,* change **x:** and **y:** to rotate the chart

5. Investigate some of the other options, if you like, then press **<Esc>**to **[Close]** the dialog box

6. Move back to the **Design** tab and repeat steps **1** and **2,** this time choosing **[Line with Markers]** (fourth in the set of *Line* charts) - press **<Enter>**for **[OK]**

Not all chart types are suitable for all types of data, as you'll see next:

7. Click on the **[Change Chart Type]** button and choose **[Pie]** (the first in the *Pie* group) and click on **[OK]** - you'll find that a pie chart can only plot one data series at a time
8. Also, in the *Pie* group, repeat step **6** and choose **[Exploded Pie]** (the fourth) - the pie slices separate
9. Move the mouse cursor over any slice and, holding the mouse button down, drag the slice in as far as you can - all the slices come together again.
10. Click on any slice (to select that slice) and drag it outwards - each slice can be exploded individually
11. Click away from the slice (in the background) then **[Change Chart Type]** to **[Bubble]** - click on **[OK]**

The bubbles are drawn too large; to resize them:

12. *Right click* on any of the bubbles and choose **Format Data Series...**
13. Change *Scale bubble size to:* **15** -press **<Enter>**for **[Close]**

There isn't time to discuss in detail all the different chart types/subtypes here, but you're welcome to do so.

Combination Charts

Excel lets you combine certain chart types onto a single chart - for example you could have both a column and a line. To demonstrate this, start with a new chart:

1. Move back to the data - click on *Sheet 1*
2. Select cells *A1* to *A11* then move to the **Insert** tab and click on **[Line]** in the *Chart* group - note that you can choose the Chart Type here (you don't have to do so on the *Chart Tools Design* tab)
3. Choose **[Stacked Line]** (the second in the top row) - a chart appears, as before
4. Next, *right click* on the data *(A1* to *A11* should still be selected) and **Copy** it
5. *Right click* on the chart and **Paste** in a second set of xxx values - the line adds the new values to the old
6. Right click on the top line, to select it, and choose **Change Series Chart Type...**
7. Select **[Clustered Column]** (the first one in the *Column* group) then press **<Enter>**for **[OK]**

You now have a combination chart. The line isn't a trendline. To prove this:

8.Change the data in cell *A2* to **0** - press **<Enter>**to plot the new value (the line is no longer straight)

X-Y Charts

In all the charts you have seen so far, the horizontal (x-) axis isn't actively used. It has been simply numbered 1to 10, which essentially indicates the data row in the data set (ie data values in *A2* and *B2* are in row 7). If you want to plot one set of data values against another, then you ***MUST*** use an *X-Y (Scatter) Chart:*

1. First, select your data - here select *A1* to *B11*
2. Move to the **Insert** tab, click on the **[Scatter]** button and choose **Scatter with only Markers** (the first)

The new graph only plots the yyy values - the xxx values are used to position them along the horizontal axis. Note the gap between the first two points and also how the points are plotted at their exact position on the horizontal axis.

3. Change the value in cell *A11* to **11** - the last point moves further along the axis
4. Select the yyy series again (drag through cells *B1* to *B11*), *right click* on the selection and **Copy** the data

5. *Right click* on the chart and **Paste** in a second set of y-values (these are plotted on top of the first)
6. *Right click* on any of the new values and choose **Change Series Chart Type...**
7. Choose **[Clustered Column],** as before, then press **<Enter>**for **[OK]**

You'll find that the columns don't all appear where you want them - they aren't making use of the horizontal axis. Here, you can't create the combination chart you might have hoped for.

8. Press **<Ctrl z>**to **[Undo]** the chart type change
9. *Right click* on any of the new values and choose **Format Data Series...**
10. Set *Plot Series On* to **Secondary Axis** - press **<Enter>**for **[Close]**
11. *Right click* on the new axis on the right and choose **Format Axis...**
12. Under *Axis Options,* change **Maximum:** to a **Fixed** value of **100** then press **<Enter>**for **[Close]**

This last exercise shows you the value of a secondary axis - if you have two series with different scales of numbers (eg one set with values up to 10 and another with values up to 1000) then you can plot them on the same graph by making use of a second axis. Here, you don't need the duplicate series so:

13. Click on any of the new values (to select the series) then **<Delete>**them

Next, try adding some error bars:

14. Move to the **Layout** tab, click on **[Error Bars]** and choose **Error Bars with Standard Error** -both horizontal and vertical error bars appear
15. Click on any of the horizontal bars and **<Delete>**it (you'll find they all disappear)

Templates

The second button in the *Type* group on the **Chart Tools Design Tab** is **Save as Template.** This lets you set up the exact style of chart you want for a set of charts, which can then be used for all of them. To see this:

1. *Right click* on the *Chart Area* of the current chart and **Format Chart Area...**
2. Choose a *Fill* **(Solid, Gradient** or **Picture)** then press **<Esc>**for **[Close]**
3. *Right click* on the *Chart Title* and change the **[Font Colour]** and **[Font Size]**
4. Now, move to the **Design** tab and click on **[Save as Template]**

Give the template a name (eg**My Template)** then press **<Enter>**for **[Save]** - note that is goes into a special folder and that this is not retained on the IT Services lab PCs (it would be on your own)

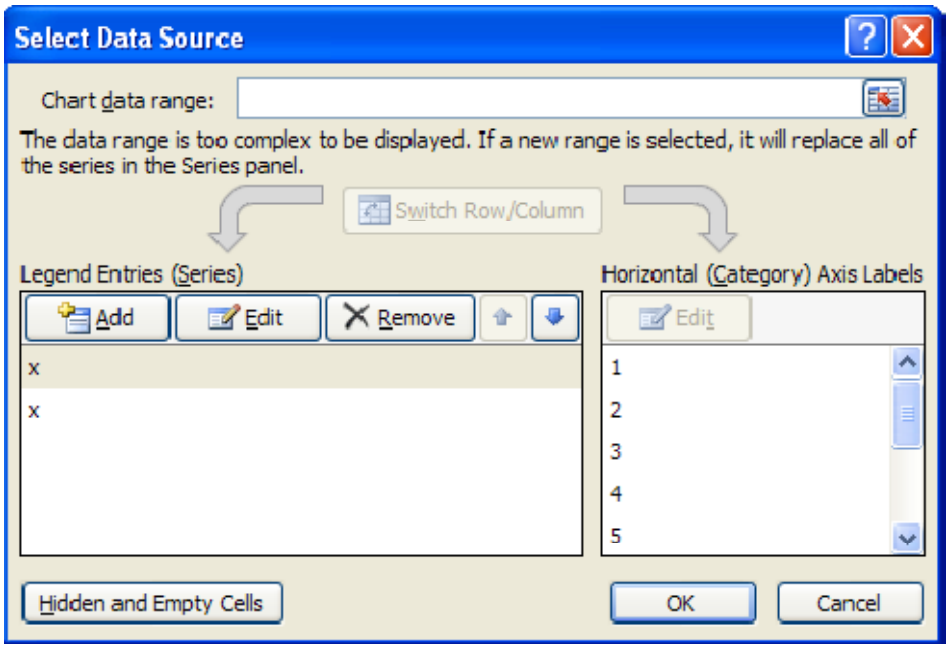
<Delete>the *Scatter* chart and click on the *Combination Chart* to select it

Now, click on the **[Change Chart Type]** button, choose **Templates** then select **My Template** - press **<Enter>**for **[OK]** - your chart area and title should now match the *Scatter* chart

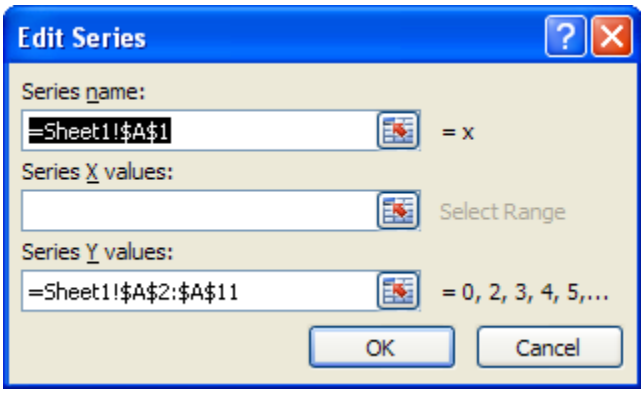
The Data Group

The two buttons in the *Data* group let you change the data being used for the chart. Only one of the buttons is currently active, so:

1. Click on the **[Select Data]** button - the following dialog box appears:



2. In *Legend Entries (Series)* on the left, select the lower **xxx** then **[Remove]** it
3.With the *Select Data Source* dialog box still open, click on **[Edit]** – another dialog box appears:



4. Click in the empty *Series X values:* box then drag through cells *C1* to *C11*
5. Note the change to the chart then **[Cancel]** the new X series
6. Now click on **[Add]** – the *Edit Series* dialog box again appears
7. Click on cell *B1* to set the *Series name:* to **=Sheet1!$B$1 a**
8. Move to the *Series Y values:* and **<Delete>**the current setting
9. Now drag through cells *B2* to *B11* to set this to **=Sheet1!$B$2:$B$11** - press **<Enter>**for **[OK]**
10. Note the change to the chart then **[Remove]** the new yyy values - press **<Enter>**for **[OK]**
11. Finally, click on **[Switch Row/Column]** – the graph goes crazy (press **<Ctrl z>**for **[Undo]**)

The **Switch Row/Column** button does have its uses. If your data was typed in across the columns (instead of down the rows) then you would be making use of it. By default, Excel expects your data to be in rows.

Chart Layouts

Excel provides you with some pre-defined popular layouts which, if you know them, can make it very easy to get various extra chart elements for free.

1. Click on each of the 3 buttons shown in the *Chart Layouts* group to see their effect

2.Now click on the **[More]** arrow at the bottom of the *Chart Layout* scroll bar to see further layouts

3. Try some of these – **Layout 9**, for example, supposedly gives you a trendline and regression statistics

Chart Styles

The final group on the *Chart Tools Design* toolbar is called *Styles.* Again, these are pre-defined styles which help make colouring your chart simple and which give a very professional look:

1. Click on some of the buttons provided in the *Chart Styles* group to see their effect
2. Now click on the **[More]** arrow at the bottom of the *Chart Styles* scroll bar to see further styles
3. Try some of these - the ones with a black background look spectacular
4. Click on the **[Change Chart Type]** button and select a **[Pie]** chart - press **[Enter]** for **[OK]**

If there is a particular style you like but would also like to keep your own formatting, you can:

5. Apply your own template - click on **[Change Chart Type]** then select **My Template**
6. *Right click* on the preferred **[Chart Style]** then choose **Apply and Maintain Formatting** - your *Chart Area* and *Title* settings should be preserved but other elements will change to reflect the chosen style
7. *Right click* on the **[Chart Style]** again and choose **Apply and Clear Formatting** - your settings are now lost

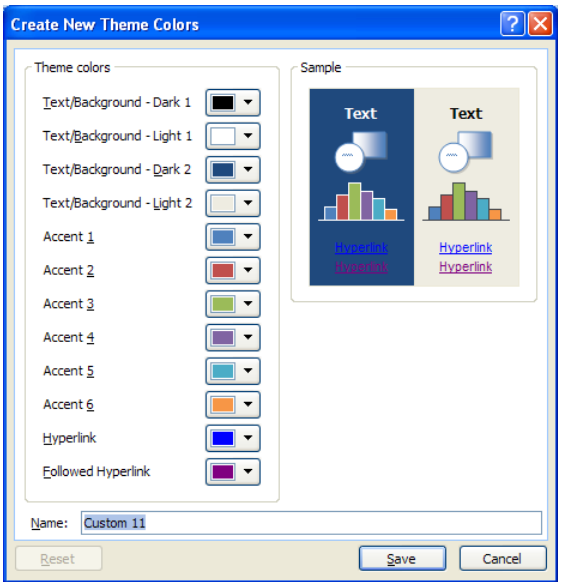
Themes

The default chart colours used in Excel 2007 are the accent colours from the current theme. To change the colours:

1. Start by changing the **[Chart Style]** to a multicoloured pie chart (so you can see all the colours)
2. Move to the **Page Layout** tab and click on the **[Themes]** button
3. Move the mouse cursor over the themes and watch how the pie slices change colour and effect
4. Choose the theme you like best then click on the **[Colors]** button to change that theme's colours

To see how the colours in the theme are defined:

5. Click on the **[Colors]** button again but choose **Create New Theme Colors...** - a dialog box appears:



You're creating your own theme colours here, which you can name if you like:

6. Type **my theme** to replace *Custom 11* as the *Name:*

7. Next, change the theme colour you don't like - the *Accent* colours are used for the area colours

Note that the colours are repeated so that *Accent 1* controls the colour of pie slices 1 and 7.

8. Repeat step **7** for any other theme colours you want to change

9. Click on **[Save]** to save your theme

You've finished exploring charts now, so:

10. Close down Excel, as usual - there no need to save your file, unless you want to.

Printing :

Print Preview

Before printing your work, you should preview it. This is particularly important in Excel if you want it to fit neatly onto the page. In a minute you will look at the *Page Setup* but first:

1. Click on the **[Office]** button and choose **Print** followed by **Print Preview**

Ideally, it would look better to have the paper sideways and you wouldn't want all of the data shown (the *taxrate* cell, for example, shouldn't appear).

2. Click on **[Close Print Preview]** to quit *Print Preview*

6.4 Working with functions :

Functions A function is a built in **pre defined formula** in Excel. One of the key benefits of functions is that they save your time since you do not have to write the formula yourself. For example, you could use an Excel function called **Average** to quickly find the average of a range of numbers. Excel has hundreds of different functions to assist with your calculations. Each function has a particular syntax, which must be strictly followed for the function to work correctly.

Function Library

The function library is a large group of functions on the **Formula** Tab of the Ribbon. These functions include:

AutoSum: Easily calculates the sum of a range

Recently Used: All recently used functions

Financial: Accrued interest, cash flow return rates and additional financial functions
Logical: And, If, True, False, etc.
Text: Text based functions
Date & Time: Functions calculated on date and time
Math & Trig: Mathematical Functions

You can visit each of these functions in the library to know more about them.

Insert a Function To insert a function:
Click the cell where you want the function applied
Click the Insert Function button on the formula bar. The **Insert Function** dialog box opens.
Choose the function from the dialog box. You may search on a particular function in the dialog box or change the category and select the function. Help for each function is available right there in the dialog box.
Click OK. **Function Arguments** dialog box opens.
Select the cells or range of cells for function arguments and click OK.
The Function is added to the formula bar

Counting functions
There are four functions which let you count up the number of cells matching certain criteria:
- **COUNT** tells you how many cells contain numbers
- **COUNTA** tells you how many cells are not empty
- **COUNTBLANK** tells you how many cells are empty
- **COUNTIF** tells you how many cells match a certain criterion

There are also two specialized functions (**DCOUNT** and **DCOUNTA**) for when Excel is used as a database.

Logical functions
IF gives you alternative results depending on a condition - also **SUMIF** and **COUNTIF**
- **AND** allows you to check several criteria are all true
- **OR** checks whether any criteria are true
- **NOT** changes *true* to *false* and vice-versa

6.5 Sort and filter commands :

SORTING THE data

Sort & Filter:
When sorting data in Microsoft Excel, it's very important to decide whether you want just part of the data sorted or the whole dataset.

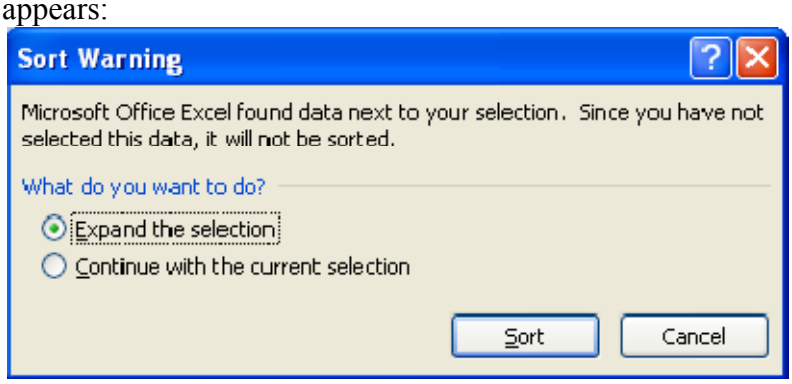
1. Load up Excel and **[Open]** the file.
2. Decide which column you want to sort on (eg Column **B**) and click on *any cell* in that column
3. Click on the **[Sort & Filter]** button in the *Editing* group on the right of the **Home** tab and choose **Sort Smallest to Largest** to sort the data into increasing values

4. Repeat step **3** but choose **Sort Largest to Smallest** to sort the data into decreasing values
5. Press **<Ctrl z>**(or click on the **[Undo]** button) *twice* to return the data to its original order - or, with this data, you could use **[Sort & Filter]** on Column **A**

Note how all the data in the rows moved together as the sort was applied. Excel sorts blocks of data, delimited by blank rows or columns. This next exercise demonstrates this very clearly:
1. Select all the data - press **<Ctrl a>**
2.[Copy] the data, click on cell **I1** and press **<Enter>**to paste in the copied cells
3. *Right click* on the **15** in the row numbers down the left and choose **Insert** to insert a blank row

4. Click on any cell with data in column **J** then on **[Sort & Filter]** and choose **Sort Smallest to Largest** - you will find that only the section of data containing that cell is sorted
5. Press **<Ctrl z>**(or click on **[Undo]**) to return the data to its original order
6. Remove the empty row – again, press **<Ctrl z>**(or click on **[Undo]**)

Sorting selected data
If you only want to sort part of the data, you have to select it first:
1.Click on the column heading letter **B** to select that column
2. Click on **[Sort & Filter]** and chose **Sort Smallest to Largest** - a warning message appears:



3. Select **Continue with the current selection** - press **<Enter>**for **[Sort]**
You will find column B is now sorted but the rest of the data hasn't moved. This could be a disaster if the rows represented data records (as they do here - the data is now corrupted). Fortunately, the default is to sort all the columns (you had to reset this option at step **3**).
4. Press **<Ctrl z>**(or click on **[Undo]**) to return the data to its original order

The warning doesn't appear if cells in two or more columns are selected, as you'll see next. You can sort on more than one column in a selection, but the columns must be next to each other (ie you can't **<Ctrl>**select – if necessary, move the columns around to get them in a suitable order) and sorting is carried out based on the left-most column:
5. Drag through the column heading letters **B** to **E** to select those columns
6. Click on **[Sort & Filter]** and choose **Sort Smallest to Largest** - all four columns are sorted, based on column B, with no warning
7. Press **<Ctrl z>**(or click on **[Undo]**) to return the data to its original order

You can also sort on part of one or more columns
8. Drag through cells **A2** to **B15**

9. Click on **[Sort & Filter]** and choose **Sort Largest to Smallest** - just those cells are sorted
10. Press **<Ctrl z>**(or click on **[Undo]**) to return the data to its original order
If you wanted the sort based on column B then you have to use **Custom Sort.**

FILTERS
Microsoft Excel provides a very simple mechanism for selecting data subsets. Filters can be set up to choose specific values or a range of values. Several filters can be used, each acting further on the current data subset. An advanced filter is provided for more complicated selections.

Simple Filters
The simplest way to understand how filters work is to try them out on an example file:
1. Load up Excel and **Open** the
2. Make sure the active cell is within the set of data (eg click on cell *A1*)
3. On the **Home** tab click on the **[Sort & Filter]** button on the right and choose **Filter**
Filter arrows are now attached to the column headings in row 1. Filtering textual data and numeric data is usually slightly different and is dealt with in turn below.

6.6 Summery statistics, correlations, regression, t-test, z-test, Chi square test, Macros. :

6.7 Introduction to SQL. :

6.8 Assignments :

1. X Ltd decided to invest ?6,500 in a real estate development project where the real estate developers agreed to pay them Rs. 1,780 for four consecutive years in return of this investment. On the basis of this information, do the following:
Calculate the internal rate of return (IRR) for the real estate project investment and the net present value (NPV) of the project to crosscheck the IRR obtained. .

2. Insert 20 random numbers one below the other. Using the Auto Sum feature of Excel, find out the sum of the 20 numbers and the average of 20 numbers and display the biggest and the smallest numbers.

3. Insert 10 random numbers one below the other. Using the appropriate function in Excel, find the square root of each of them and the sum of the square root of the numbers.

4. Insert 20 random numbers one below the other. Find the mode using the appropriate function in Excel.

5. A school had a batch of 20 students whose results of the annual examination were published on 31 December 2013.
The format of the mark sheet of the annual examination of the first batch is as follows:
Roll No. Name English Maths History Total Percentage Average Grade, Each subject has a total marks of 100. Using electronic spreadsheet and appropriate formulae and functions, calculate the following:

(a) Total for each student
(b) Percentage of each student up to two decimal places
(c) Average marks of each student
(d) Grade for each student by applying the following conditions:

Percentag	Grad
0-30	F
>30-50	D
>50-70	C
>70-85	B
>85	A

6. A cricket team has 11 players whose performance in five matches was announced during a team meeting on 31 December 2014. The format of their performance is as follows:
Match No. Name Match I Match 2 Match 3 Match 4 Match 5 Total Average Grade
Using electronic spreadsheet and appropriate formulae and functions, calculate the following:

(a) Total runs of each player
(b) Average runs of each player
(c) Grade for each player by applying the following conditions:

Average	Grade
0^0	Poor
>40-50	Bad
>50-70	Good
>70-80	Nice
>80	Excellent

7. A company has five salespeople who sell three products X, Y. and Z respectively. Their quarterly performance was published on 30 April 2014. The format of the performance of the salespeople is as follows:

ID Name Jan Feb Mar Total Average Category

Using electronic spreadsheet and appropriate formulae and functions, calculate the following:

(a) Total units of products sold by each salesperson
(1)) Average number of products sold by each salesperson
(c) Ranking of each salesperson by applying the following conditions:

Average	Grade
0-40	Poor
>40-80	Good
>80	Excellent

8. M/s XYZ Furniture Ltd has a 12-month inventory of stock for four items—chairs, tables, sofas, and cabinets. The unit price for each item is given in the following format.

•Month Name of Number Unit price Total value Category inventory of units

Do the following:

(a) Calculate the total stock.
(b) Calculate the total value of each type of product.
(c) Categorize them as fast-moving, slow- moving, etc.

Using electronic spreadsheet and appropriate formulae and functions, calculate the following:

(a) The total quantity of inventory—total stock
(b) The total money invested for the stock by M/s XYZ Furniture Ltd
(c) Grade for each inventory per month by applying the following conditions:

Bfij}?!	
0-10,000	Slow
>10,000	-;
50,000	Medium Fast
>50,000	

9. The budget of a company for 2012-2013 is as follows:

(a) Salary = ? 10,000
(b) Maintenance = ? 1,000
(c) Purchase of new equipment = ?5,000
(d) Others = ?3,500

Calculate the percentage values for each category and show the percentage distribution with the help of a pie chart.

10. The number of visitors in Maddox square Durga puja for 2014 in each day are as follows:
Sasthi—2800 Saptami—3900 Astami—4800 Nabami - 5600
Calculate the percentage values of visitors for each day, taking into account the total number of visitors for all the four days and show the percentage distribution with the help of a bar chart.

11. In a town, the census for the period 1 January 2014 to 31 December 2014 revealed the following:
Population of Hindus = 5,000 Population of Muslims = 3,800 Population of Sikhs = 2,800 Other religions = 3,400 Calculate the percentage values of Hindus, Muslims, Sikhs, and other religions, taking into account the total number of citizens in the town and show the percentage distribution with the help of a cylinder chart.

12. During Christmas holidays, the average number of people who have breakfast, lunch, tea, and dinner in Star International are 400 per day, 600 per day, 500 per day, and 480 per day, respectively. Moreover, the average number of takeaway customers are 1,200 per day. Calculate the percentage values of people having breakfast, lunch, tea, and taken - ways, taking into account the total number of customers in Star International and show the percentage distribution with the help of a 3D chart.

13. Four employees joined a company on 1 January 2013. The starting salaries and monthly increments of these employees are as follows:

Name of the employee	Starting salary per month (₹)	Monthly increment (₹)
A	50,000	1,000
B	40,000	800
C	80,000	1,500
D	60,000	1,100

(a) Prepare a monthly salary table of these employees for 2014.
(b) Calculate the total salary received by each employee in 2014.
(c) Calculate the monthly average salary of the four employees.
(d) Show the monthly average salary of these employees with the help of a bar graph.

14. Miss Sen wants to mount a modular kitchen which will cost her ?2,00,000. She has planned to take personal loan from XYZ Bank. She has to make 20 per cent down payment of the total amount and the remaining amount as loan from the bank. The bank will give her the loan at 10 per cent interest for a period of seven years. Calculate the down payment amount and the EMI Miss Sen has to make to repay the loan.

15. Miss Bee wants to plan a Europe tour which will cost her 112,00,000 for her family of three adult members. She has planned to take a loan from Tour Finance & Co. She has to make a 20 per cent down payment of the total amount and decided to take the remaining amount as loan. The company will give her the loan amount at 18 per cent interest for a period of five years. Calculate the down payment amount and the EMI she has to make to

repay the loan. It is an internal understanding that every adult member will repay his share of her loan.

16. Miss Gamma wants to purchase an iPhone which will cost her ?60,000. She has planned to take loan from a friend to buy it. She has to make a 10 per cent down payment of the total amount and planned to take the remaining amount as loan. The friend will give her the loan amount at 8 per cent interest for a period of three years. Calculate the down payment amount and the EMI she has to make to repay the loan. Use conditional formatting to colour the cell with green.

****

CHPTER 7
Making presentation with MS Power point

Syllabus : Starting MS Power point - MS Power point Environment - working with power point - working with different views – designing presentations - printing in power point.

7.1 Starting MS Power point :

Microsoft PowerPoint is widely used for making professional quality presentations in a variety of formats, including on-screen computer slide shows, black-and-white or colour overheads, and 35mm slides. You can also use it for speaker's notes and audience hand-outs. In addition, PowerPoint can be used as a drawing package for preparing pictures, forms, posters and leaflets.

BASIC OPERATIONS

PowerPoint is used to create, view and present slide shows that combine text, shapes, pictures, graphs, animation, charts and videos.

Starting Microsoft PowerPoint

To load Microsoft PowerPoint:

1. Click on the **Start** button again but this time choose **All Programs**
2. From the sub-menu choose **Microsoft Office** then **Microsoft Office PowerPoint 2007**

Creating a Presentation

This is the first view which one gets when Power Point is opened. This called the **Normal View** of the workspace. There are three main areas in the Normal view:

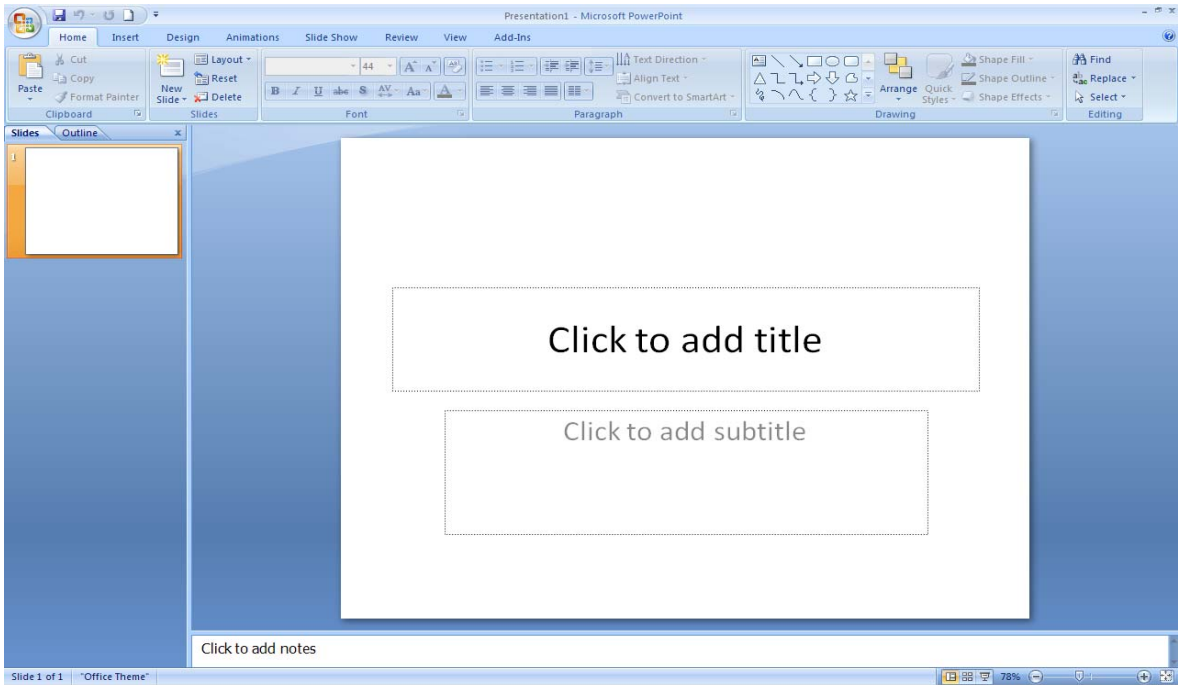


Figure 7.1 : Normal View

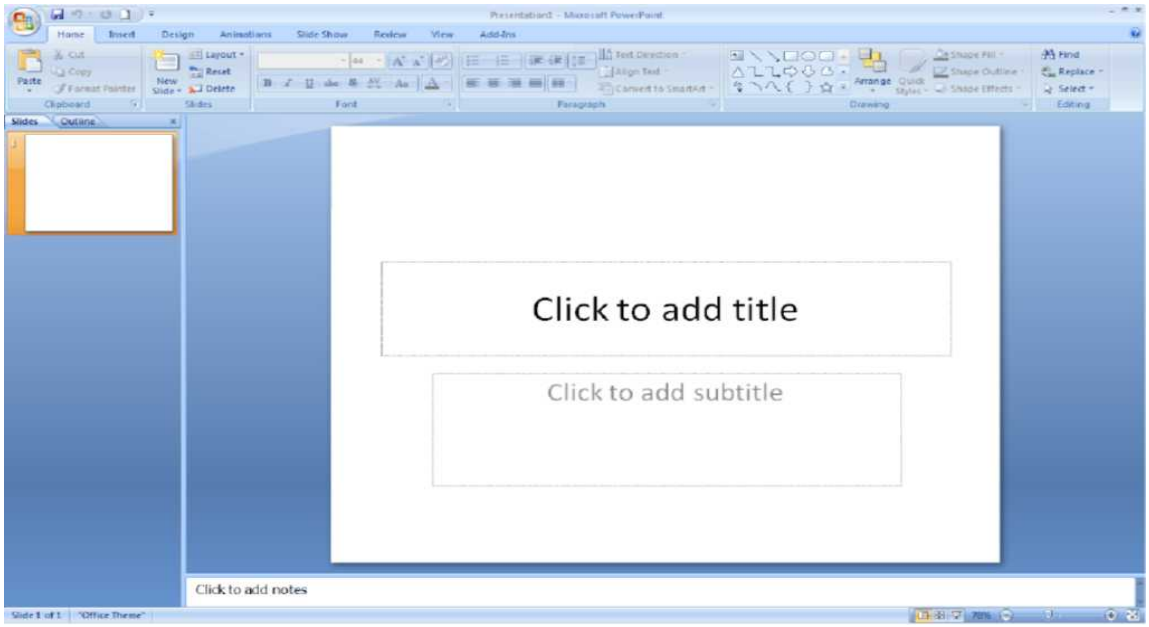


Figure 4.1 : Normal View

a) **Slide Pane:** This is the big area in the middle where the slide is made. This has boxes with dotted lines called the placeholders. Placeholders contain text items or non-text items like pictures, charts etc.
b) **Slides Tab:** On the left is the area which has thumbnail versions of the slides in the presentation and the slide which is currently being edited is highlighted.
c) **Notes Pane:** In the bottom area is the Notes Pane where the notes needed to be referred during the presentation are written.

Inserting a new slide

Each Presentation opens with a single slide. New slide can be added to the presentation by selecting New Slide option on the Home Tab in the menu. This way new Slide gets inserted below the slide selected in the Slides Tab.

The Layout of the slide can also be selected from the gallery of layouts. Once the layout is selected that kind of Slide will get inserted. If no layout is selected the default layout slide will be inserted.

A Slide Layout arranges the content of the slide for e.g., One may want the slide to have a Title and a picture with text or a Title with two pictures with text for comparison or a slide with just a Title placeholder.

The title and subtitle can be written in the Title placeholder. The Content placeholder will contain the text or graphic elements like charts, pictures, movie files etc.
Some of the layouts have two of these content placeholders so that one can put the content text in one and graphics in the other like the example shown in Figure 7.2

Add a new slide to the new presentation and choose the Layout for the same:
Click **New slide** Option on the **Home** Tab in the menu. •
Click the **Layout** Option on the **Home** Tab. The List of Layouts is displayed.

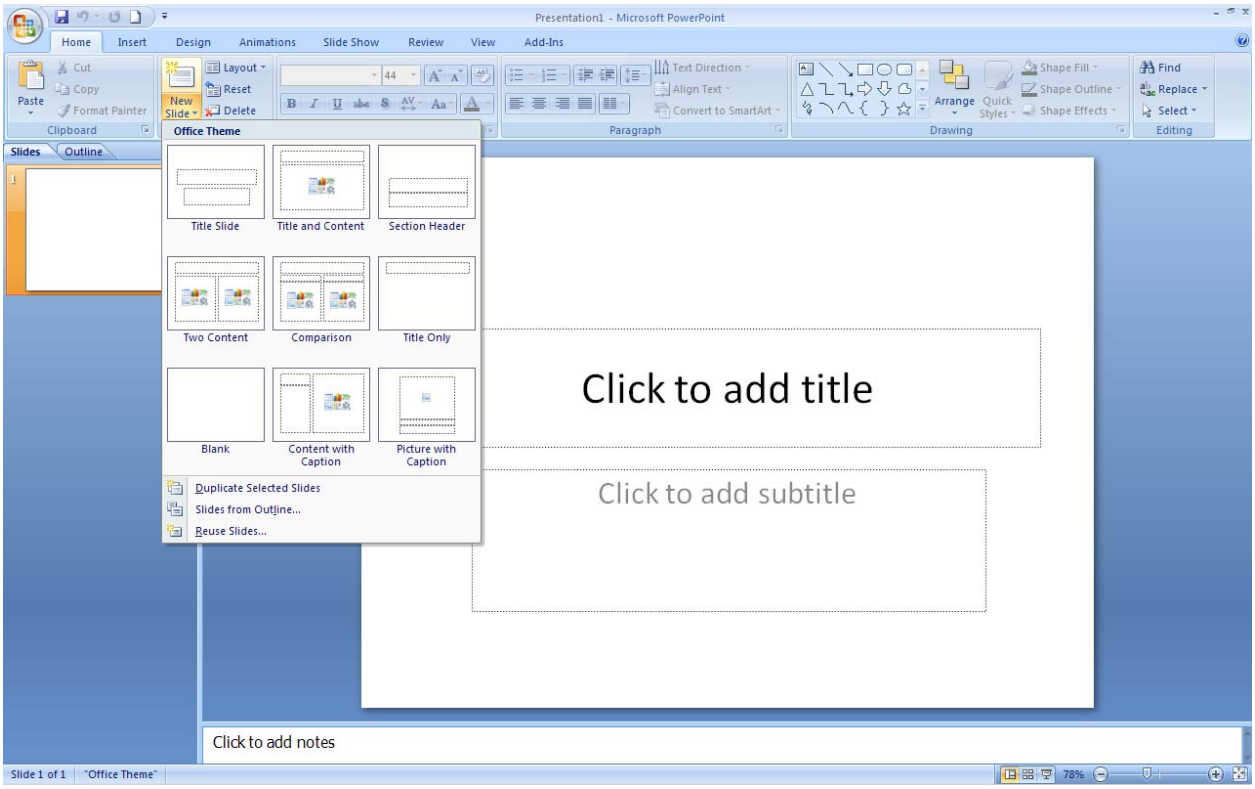


Figure 4.2 : Layout Gallery

- Select the layout for the slide. Every slide can have a separate layout.
- Select two different layouts for the two slides as shown in Figure 7.3. Click on the placeholder to write the title and add text.

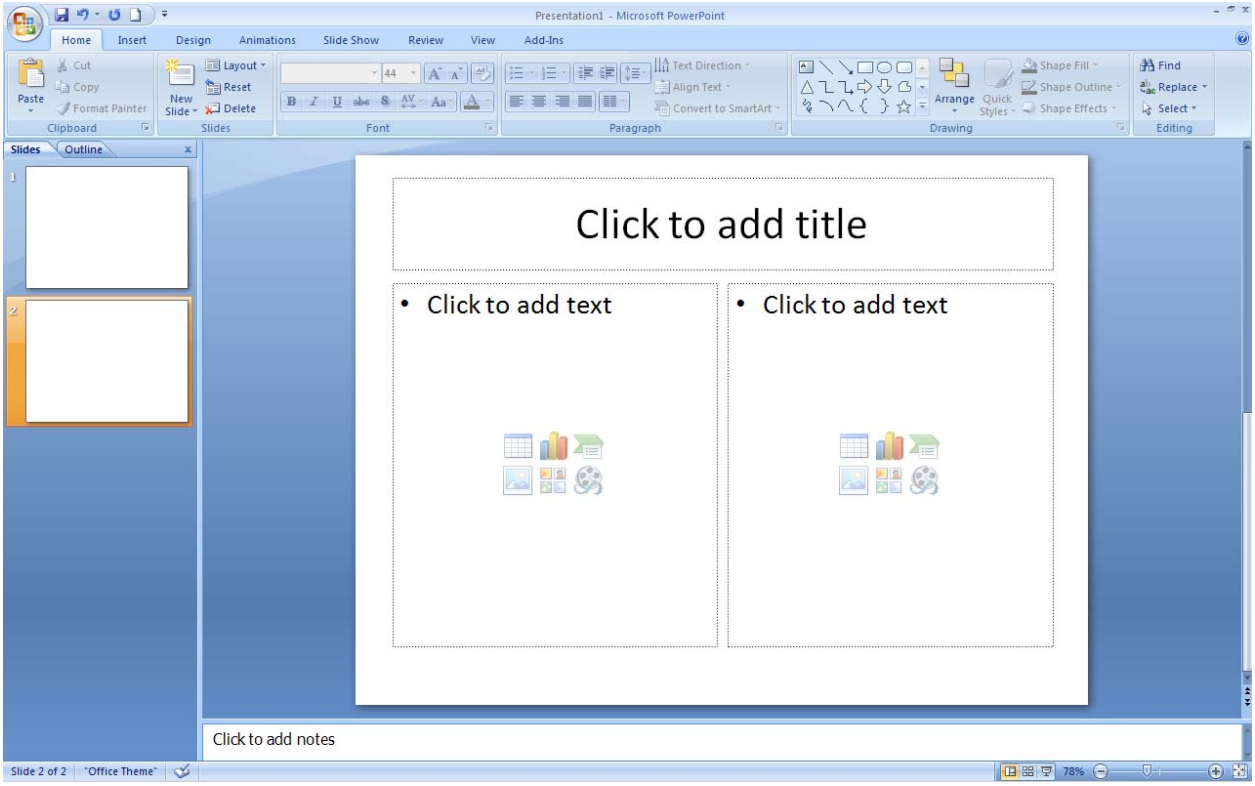


Figure 7.3 : Graphic Layout

The default formatting of the text is bulleted list. Use the different levels of text within the bulleted list to write major and minor points.

Select the various commands in the **Font** group on the **Home** Tab menu to change the character formatting such as font size and colour.

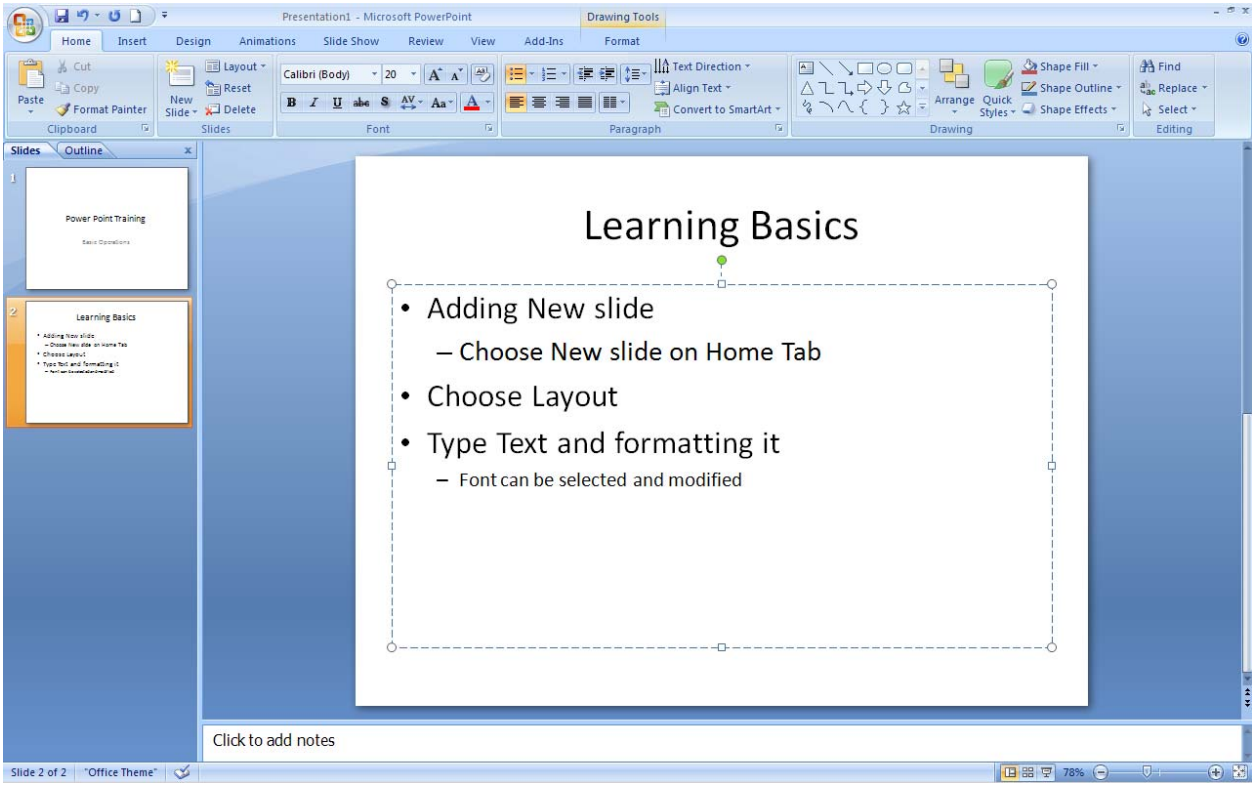


Figure 7.4 : Formatting Text

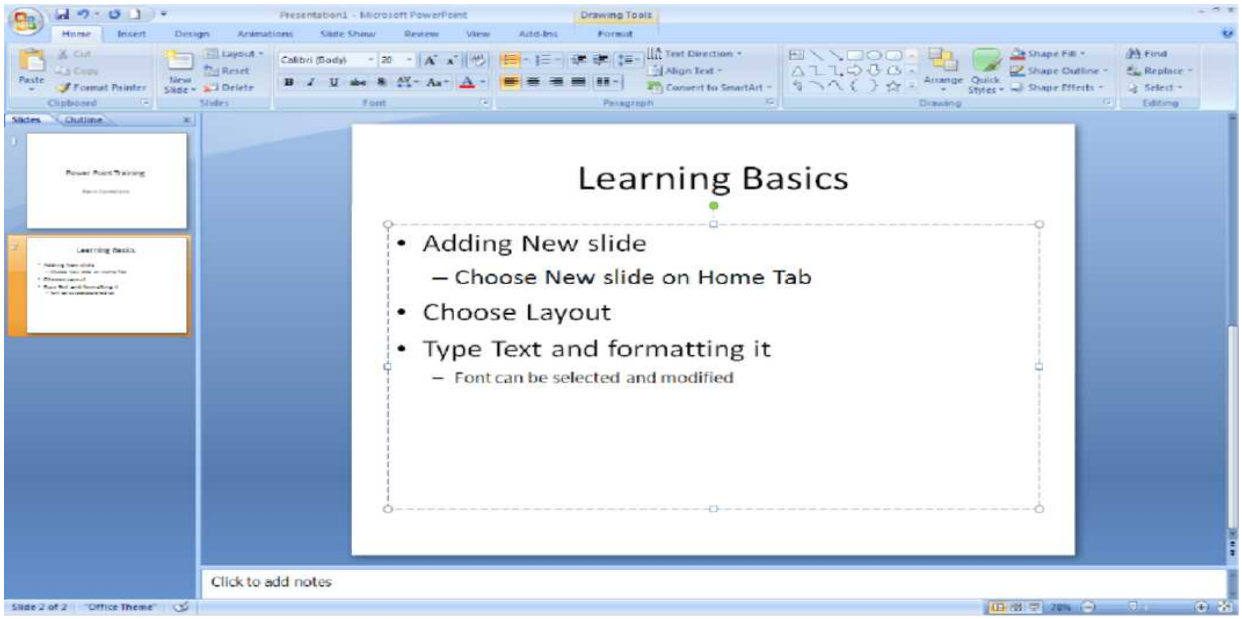


Figure 7.4 : Formatting Text

Notes can be referred to at the time of presentation can be written in the Notes pane at the bottom area of the Normal View. These notes will help to keep the matter in the presentation

slides precise and to the point. These can be printed and used by the presenter at the time of giving the presentation.

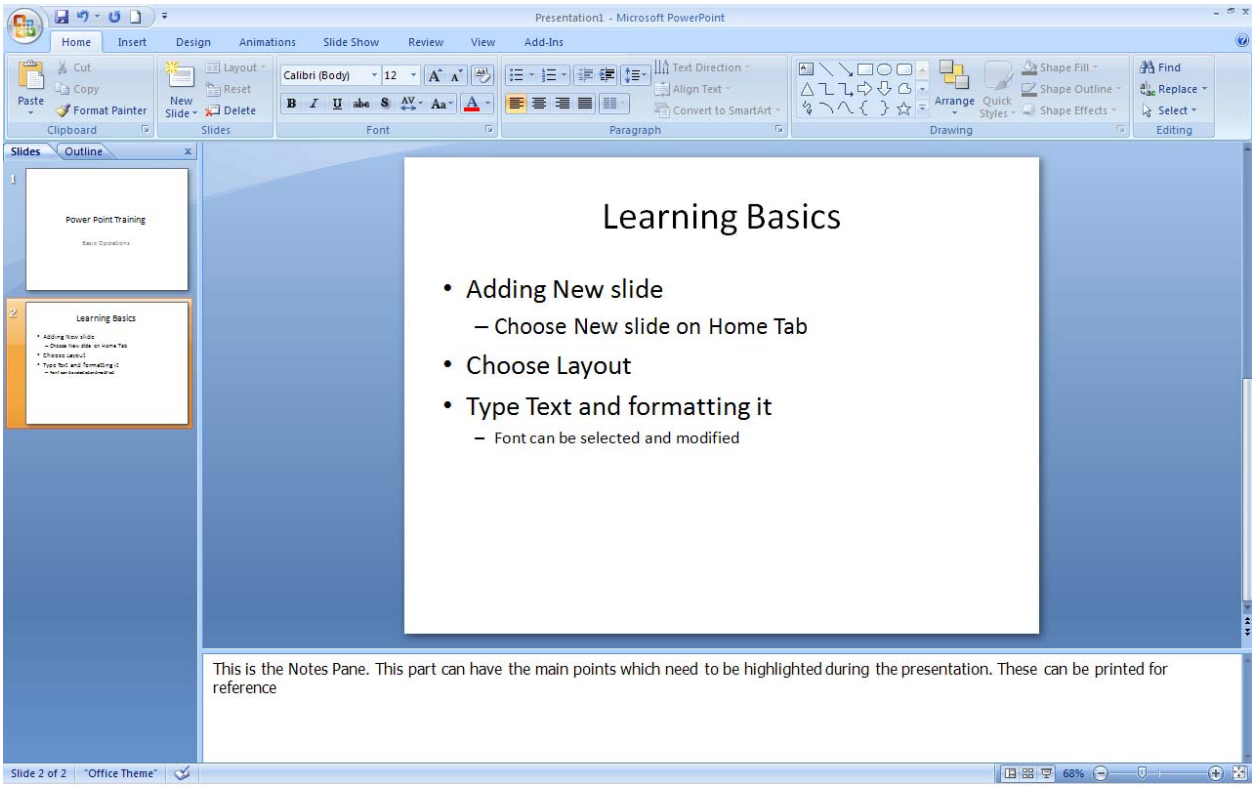


Figure 7.5 : Notes Pane

- Click on the Notes Pane and write notes for the presentation
- To print these notes, select the **Print** Option from the **Microsoft Office** button. Choose the Notes Page option from the **Print What** list.

Opening and Saving a Presentation

One can open a New Presentation or open an existing one using the Microsoft Office menu button.

- Select **New**option to open a new presentation.

- Lists of templates available are displayed as shown in Figure 4.6. Choose any one to open the new presentation in the selected template.

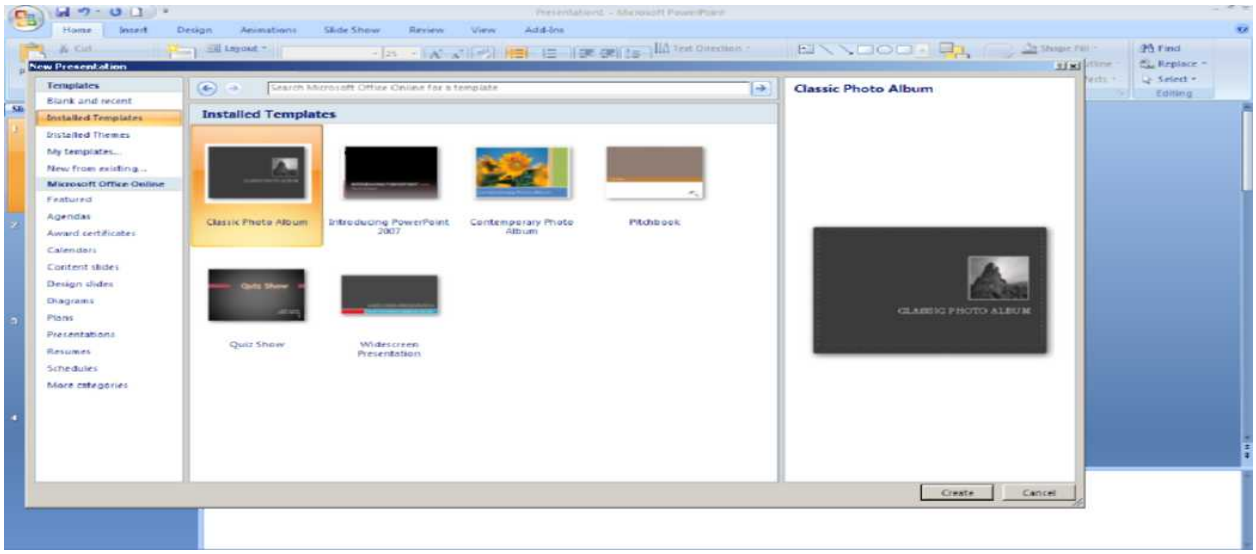


Figure 7.6 : New Presentation

To open an existing presentation choose **Open** option and select the presentation to be opened.

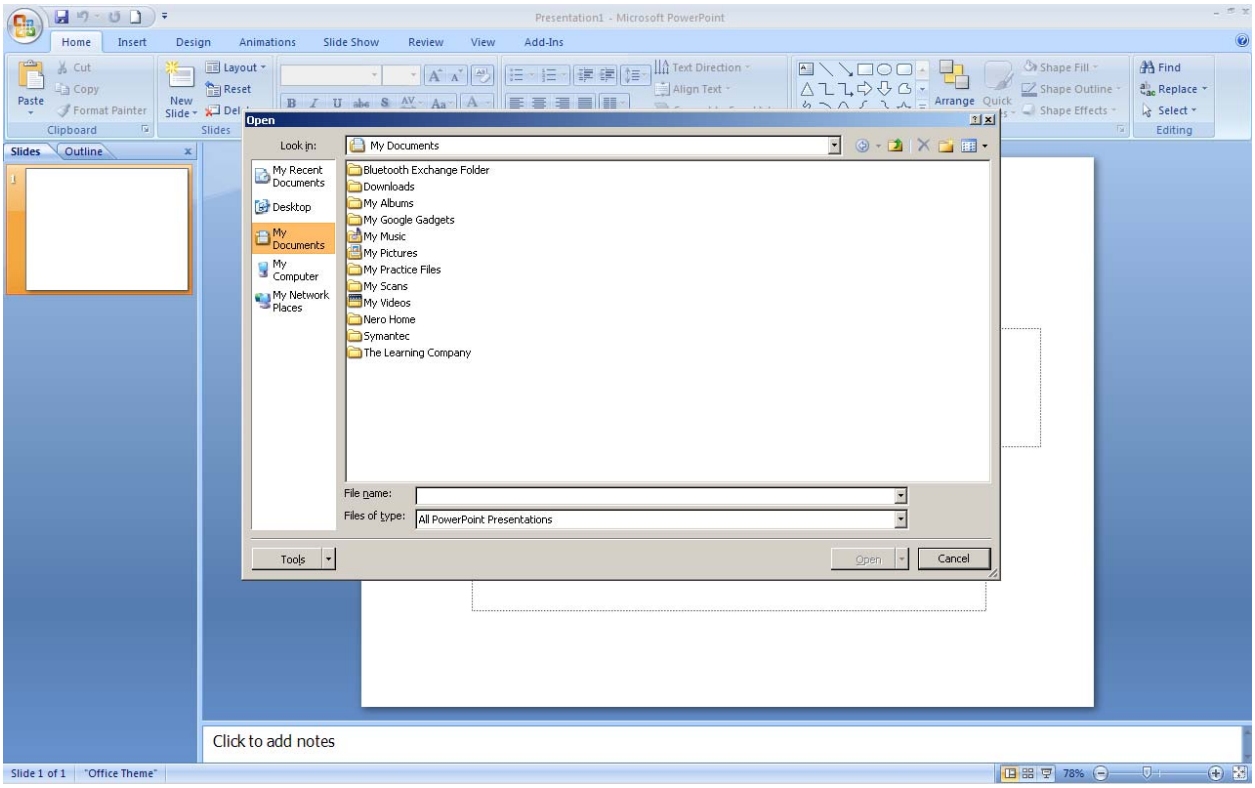


Figure 7.7 (a) : Open an existing Presentation

To save the Presentation, choose **Save**option from the **Microsoft office** button and give the name for the presentation.

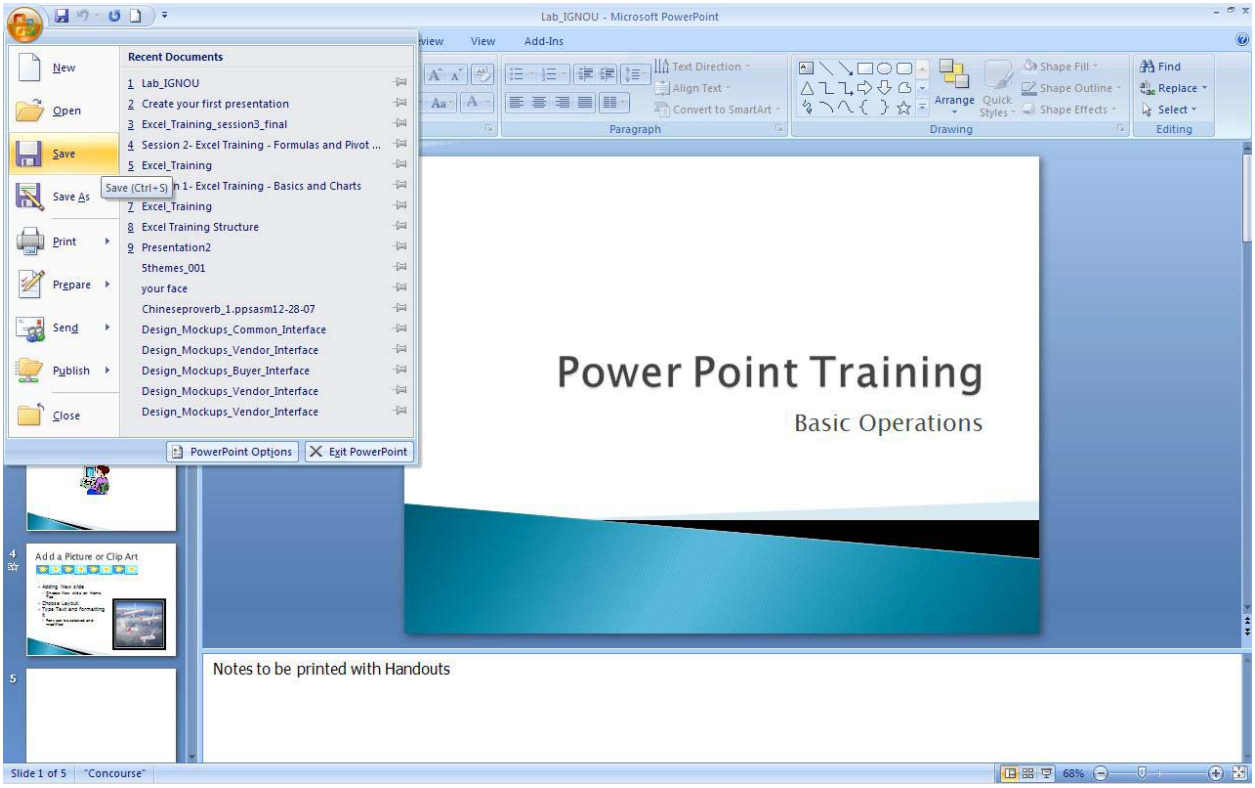


Figure 7.7 (b) : Save a Presentation

7.2 MS Power point Environment :

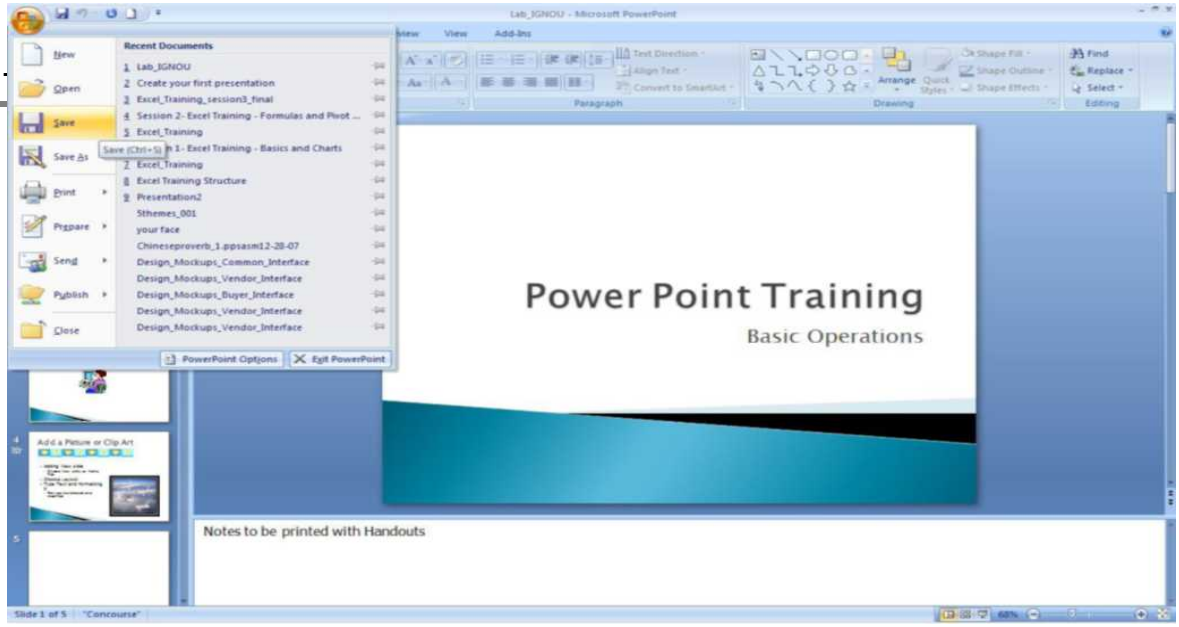


Figure 7.7 (b) : Save a Presentation

Applying a Theme to the Presentation

Every Presentation can be based on a Theme which determines the look and color of the slides and gives the presentation a constant look to all the slides.

A Theme includes the following elements:

- Background design
- Colour scheme
- Font types and sizes
- Placeholder positions

The colour scheme will include the background colours, font colours, fill colours or the shapes, borders and table colours etc. The theme will not affect the layout chosen for the presentation and basic layout will remain the same but will be implemented with the theme.

To choose a Theme for the presentation:

Click the **Design** Tab on the menu.

The Theme samples are shown as thumbnails in the **Themes** group.

When any theme thumbnail is chosen, a preview of the same is shown on the slide

When the theme is selected by clicking on the thumbnail, it is applied to all the slides in the presentation

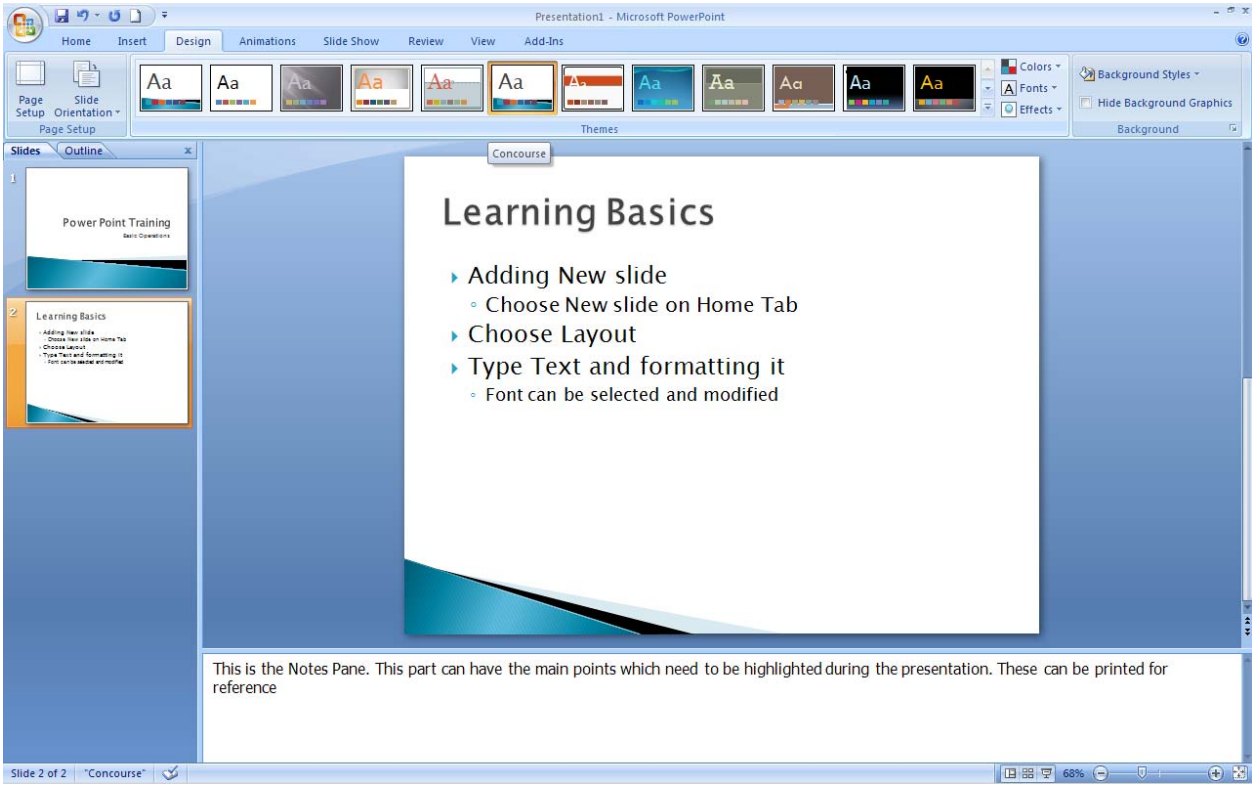
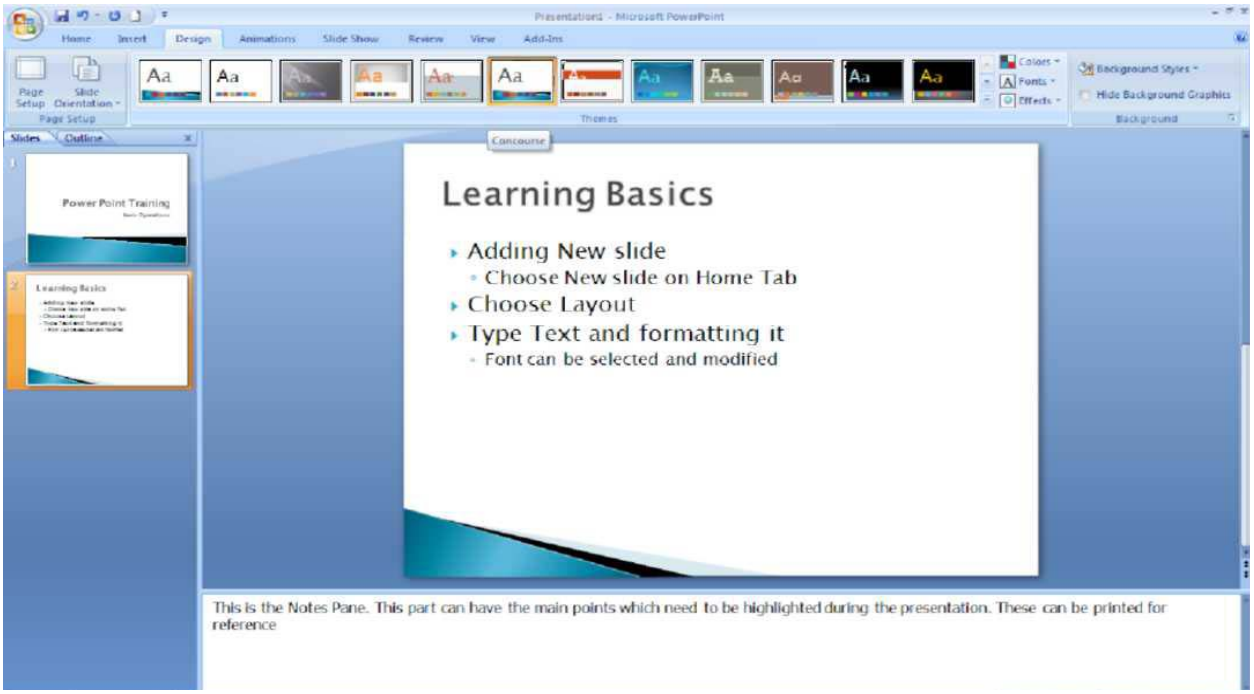


Figure 7.8 : Theme Selection



Every new Presentation is by default opened with the Office Theme. New Theme can be chosen and applied as and when required.

Working with Pictures and Clipart

The Presentation can be given bright and colourful appearance by adding Pictures and Clip Arts. There are two different methods of inserting pictures and non-text items into the slides.

Inserting a Picture

When a new slide is added, different icons appear on the Placeholder. These icons are used to insert the non-text items like pictures, clip arts, animation files etc.
Click on the **Clip Art** icon in the placeholder.
The Clip Art pane will open as shown in Figure 7.9. Search for the kind of clip needed.

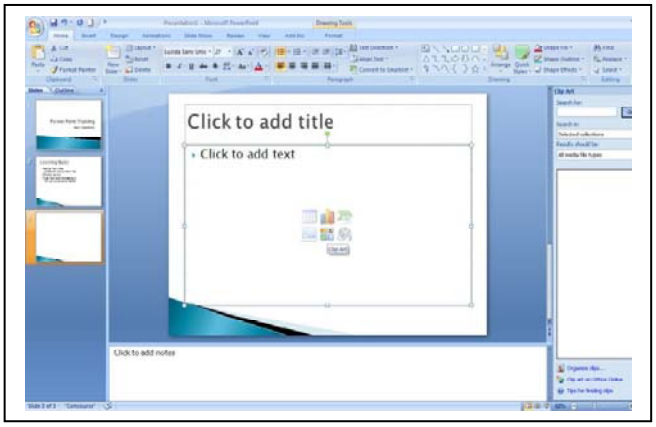


Figure 7.9 : Select Clip art

- Select the Clip that is to be inserted into the slide. The picture will automatically get sized and inserted in the placeholder as shown in Figure 4.10.
- The position and size can be modified as required

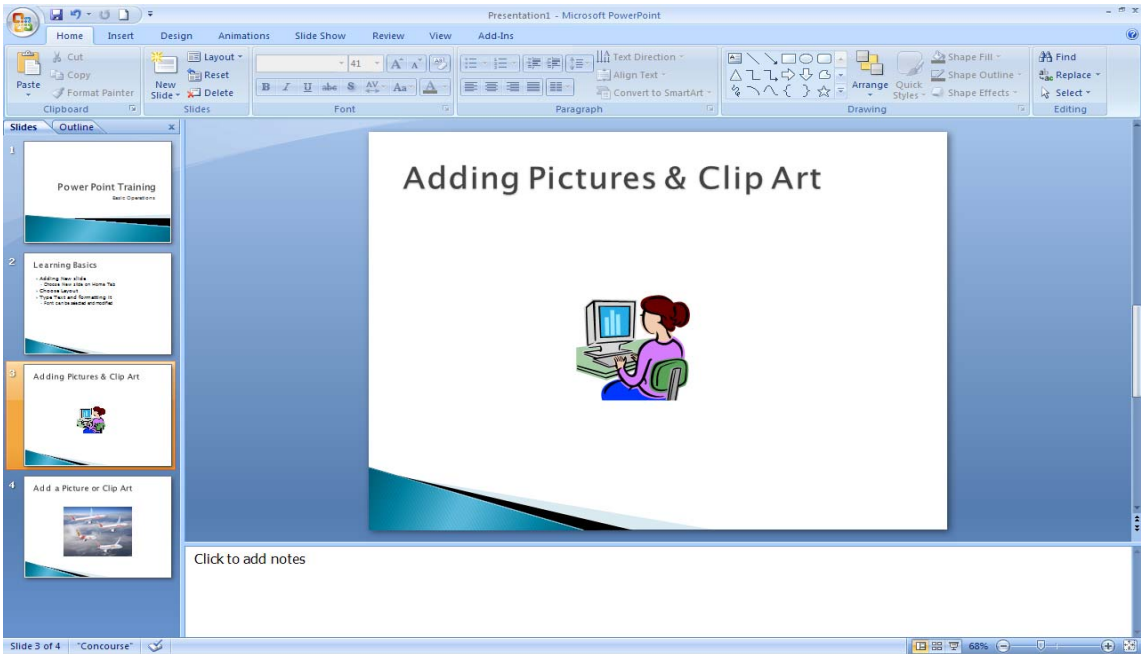


Figure 7.10 : Clip Art added

Another way is to use the Insert tab in the menu. All non-text items like pictures, sound files, animation files, text boxes, hyperlinks etc. can be added from this menu option.

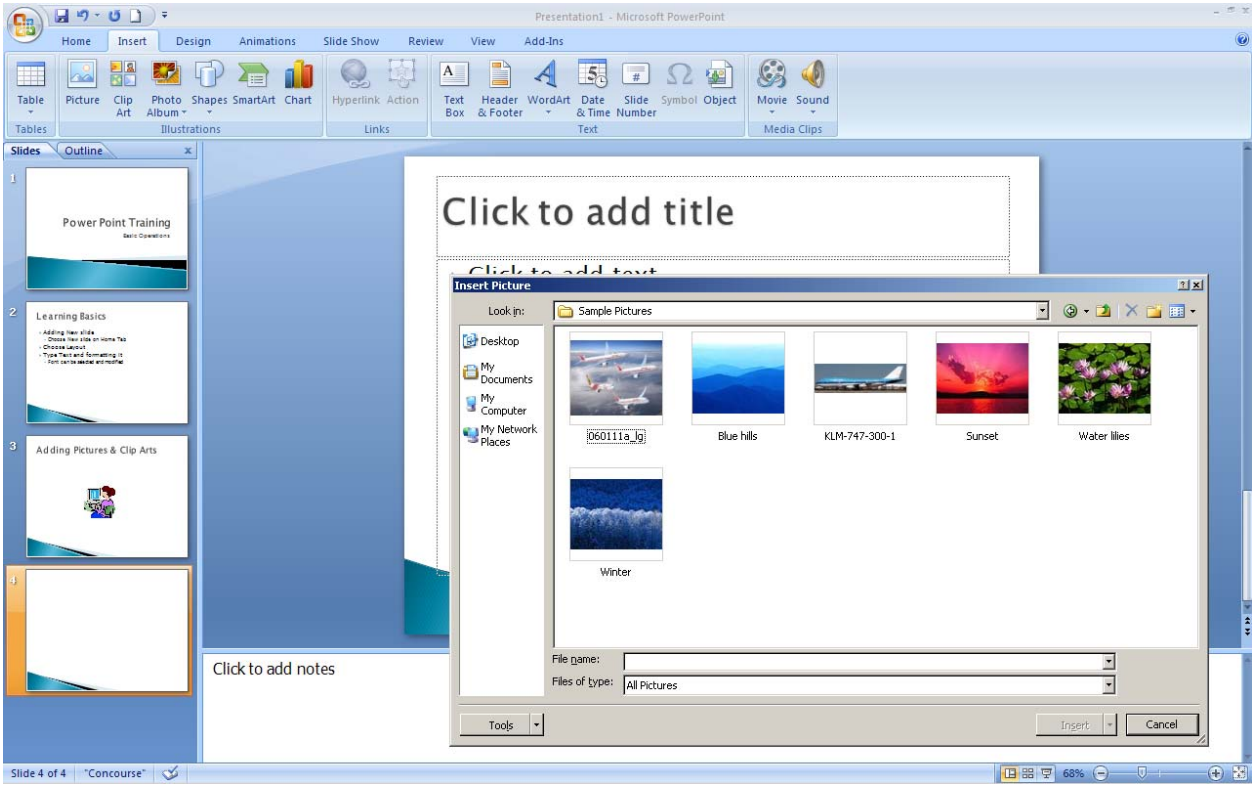


Figure 7.11 : Adding Picture

Once the file is selected, it gets inserted into the slide. The position and size can be modified as required.
Please note that when a picture is added into the presentation it can increase the size of the presentation.

Formatting the Picture

The Picture or Clip Art can be formatted to change the picture brightness, compress the picture, change its contrast, or give new picture styles.

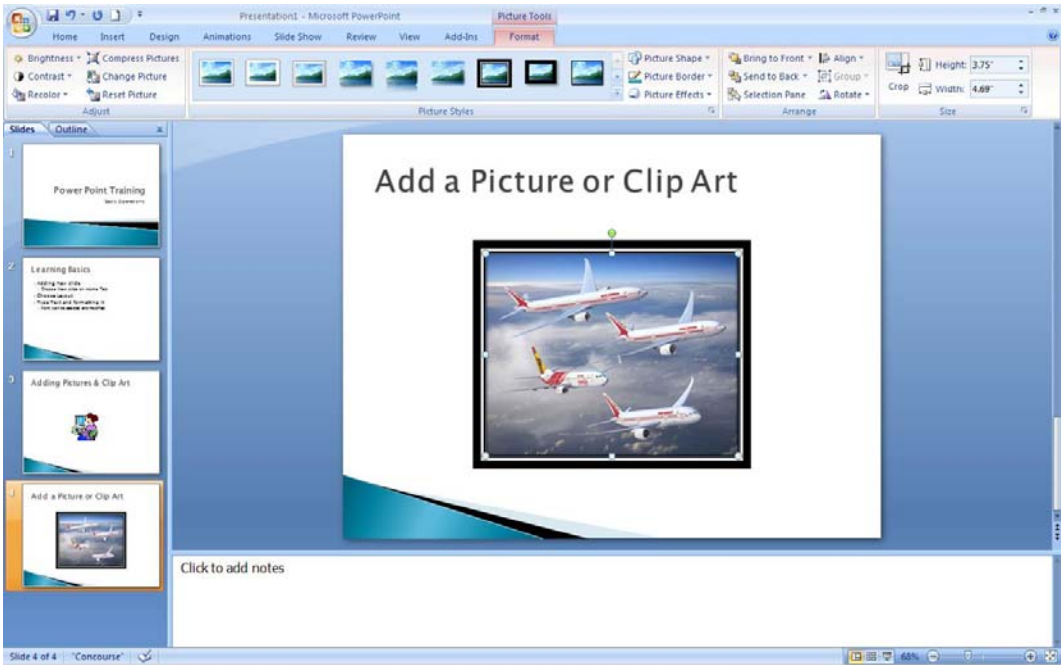


Figure 7.12 : Picture Format

Click on the Picture or Clip Art to be formatted.
The **Picture Tools -> Format menu** appears with various options like Picture Brightness, Contrast, Resize, Border, Styles, and Effects etc.
Any of these can be applied to the selected picture or Clip Art.

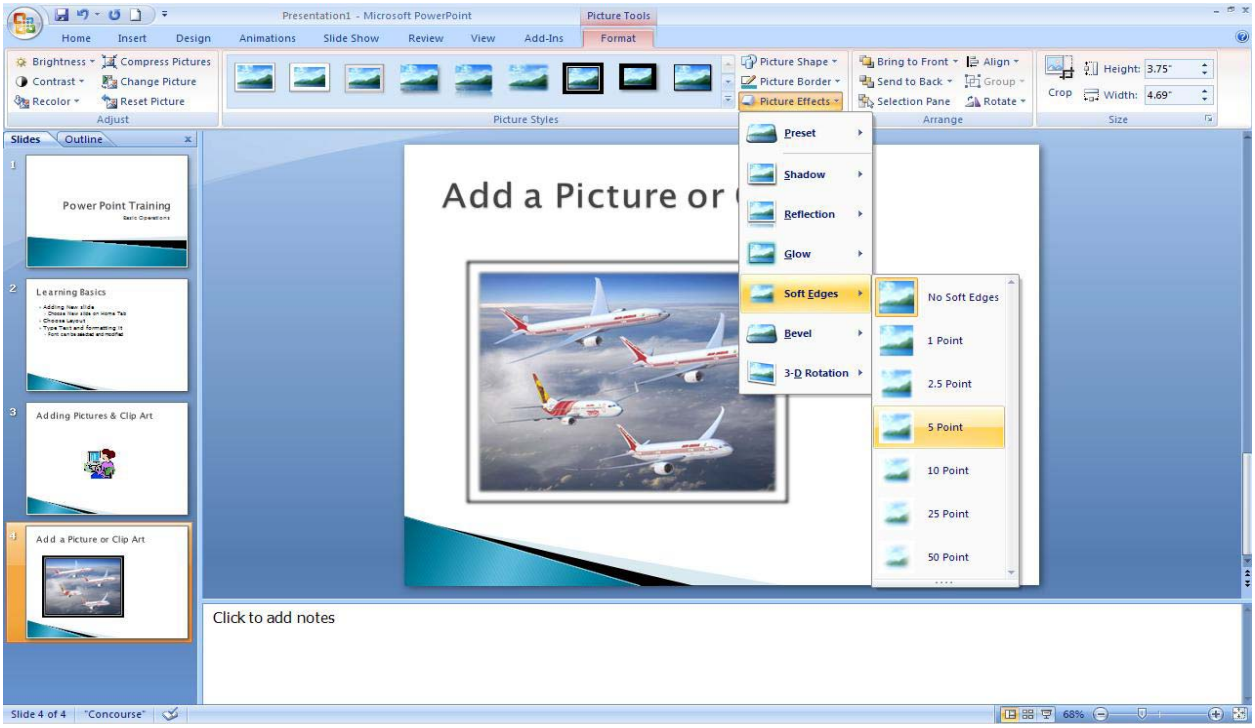


Figure 7.13 : Picture Effects

7.3 Working with power point - working with different views :

Arrange the Pictures & Clip Art

After the Picture or Clip Art has been selected and formatted, all the objects on the slide have to be aligned correctly.

Choose all the place holders that have to be aligned.
Then use the **Arrange** option in the **Format** Tab to Order, Group and position the objects.

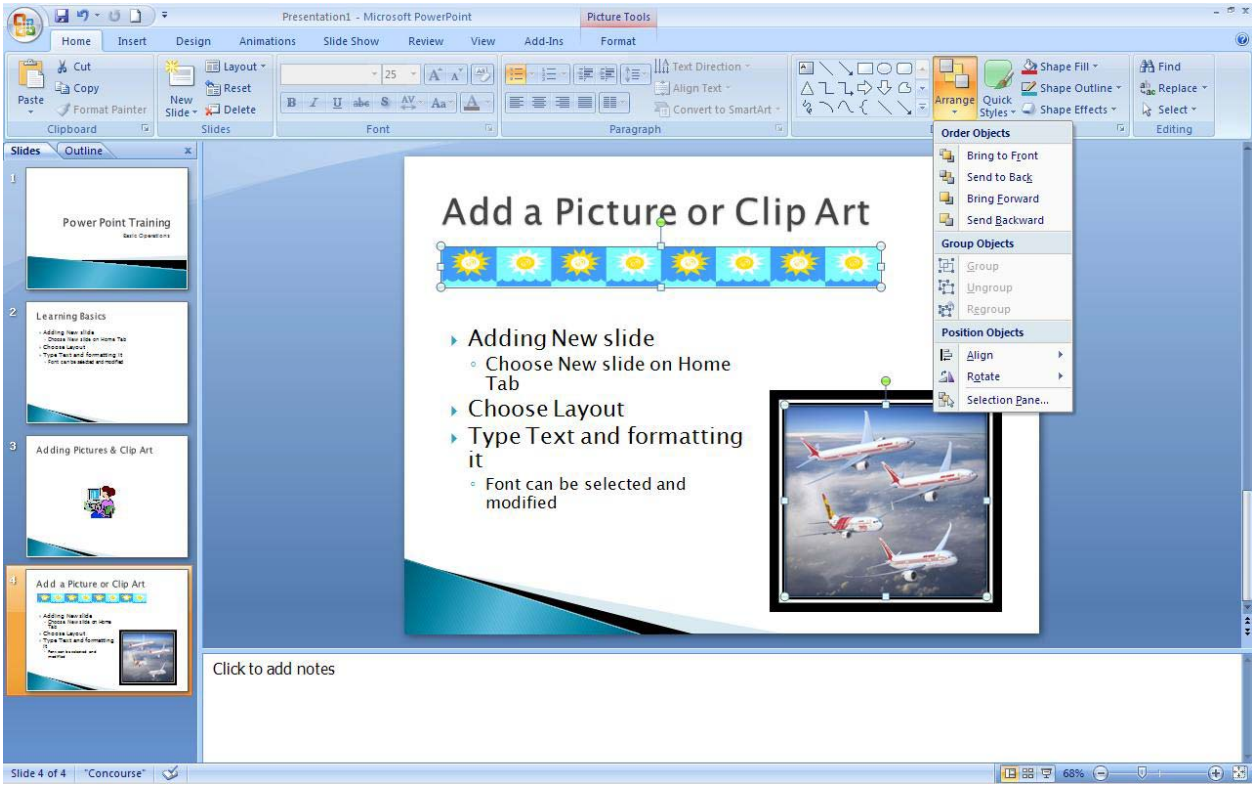


Figure 7.14 : Arrange Objects

Working with Animation and Videos

The Text and objects like charts, graphs, bullets, tables etc can be animated within a presentation. Special sound effects or visual effects including movement can be applied to the objects to control the flow of information or to focus on important points as well as give a better look to the presentation.

There are built-in animation effects within PowerPoint which can be used on the individual slides within the presentation or the layout can be customized. Also, custom animation effects can be created if required.

Apply built-in Animation effect to an object

Both text and objects can be animated in a similar way on a PowerPoint slide

To apply a built-in animation effect:

Select the text or object that has to be animated

On the **Animation** Tab, in the **Animation** group, choose the Animation effect from the Animate list.

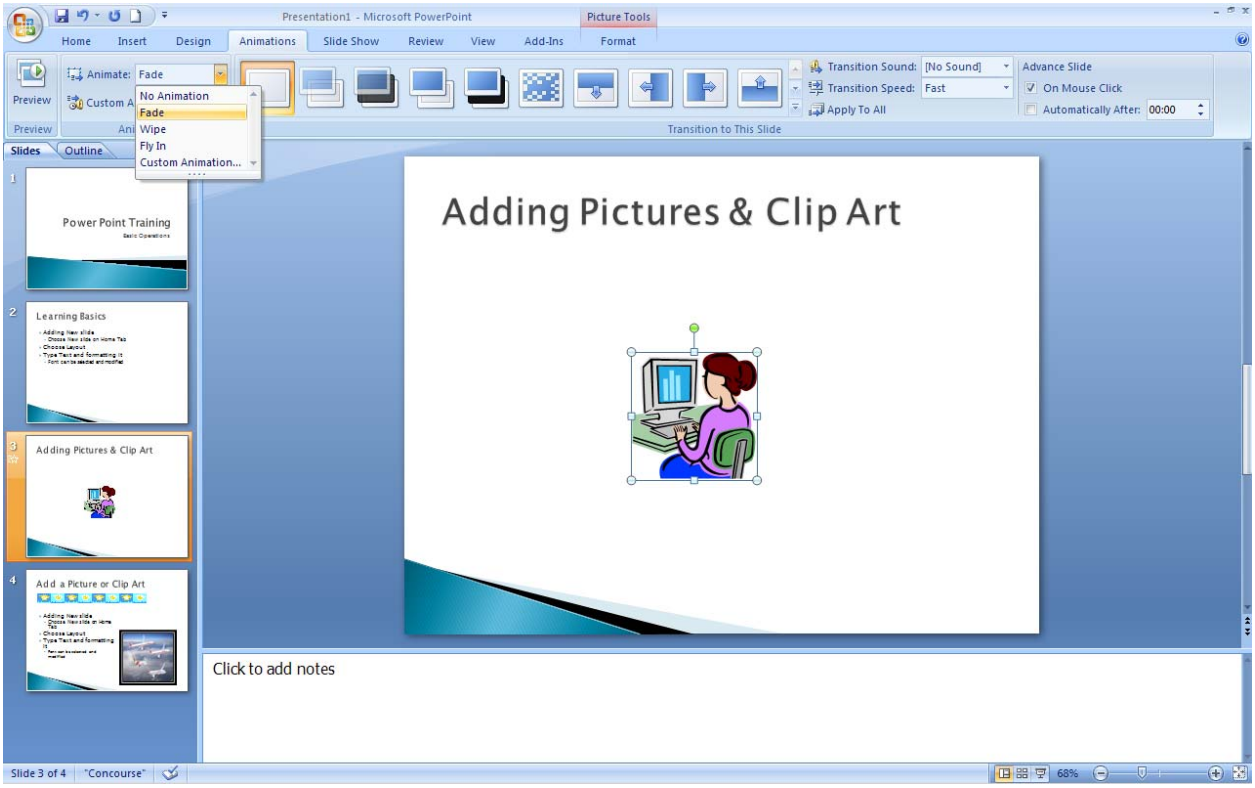


Figure 7.15 : Animate Object

Custom effects can be added by to the objects by choosing the **Custom Animation** option from the Animation Tab.

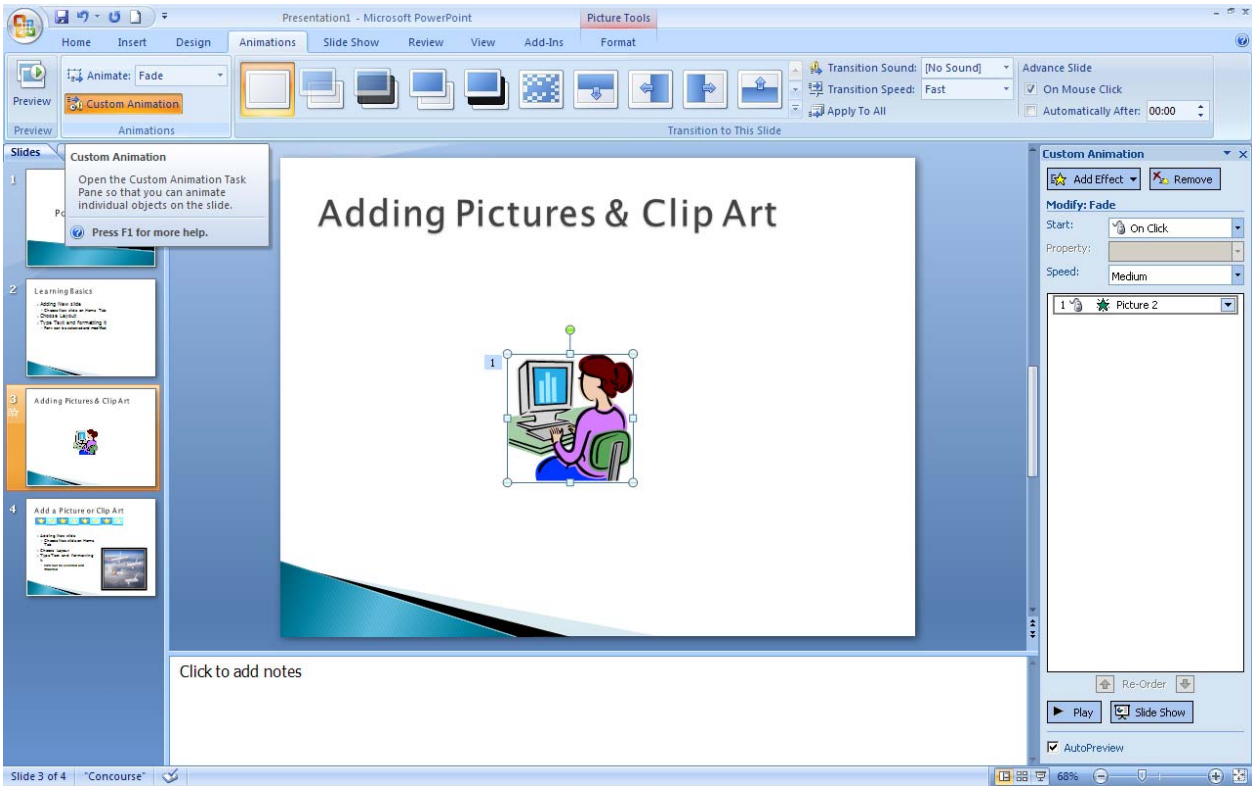


Figure 7.16 : Custom Animation

Adding Slide Transition :

PowerPoint provides various types of slide transitions like Blinds Horizontal, Box in, Box out Blinds Vertical, Checkerboard Across, Checkerboard Down etc.

The same transition can be added to all slides or different transition can be applied to different slides.

Select the Slide from the Slide window to which slide transition has to be applied
On the **Animation** Tab, in the **Transition to this Slide** group, choose any of the transition effect option.
The transition speed between the current slide and the next slide can also be set.
To apply the same effect to all the Slides, Click **Apply to All**option.

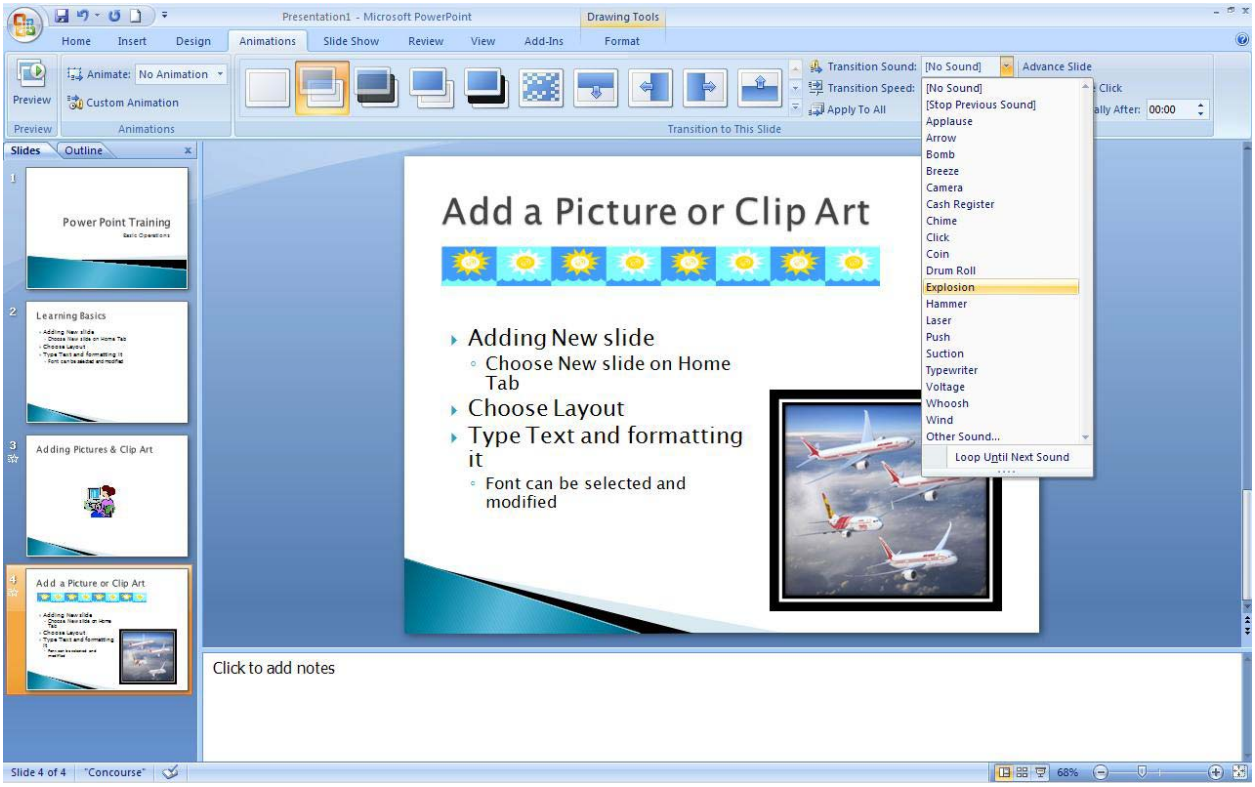


Figure 7.17 : Slide Transition

The sound effect for the Slide transition can also be chosen from the **Transition Sound** List.

Add and Play Movie in a Presentation

Movies are video files with formats such as AVI or MPEG. Animated GIF files which include motion can also be included. Unlike the pictures, clipart drawings etc which are embedded in the presentation, the movie files are linked to the presentation. If the location of the file is modified, the movie file cannot be located.

To add a Movie to the slide:
In **Normal** View, click the slide to which the movie has to be added.
On the **Insert** Tab, in the **Media Clips** group, select the **Movie** option.
Choose the option **Movie from File,** locate the folder that contains the file and then select the file to be inserted.

Choose from the option to play the movie **Automatically** or **When Clicked.** This will allow the movie to be played either automatically when the slide appears or has to be started explicitly by clicking on the movie button.

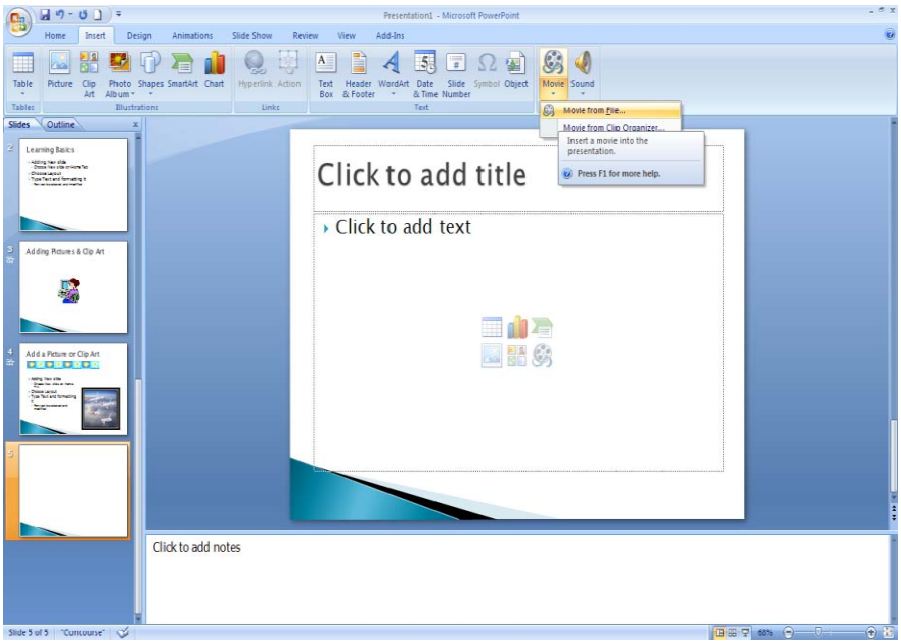


Figure 7.18 : Movie from File

When a movie is inserted, a pause trigger is added called Trigger. This is added because the movie frame has to be clicked within the slide to play the movie. The movie can be played Full Screen also by choosing the **Play Full Screen** option.

7.4 Designing presentations :

LINKING

It is sometimes useful to link one PowerPoint presentation to another. This may be to give the presenter/reader the opportunity to view additional information, if required or if time allows. Another use might be to create a dynamic link through which information can be updated at any time. A third example might be to break up a talk into distinct sections, each with its own layout. This is achieved by linking several presentations, each of which has its own Slide Master. Another very practical reason for linking presentations might be to limit the size of files such that they fit onto external media such as floppy disks, CDs or USB memory sticks. Another example would be where a user maintains a library of small presentations, some of which are then linked together to produce a particular talk. As an alternative to creating a library of presentations, some users like to keep a wide range of slides within a single presentation and then customise particular shows by selecting just the slides required.

Viewing and Printing the Presentation

Once the Presentation is ready, one has to prepare to present it. It can be viewed as slide show on the computer first. Spell check utility can be used to run spelling cheeked. Notes can be viewed in Print Preview mode to see how they would look when printed.

Rearranging and adding or deleting slides

The order of the Sides can be changed at any point of time.

- To rearrange the slides, Choose **View** tab from the menu and select the **Slide Sorter** option.

Here all the slides are shown as thumbnails. Any slide can be selected and moved around to re-arrange the order of the slides.

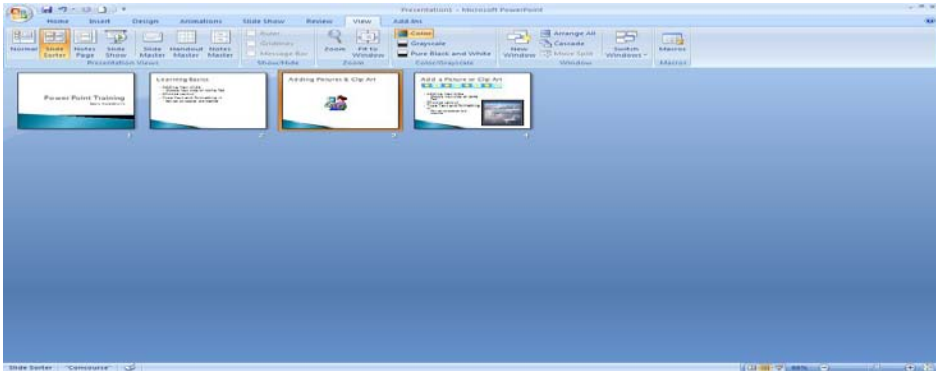


Figure 7.19 : Slide Sorter

In the **Slide Sorter** view mode, any slide may be deleted by choosing the **Delete Slide** option on the Home Menu. And new slide can be added by choosing the **New Side** option on the **Home** tab.

Viewing the Presentation

After the Presentation is prepared, it can be viewed in Slide Show mode which will give an idea as to how the slides will appear during the presentation display.

To open **Slide Show** mode, Click **Slide Show** tab and click **Start Slide Show** to start from first slide or current slide. It can also be started by clicking on **the Slide Show** button on the lower right part of the PowerPoint window. The Slides will start appearing on the computer screen.

Once can navigate through the slides either by using the **Slide show toolbar** at bottom of screen or simply by clicking the mouse button.

To come out of this mode simple press **ESC** key at any point. This will return the view to **Normal** mode.

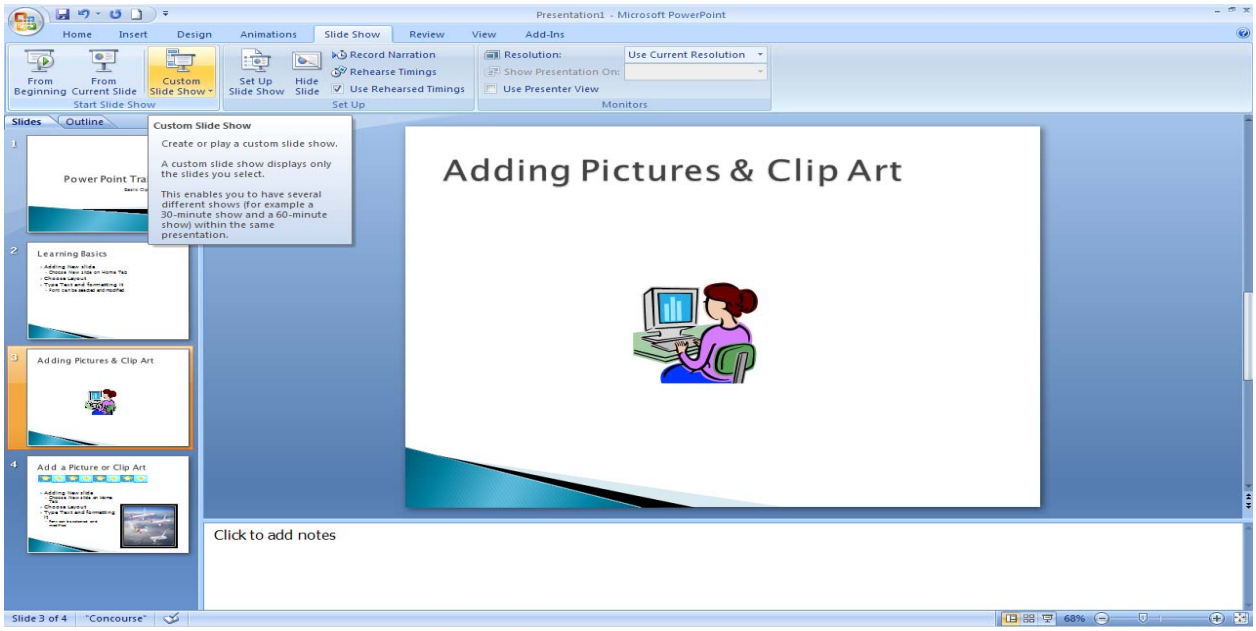


Figure 7.20 : Customizing Slide Show

Once can also set up a Custom Slide show to display only a selected list of slides. This feature helps to create a 30-minute show or a 60-minute show from the same presentation as and when required.

Spell Check, Print Handouts and Notes

To remove any spelling errors, the Spell check option can be used. On the **Review** tab, in **Proofing** group, click **Spelling** and then choose the correct options as the spell checker moves from one slide to another.

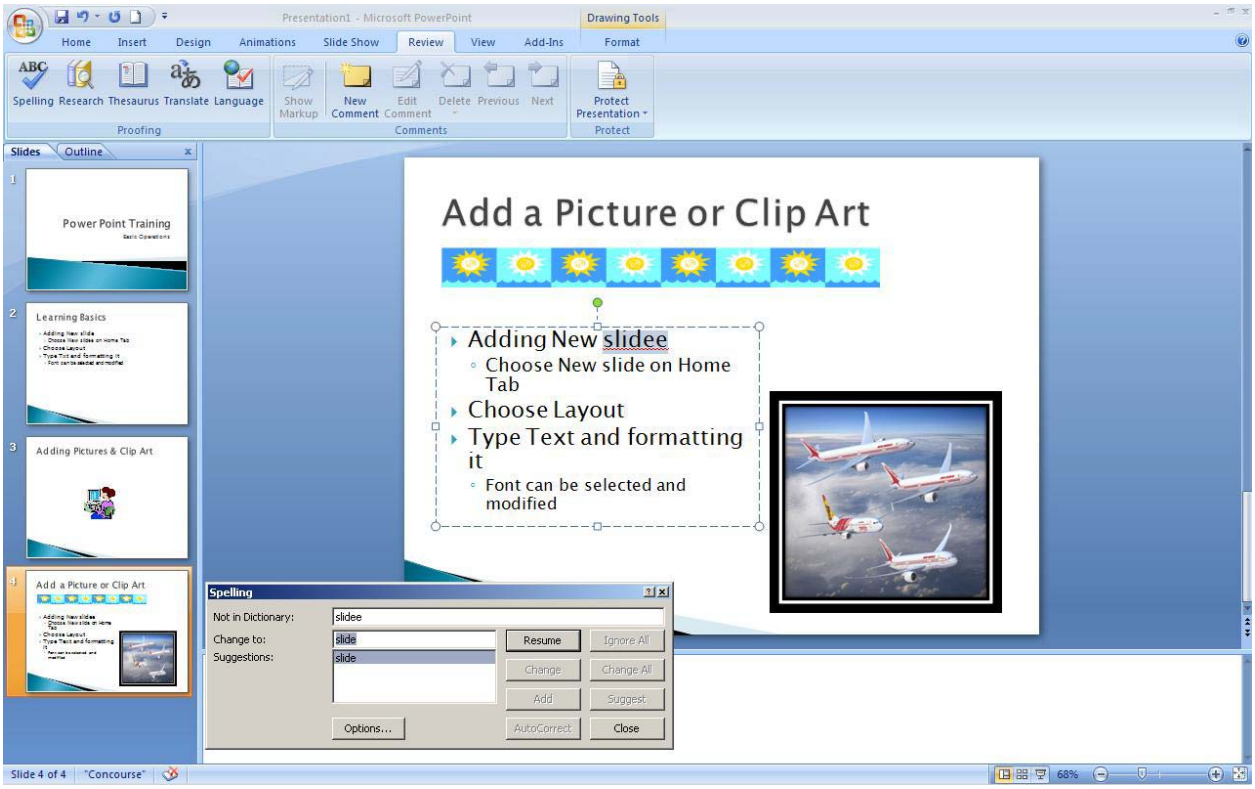


Figure 4.21 : Spell Check

7.5 Printing in power point File :

The Handouts for the audience or the Notes for the speaker can be printed using Print Preview option on the Microsoft Office button.

- Select the **Print Preview** option on the **Microsoft Office** button. Select **Handouts** from the **Print What** list. Choose one of the **Handout** types from the list

As the Handout type is selected, the same is displayed in the preview mode to show it will look when printed in the selected format.

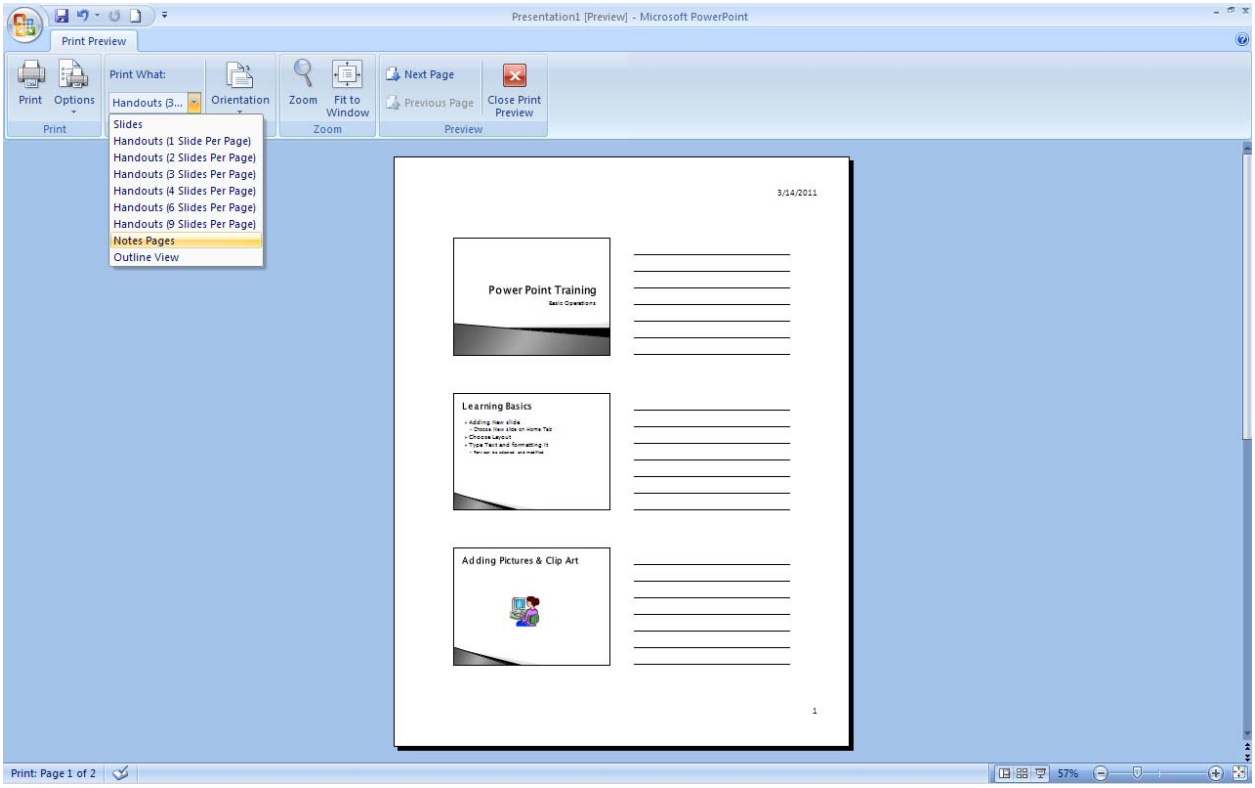


Figure 4.22 : Print Handouts

To Print the Notes for the Speaker, select the Notes Page option from the Print What List as shown in Figure 7.23.

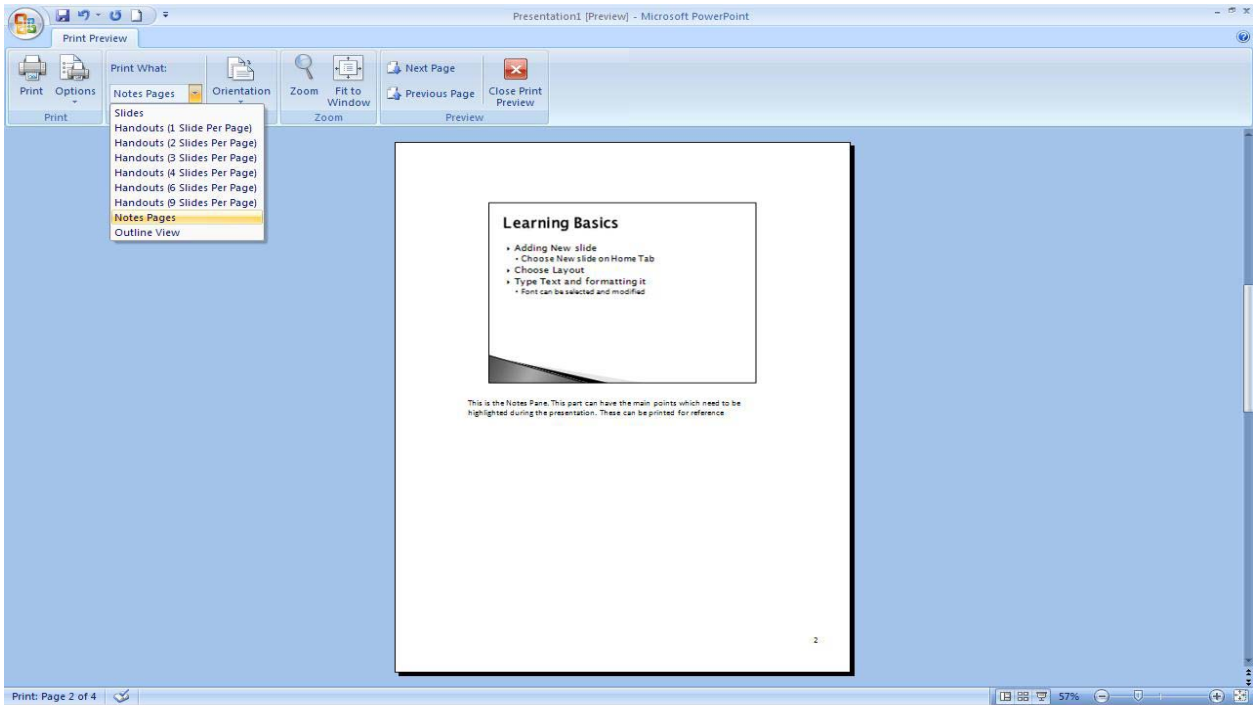


Figure 7.23 : Print Notes

7.6 LAB EXERCISES

1. Take any consumer product of your choice. Make a marketing presentation with at least 10 slides. Use different customized Animation Effects on Pictures and Clip Art on any four of the ten slides?
2. How can a Presentation be reviewed by another person and how are comments added to it?
3. Create a Presentation on "Advantages of Fast Communication in Today's world" with three different Slide Transitions with Sound effect?
4. How can a Power Point presentation be saved as a RTF file?
5. Create a Photo Album in PowerPoint?
6. Suppose you have already created a presentation for photo album and now you want to do the following:

Add slides to this presentation? How will you add slides to this presentation?
After creating the photo album, you realized that one of the slides will look better if it had different layout, how do you change the slide layout? Before printing, you want to preview the slides to check the album. • Print the copies of your photo album.
7. Create a Presentation for sales presentation with following features:
8. All the slides should follow common design i.e. same title style, same footer with confidential clause, page numbers.
9. All slides should have slides notes.
10. Make a short presentation on Cloud Computing technology describing the evolution of the Operating systems? For each of the slide you should have Timer based Transition Write Speaker Notes for each slide. Add a video to at least two slides which can be run in Play Full Screen option.

CHAPTER 8
Data Communication

Syllabus : Computer networking basics - LAN Technology and networking Topology - WAN Technology. Networking Devices.

8.1 Computer networking basics

A computer network is a collection of computers and terminal devices connected together by communication system. The set of computers may include large-scale computers, medium scale computers, mini computers and micro-computers.

Types of Networks :-

Based on the structure, the computer networks are divided into four types as :

(1) Local Area Networks (LAN)
(2) Wide Area Networks (WAN)
(3) Metropolitan Area Networks (MAN)
(4) Storage Area Networks (SAN)

(1) Wide Area Networks (WAN) :-

A WAN covers a large geographical area with various communication facilities such as long distance telephone service, satellite transmission, and under-sea cables. The WAN typically involves best computers and many different types of communication hardware and software. Examples of WAN are interstate banking networks and airline reservation systems. Wide area networks typically operate at lower link speeds (about 1 Mbps).
Following are the salient features of WAN :
(i) Multiple user computers connected together.
(ii) Machines are spread over a wide geographic region.
(iii) Communications channels between the machines are usually furnished by third party (a Telephone company, a public data network).
(iv) Channels are of relatively of low capacity.
(v) Channels are relatively error-prone (error rate of 1 in 10^5 bits transmitted).

(2) Local Area Networks (LAN) :-

LAN covers limited area. A typical LAN connects as many as hundred or so computers that are located in a relatively small area, such as a building or several adjacent buildings. Organizations have been attracted to LAN because they enable multiple users to share software, data, and devices. Unlike WAN which use point – to - point links between systems, LANs use a shared physical media which is routed in the whole campus to connect various systems. LANs use high speed media (1 Mbps to 30 Mbps or more) and are mostly privately owned and operated.

Following are some salient features of LAN :

(i) Multiple user computers connected together
(ii) Computers are spread over a small geographic region
(iii) Communication Channels between the machines are usually privately owned. Channels are relatively high capacity.
(iv) Channels are relatively error free (bit error rate of 1 in 10^6 bits transmitted)

The critical reasons that LAN has emerged as popular are :
1. Security
2. Expanded PC usage through inexpensive workstations
3. Distributed processing
4. Electronic Mail and Message Broadcasting
5. Organizational benefits like cost, maintenance etc.
6. Data management benefits

(3) Metropolitan Area Networks (MAN) :

A MAN is somewhere between LAN and WAN. The term MAN is sometimes used to refer networks which connect systems or local area networks within a metropolitan area. MANs are based on fiber optical transmission technology and provide high speed (10 Mbps or so) between sites.

A MAN can support both data and voice, cable television networks are examples of MANs that distribute television signals. A MAN just has one or two cables and does not contain any switching elements like WAN.

(4) A Storage Area Network (SAN) : SAN is a dedicated, centrally managed, secure information infrastructure, which enables any-to-any interconnection of servers and storage systems. A SAN :
(a) Facilitates universal access and sharing of resources.
(b) Supports unpredictable, explorative information technology growth.
(c) Provides affordable 24 hours x 365 days availability.
(d) Simplifies and centralizes resource management.
(e) Improves information protection and disaster tolerance.
(f) Enhances security and data integrity of new computing architectures.

8.2 Networking Topology :

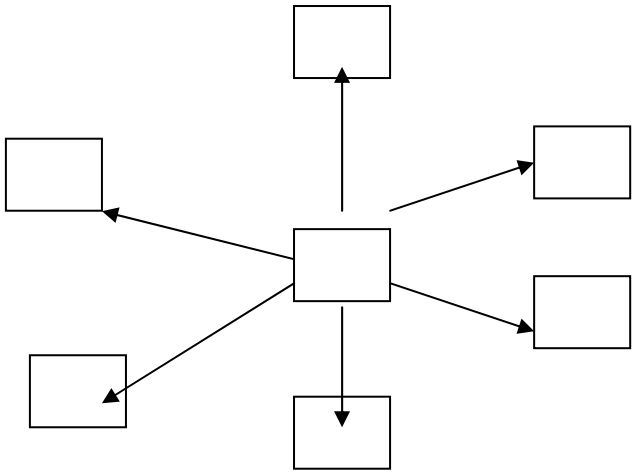
The geometrical arrangement of computer resources and communication facilities is known as network structure. There are four basic network structures :

1. Star network
2. Bus network
3. Ring network
4. Mesh network

1. Star Network :-

In this system, numbers of terminal computers are connected to a central computer as shown below. In this system, if it is desired to transmit information from one computer to another, it can be done only by sending the details through central computer.

A star network is particularly appropriate for organizations that require a centralized processing facility. For example, a star network may be used in banking for centralized record keeping in an on-line branch office environment.



Advantages :

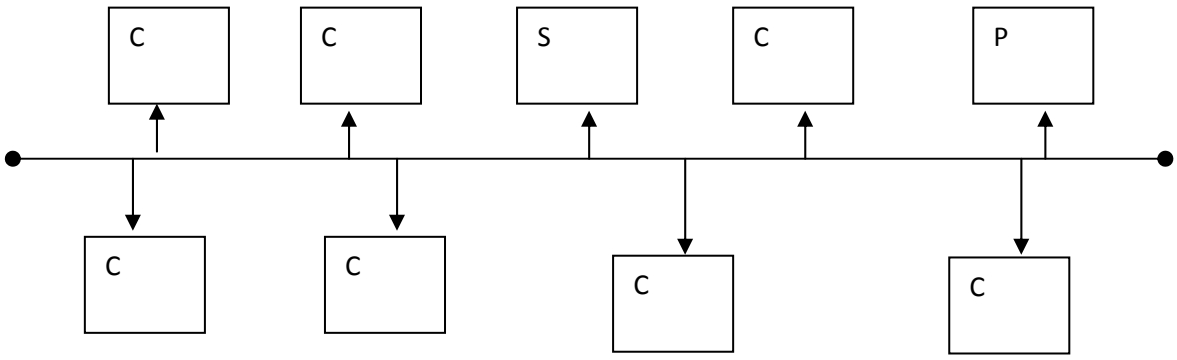
(a) It is easy to add new and remove computers from central computers.
(b) A single branch computer failure does not bring down the entire network.
(c) It is easier to diagnose network problems through a central hub.

Disadvantages :

(a) If the central computer fails, the whole network ceases to function.
(b) The cable cost is more in case of star network compared to any other networks.

2. Bus Network :-

This structure is very popular for local area networks. In this structure, a single network cable runs in the building or campus and all computers are linked along with this communication line with two endpoints called the bus or backbone. Two ends of the cable are terminated with terminators.

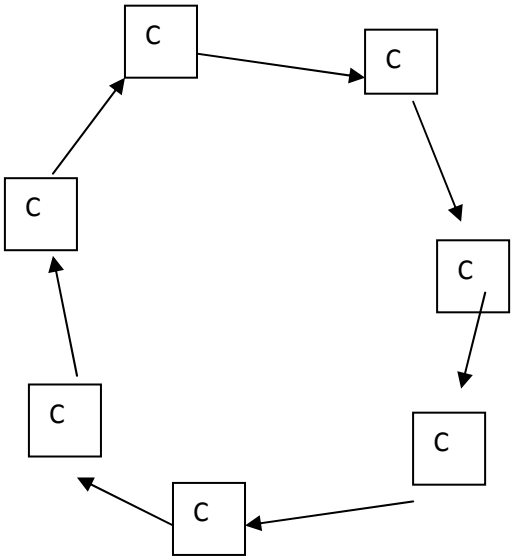


Advantages :
1. Reliable in very small networks as easy to use and understand.
2. Cabling requirement is least compared to all other type of network structures.
3. Easy to extend. Two cables can be easily joined with a connector, making a longer cable for more computers to join the network.

Disadvantages :
1. Heavy network traffic can slow a bus considerably.
2. Each connection between two cables weakens the electrical signal.
3. The bus configuration is difficult to trouble shoot.

3. Ring Network :-

This is another structure for Local Area Network. In this structure, the network cable passes from one computer to another until all computers are connected in the form of a loop or ring. There is a direct point-to -point link between two neighbouring computers. These links are unidirectional which ensures that transmission by a computer traverses the whole ring and comes back to that particular computer.



Advantages :
1. Ring networks offer high performance for a small number of workstations or for larger networks where each station has a similar workload.
2. Ring networks can span longer distances than other types of networks.
3. Ring networks are easily extendable.

Disadvantages :
1. Relatively expensive and difficult to install.
2. Failure of one computer in the network can affect the whole network.
3. It is difficult to trouble shoot a ring network.
4. Adding or removing computers can disrupt the network.

4. Mesh Network :-

In this structure, the computers are randomly connected using communication links.

8.4 Networking Devices.

(1) Modems :

Modem means *mo*dulator *dem*odulator and is a device which converts a computer's digital signal (i.e. modulates it) into an analogue signal for transmission over an existing telephone line. It also does the reverse process, in that it converts analogue signals from a telephone line into digital signals (demodulates) to enable the computer to process the data. Modems are used to allow computers to connect to networks (e.g the internet) over long distances using existing telephone networks.

Dial-up modems operate at transmission speeds of about 60 kilobits per second, which is quite slow by today's standards. However, modern broadband or **asymmetric digital subscriber line (ADSL)** modems operate at 11,000 kilobits per second (or higher). The term 'asymmetric' means that the modem is faster at **downloading** (getting) data than it is **uploading** (sending) data.
Although the ADSL modems still use the existing telephone network, unlike dial-up modems they do not tie up the line while accessing the internet, so the land-line telephone can still be used at the same time. Furthermore, they can always be 'on' so internet access can be available 24 hours a day. ADSL modems can allow telephone conversations and internet traffic to occur at the same time because of the wide bandwidth signal used: the higher frequencies are used to carry the internet signals, so they do not interfere with normal telephone traffic. Cable modems also exist which allow cable television providers to offer internet access as well as receiving television signals.

(2) Network hubs :
Network hubs are hardware devices that can have a number of devices/computers connected to them. Its main task is to take any data received via one of the ports and then send out this data from all of the ports. Each computer/device will receive the data, whether it is relevant or not.
(3) Switches :
Switches are similar to hubs but are more efficient in the way they distribute data. A hub learns which devices are connected to which ports. Each device has a **media access control (MAC) address** which identifies it uniquely. **Data packets** sent to the switch will have a mac address giving the source and receiving device. If a device X is always sending the switch data via port 4 then it learns that X must be connected to that port; any data packet which is intended for X only is then sent through port 4 and not through any of the others. This means that the network traffic only goes to where it is needed and so a switch is more efficient than a hub, especially when the network is very busy.
(4) Bridges :
Bridges are devices that connect one LAN to another LAN that uses the same **protocol** (the rules that determine the format and transmission of data). They decide whether a message from a user is going to another user on the same LAN or to a user on a different LAN. The bridge examines each message and passes on those known to be on the same LAN and forwards messages meant for a user on a different LAN.
In networks that use bridges, workstation addresses are not specific to their location and therefore messages are actually sent out to every workstation on the network. However, only the target workstation accepts this message. Networks using bridges are interconnected LANs since sending out every message to every workstation would flood a large network with unnecessary traffic.
(5) Routers :
Since large companies often have more than one network there are occasions when the computers in one network want to communicate with the computers in one of the other

networks. Routers are often used to connect the LANs together and also connect them to the internet.

Routers inspect the data packages sent to it from any computer on any of the networks connected to it. Since every computer on the same network has the same first part of an **internet protocol (IP) address**, the router is able to send the data package to the appropriate switch and it will then be delivered using the mac destination address in the data packet. If this mac address doesn't match any device on the network it passes on to another switch on the same network until the device is found.

(6) HTTP proxy servers

This is a special type of server that acts as a buffer between a WAN (usually the internet) and a LAN. The server passes on the service requests to the internet and then passes back the requested pages. It therefore retrieves web pages and passes them on to the computer that made the request. Any page retrieved from the internet is stored on the server, which means that when a different computer requests the same page it is available immediately thus considerably speeding up the browsing process.

8. 5 : Assignments :

1. What are the different types of networks based on structure ? Explain each.
2. Explain the functions of any four Networking Devices ?
3. Write a note on Networking Topology ?
4. Write a note on LAN & WAN with examples?

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CHAPTER 9

Information System Management

Syllabus : *Information System Management - Information Concepts - , its nature and functions, planning issues and the MIS organizing issues and the MIS - control issues and the MIS - Decision Support Systems - electronic Commerce - types - advantages and disadvantages - Electronic data interchange - How EDI works - EDI benefits and limitations.*

9.1 Information Concepts :

What is Data ?

Data is a series of non-random symbols, numbers, values or words, a series of facts obtained by observation or research, a collection of non-random facts, the record of an event or fact.

Examples of Data :

Today's date, Measurements taken on a production line, Records of business transactions.

What is Information ?

Data that has been processed so that they are meaningful. Data that has been processed for a purpose. Data that has been interpreted and understood by the recipient.

Examples of Information

A bank statement, A sales forecast, A telephone directory.

Information involves transforming data using a defined process, Involves placing data in some form of meaningful context, Is produced in response to an information need and hence serves a specific purpose, Helps to reduce uncertainty, thereby improving decision behaviour.

Data Transformation Process involves Classification, Rearranging / sorting, Aggregating, Performing calculations, Selection.

Value of Information :

1. Tangible Value

Can be measured directly, usually in monetary terms.

Tangible value = Benefit of Information – Cost of gathering it.

2. Intangible Value

Difficult to measure or impossible to quantify.

Intangible Value = Improvement of decision behaviour – Cost of gathering it.

Qualities of Information :

1. Time dimension
2. Content dimension
3. Form dimension
4. Additional characteristics

Attributes of Information Quality :

Time	Content	Form	Additional Characteristics
Timeliness	Accuracy	Clarity	Confidence in source
Currency	Relevance	Detail	Reliability
Frequency	Completeness	Order	Appropriate

9.2 Types of Information :

Information collected in Business/Organizational environment fall into four general categories : personal information, operational information, administrative information, and departmental information.

1. Personal Information

Personal information in IT language addresses all items created by the professional for and by the individual. It includes electronic mail (e-mail), voice mail (v-mail),faxing, paging, chatting, browsing (surfing), video conferencing, and telephoning (voice). Personal information can be created by using office automation products(word processing, spreadsheets, business graphics, and other applications). The distinction of personal computer or in a private area on the network called a home drive. Some of this information is not business-related (pictures of family and friends, a humorous video clip, music files, etc.). When such personal information accumulates it becomes a resource problem for IT backup and storage. This issue has led to strict policies regarding the creation and storage of personal information.

2. Operational Information

Operational information refers to information reflecting the business function of an organization. Operational information is used for day-to-day business management. Program registration information is important to the business function of a recreation center. Work order systems are important to park maintenance. The software applications related to these IT functions are referred to as vertical markets, which means that they are specially written for a specific discipline. Sports scheduling software and membership software fall in to the vertical market category.

3. Administrative Information

Administrative information refers to applications that are needed in all sections within an organization. Human resources, payroll, and accounting applications are IT services that are used in all areas of business. Even an organization that does not administer one of these applications may be involved with the workflow through the use of time cards, purchase orders, and check requests. Administrative systems are usually closely watched to make sure the systems are correctly used and to ensure data integrity. Administrative systems contain information that users want on a periodic basis.

4. Departmental Information

Departmental information is any information (personal, administrative, or operational) that is used for organization business such as marketing and assessment tools for surveys, user statistics, etc., to which everyone needs access.

The distinctions among these information types are important. All users create a certain amount of personal information. This information may not be on the organization network, thus it may not be supported. Departmental information must be stored on the organization network, so that it can be supported and accessed by other staff members. Users not attached to the network must identify procedures for supporting departmental information. (See section on disaster recovery, below.)

Many users handle departmental information like personal information. It is stored in an area not routinely supported, and it is not accessible to others. Typically, the standards for creating this information are developed by the user. As such, it is not easily merged, sorted, or integrated with other departmental information. Many staff members perceive their databases to be the official records of the organization; however, they lack accuracy and precision because information was never verified and standards for data entry were lacking.

Each information resource has a cost associated with managing it. As the number of information resources increases, so does the complexity of the organization. The value of information to the organization increases, as more people who need it can access it. One goal for an organization seeking peak efficiency is to design an information system that allows all staff to have access to any information resource necessary to get their jobs done, while protecting information that is confidential or only should be available to certain groups. The costs of such a system increase with the complexity of the organization. Complexity becomes greater if the organization:

• increases staff (staff additions);
• increases the number of organization services offered (new services);
• increases the number of staff locations (new facilities);
• restricts staff access (additional security administration);
• hires computer-illiterate staff (no training expectations); and
• lacks a technology plan and engages in unrestricted buying and implementation.

Information is the result of collection, manipulation, and analysis. Information has a cost, a value, and a shelf life. There is no value to information unless someone needs it. The value of information increases if the user can have access to it in any form desired with an immediate turnaround, *and* if it is current. This can only be accomplished with a good business plan overlaid with a good IT plan. The ultimate goal is to connect all business units together with a common interface and to enforce a management expectation that each unit keeps its information up-to-date. The information must be correct, accessible, and timely.

9.3 Information System

What is a System ?

It is a collection of interrelated components that works together towards a collective goal.
Its function is to receive inputs and transform them into outputs.

System Components

1. Input 2. Process 3. Output 4. Feedback 5. Control mechanism.

What is Information System ?

An organized combination of People, Hardware, Software, Communication networks, and Data resources, that collects, transforms and disseminates information in an organization.

FUNCTIONS OF INFORMATION SYSTEM :

The information systems function represents :

1. It is a major functional area of a business as like accounting, finance, operations management, marketing, marketing, and HRM.
2. It is an important contributor to operational efficiency, employee productivity and morale, and customer service and satisfaction.
3. It is a major source of information and support needed to promote effective decision making by managers.
4. It is an important ingredient in developing competitive products and services that give an organization a strategic advantage in the global marketplace.
5. It is a major part of the resources of an enterprise and its cost of doing business, thus posing a major resource management challenge.
6. A vital, dynamic, and challenging career opportunity for millions of men and women.

9.4 Nature and functions of Management Information System :

Evolution of MIS :-

Earliest use of Information System was recorded during third millennium BC in a Sumerian Temple. They used clay tablets for recording receipts and issues of grains to the individual workers. The industrial revolution and growth in business industry along with development of accounting systems, organization size, and development of computing technology have ensured the fast growth of information systems during the last few centuries.

As business grows (from sole trading firms to global corporations), it is found impossible to a manager to visit all his organizations facilities, plants and warehouses. It was the information system that kept informed of this organization activities. A full fledged information system requires in an organization to collect data at source measured with precision, process it immediately and keep its entire file updated to feed the managers, with most current, highly accurate information.

Data is used in the form of raw material and must be subjected to manipulation or processing to produce useful information. An information system produces information using data. If information system produces information, which is useful for managers in planning, organizing, directing and controlling of the organization, then such system is called "Management Information System".

The information provided by MIS supports the manager to take structured (or programmed) decisions which are those that are based on predictable patterns of activity.

Definition of MIS :

MIS can be defined as a system that

(a) provides information to support managerial functions like planning, organizing, directing, controlling.
(b) collects information in a systematic and a routine manner which is in accordance with a well defined set of rules.
(c) includes files, hardware, software and operations research models of processing, storing, retrieving and transmitting information to the users.

Objectives of MIS :

(a) Facilitate the decisions-making process by furnishing information in the proper time frame. This helps the decision-maker to select the best course of action.
(b) Provide requisite information at each level of management to carry out their functions.
(c) Help in highlighting the critical factors to the closely monitored for successful functioning of the organization.
(d) Support decision-making in both structured and unstructured problem environments.

(e) Provide a system of people, computers, procedures, interactive query facilities, documents for collecting, storing, retrieving and transmitting information to the users.

Components of MIS :

As predicted by McLeod, in 1986, a typical MIS is based on four major components. They are :

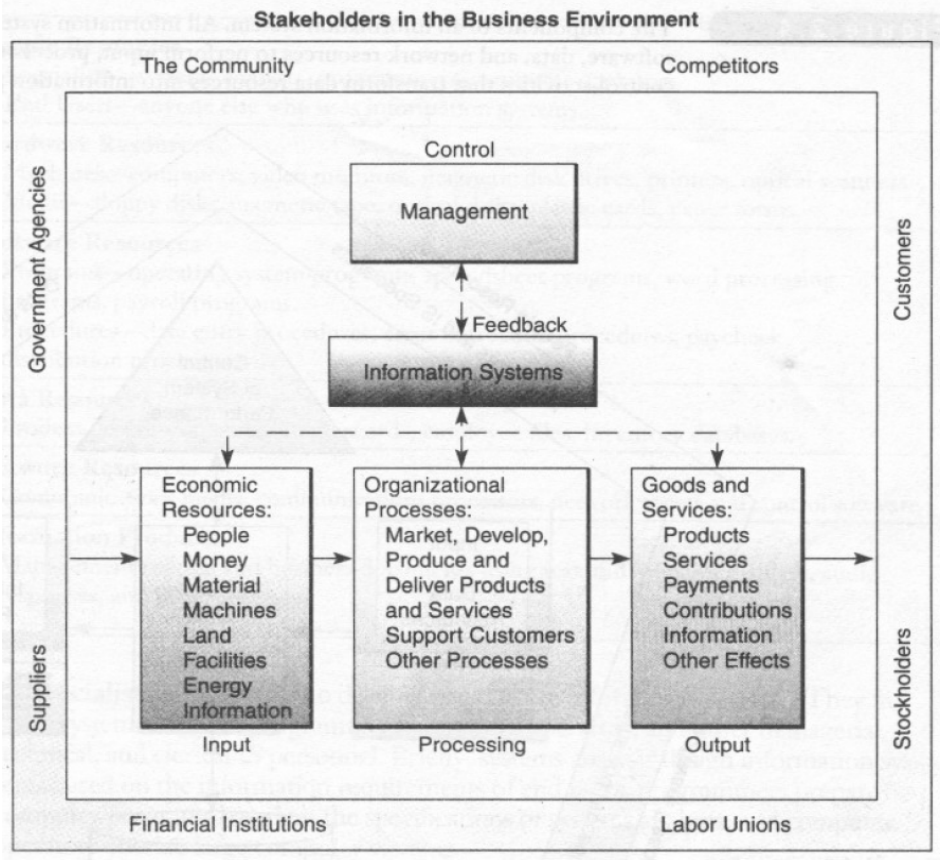
(a) **Data gathering** – data required to the operations of the organization have to be gathered from both internal and external sources.
(b) **Data entry** – stored in databases.
(c) **Data transformation** – in to useful information by means of computer programs and judgments made by technical staff and other system users.
(d) **Information utilization** – applied to decision making process related to organizations operation.

Functions of MIS :

(a) **Collect data** – Internal data can be collected from company records or reports, marketing data, financial data, production data, personnel data and information compiled by manager themselves. External sources include trade publications, customers and consultants, government data, technology data, social change data, Economic data etc..
(b) **Store and process data** – using computers.
(c) **Present information to Managers** – for their use.

Resources of MIS :

People, hardware, software, data, and networks are the five basic resources of information systems.



1. People resources include end users and IS specialists, hardware resources consist of machines and media, software resources include both programs and procedures, data resources can include data and knowledge bases, and network resources include communications media and networks.
2. Data resources are transformed by information processing activities into a variety of information products for end users.
3. Information processing consists of input, processing, output, storage, and control activities.

People Resources Specialists—systems analysts, programmers, computer operators. End Users—anyone else who uses information systems.
Hardware Resources Machines—computers, video monitors, magnetic disk drives, printers, optical scanners. Media—floppy disks, magnetic tape, optical disks, plastic cards, paper forms.
Software Resources Programs—operating system programs, spreadsheet programs, word processing programs, payroll programs. Procedures—data entry procedures, error correction procedures, paycheck distribution procedures.
Data Resources Product descriptions, customer records, employee files, inventory databases.
Network Resources Communications media, communications processors, network access and control software.
Information Products Management reports and business documents using text and graphics displays, audio responses, and paper forms.

9.5. Characteristics of Management Information Systems :

(a) Management oriented :

* The system is designed from the top to work downwards. It does not mean that the system is designed to provide information directly to the top management.
* Other levels of management are also provided with relevant information.

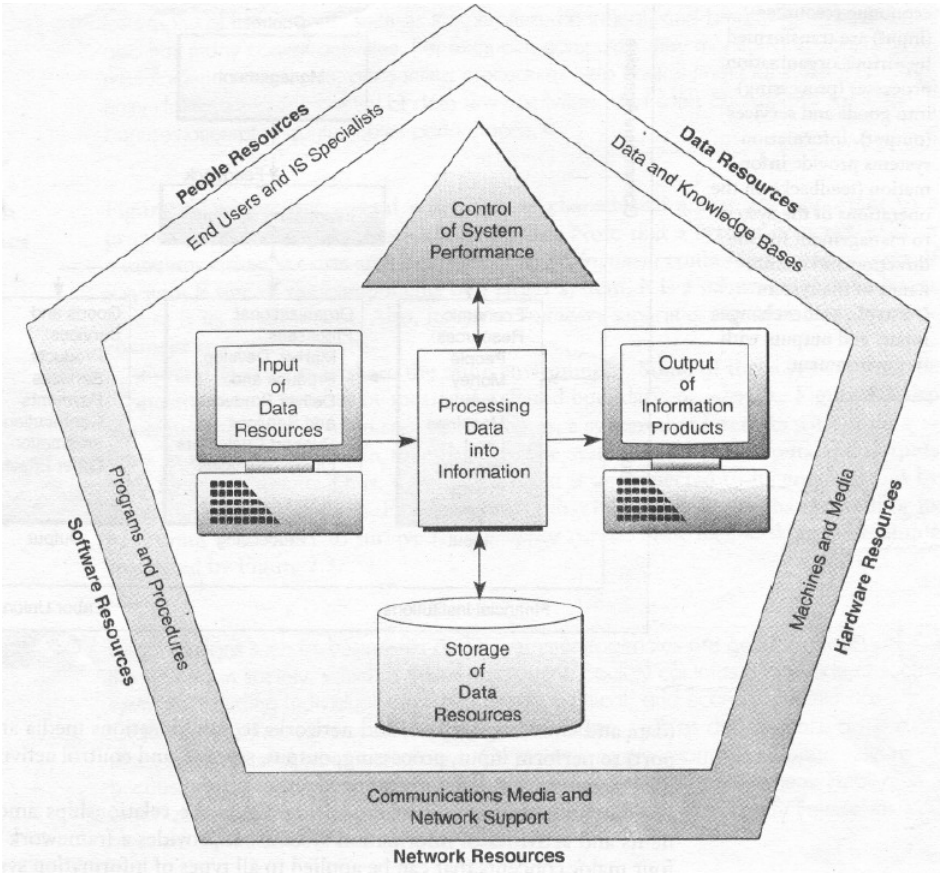
(b) Management directed :

* Because of management orientation of MIS, it is necessary that management should actively direct the system development efforts.
* In order to ensure the effectiveness of system designed, management should continuously make reviews.

For example, in the marketing information system, the management must determine what sales information is necessary to improve its control over marketing operations.

(c) Integrated :

The word 'integration' means that the system has to cover all the functional areas of an organization.



It has to consider various sub systems, their objectives, information needs, and recognize the interdependence, that these sub-systems have amongst themselves, so that common areas of information are identified and processed without repetition and overlapping.

For example, in the development of an effective production scheduling system, a proper balance amongst the following factors is desired :

(i) set up costs
(ii) manpower
(iii) over time
(iv) production capacity
(v) inventory level
(vi) money available
(vii) Customer service.

(d) **Common data flows** :

Because of the integration concept of MIS, common data flow concept avoids repetition and overlapping in data collection and storage, combining similar functions, and simplifying operations wherever possible.

For example, in the marketing operations, orders received for goods become the basis of billing of goods ordered, setting up of the accounts receivable, initiating production activity, sales analysis and forecasting, etc.

(e) **Heavy planning element** :

A management information system cannot be established overnight. It takes almost 2 to 4 years to establish it successfully in an organization. Hence, long-term planning is required for MIS development in order to fulfill the future needs and objectives of the organization. The designer of an information system should therefore ensure that it will not become obsolete before it actually gets into operation.

An example of such a feature of MIS may be seen in a transportation system where a highway is designed not to handle today's traffic requirements but to handle the traffic requirements five to ten years.

(f) **Flexibility and ease of use** :

* While building an MIS system all types of possible means which may occur in future are added to make it flexible.
* A feature that often goes with flexibility is the ease of use.
* The MIS should be able to incorporate all those features that make it readily accessible to a wide range of users with easy usability.

9.6. MIS organizing issues :

(a) Information needs at different levels of Management :

Role of MIS : (Information needs at different levels of Management) :

The role of MIS in an organization can be compared to the role of the heart.

MIS = Heart
Data = Impure blood
Information = Pure blood

* The system is expected to fulfill the information needs of an individual, group of individuals, managers etc.

MIS satisfies diverse needs through a variety of systems such as :

query systems,
analysis systems,
modeling systems,
decision support systems etc.

Bottom Level :

* MIS helps operational management by providing operational data for planning, scheduling, controlling and also helps them further in decision making at the operational level to correct an out of control situation.
* Operational information pertains to the day-to-day activities of the organization and helps to assure that specific tasks are performed efficiently and effectively.
* It include the production of routine and necessary information, such as financial accounting, payrolls, personal rosters, equipment inventories, and logistics.
* Operation level require information for the purpose of conversion of inputs into outputs. Also it supplies routine and other information to tactical tier in summarized form.

Middle Level :

* MIS helps middle level management in short term planning, target setting and controlling the business functions.
* The tactical decisions are directed towards developing divisional plans, structuring workflow, establishing distribution channels, acquisition of resources such as men, materials and money.
* The tactical information helps managers to see that the resources are being used efficiently and effectively to meet the strategic objectives of the organization.

Such information include productivity measurement (output per man-hour or per machine-hour), budgetary control, or variance analysis reports, cash flow forecasts, manning levels and profit results within a particular department of the organization, labour turn-over statistics within a department, short-term purchasing requirements etc.

A large proportion of this information will be generated within the organization using feedback between different departments. Tactical information is usually prepared regularly –

perhaps weekly, or monthly and is used for decision making referred to as management control.

Top Level :

MIS helps top management in goal setting, strategic planning and also evolving the business plans in addition to their implementation.

Strategic planning depends heavily upon information external to the organization.

When this is combined with internal data, management can make estimates of expected results. The specifics of this information are often unique and tailor made to particular strategic problems.

MIS in-fact plays the role of information generation, communication, problem identification and helps in the process of decision making.

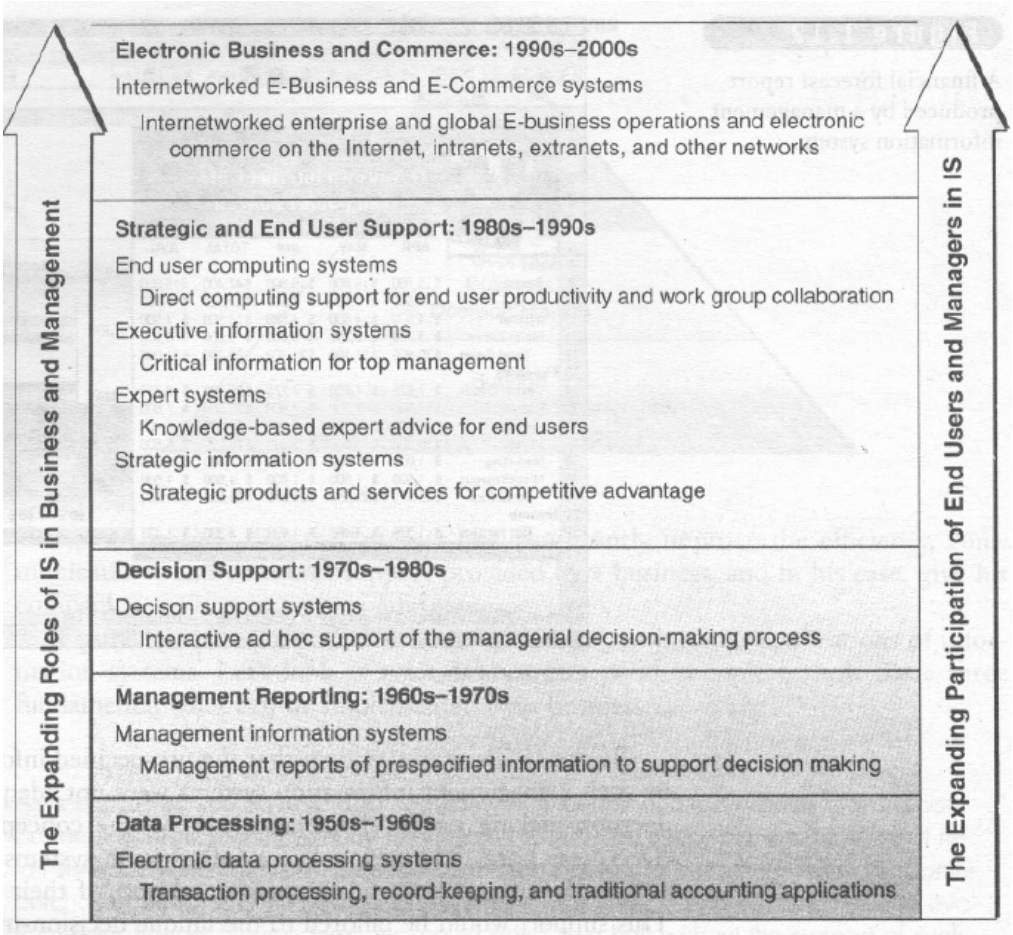
(b) Impact of MIS :

* The manager is kept alert by providing certain information indicating the probable trends in the various aspects of business.

This helped in forecasting and long term perspective planning.

* The managers attention is brought to a situation which is exceptional in nature, inducing him to take action or a decision in the matter.

Expanding roles of the business applications of information systems :



9.7. MIS - control issues : Strategic use of Information Systems

(a) Information Systems for competitive strategy :

The strategic role of information systems involves using information technology to develop products, services, and capabilities that give a company strategic advantages over the

competitive forces it faces in the global marketplace. This creates strategic information systems, information systems that support or shape the competitive position and strategies of an enterprise. So a strategic information system can be any kind of information system (TPS, MIS, DSS, etc.) that helps an organization gain a competitive advantage, reduce a competitive disadvantage, or meet other strategic enterprise objectives. Let's look at several basic concepts that define the role of such strategic information systems.

How should a managerial end user think about competitive strategies? How can competitive strategies be applied to the use of information systems by an organization?

Several important conceptual frameworks for understanding and applying competitive strategies have been developed by Michael Porter, Charles Wiseman and others. Figure 2.3 illustrates several important concepts. A firm can survive and succeed in the long run if it successfully develops strategies to confront five competitive forces that shape the structure of competition in its industry. These are: (1) rivalry of competitors within its industry, (2) threat of new entrants, (3) threat of substitutes, (4) the bargaining power of customers, and (5) the bargaining power of suppliers.

A variety of competitive strategies can be developed to help a firm confront these competitive forces. For example, businesses may try to counter the bargaining power of their customers and suppliers by developing unique business relationships with them. This effectively locks in customers or suppliers by creating "switching costs" that make it expensive or inconvenient for them to switch to another firm. Thus, competitors are also locked out by such strategies. Companies may use other strategies to protect themselves from the threat of new businesses entering their industry, or the development of substitutes for their products or services. For example, businesses may try to develop legal, financial, or technological requirements that create barriers to entry to discourage firms from entering an industry, or make substitution unattractive or uneconomical.

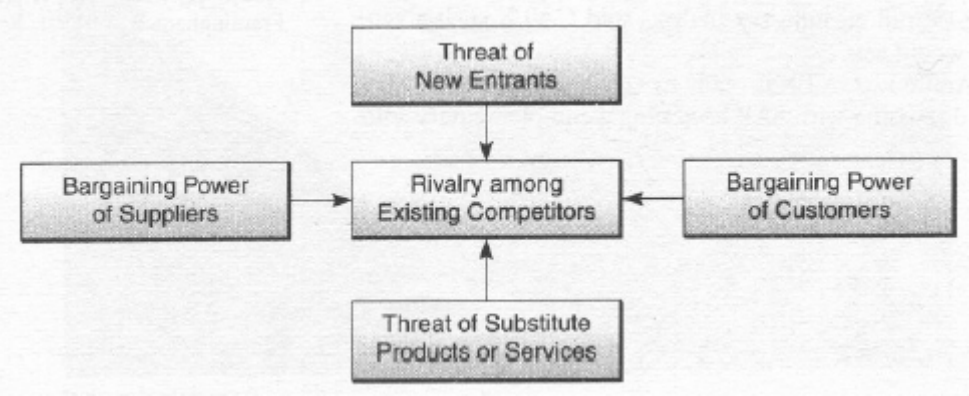


Fig. 9.3 : The competitive environment of an industry.

(b)

The five basic competitive strategies to be implemented in any business are :

1. Cost Leadership Strategy. Becoming a low-cost producer of products and services in the industry. Also, a firm can find ways to help its suppliers or customers reduce their costs or to increase the costs of their competitors.

2. Differentiation Strategy. Developing ways to differentiate a firm's products and services from its competitors' or reduce the differentiation advantages of competitors. This may allow

a firm to focus its products or services to give it an advantage in particular segments or niches of a market.

3. Innovation Strategy. Finding new ways of doing business. This may involve the development of unique products and services, or entry into unique markets or market niches. It may also involve making radical changes to the business processes for producing or distributing products and services that are so different from the way business has been conducted that they alter the fundamental structure of an industry.

4. Growth Strategies. Significantly expanding a company's capacity to produce goods and services, expanding into global markets, diversifying into new products and services, or integrating into related products and services.

5. Alliance Strategies. Establishing new business linkages and alliances with customers, suppliers, competitors, consultants, and other companies. These linkages may include mergers, acquisitions, joint ventures, forming of "virtual companies," or other marketing, manufacturing, or distribution agreements between a business and its trading partners.

(b) Strategic Role of Information Systems :

How can the preceding competitive strategy concepts be applied to the strategic role of information systems in an organization? or, How can managers use investments in information technology to directly support a firm's competitive strategies?

These questions can be answered in terms of the key strategic roles that information systems can perform in a firm. Following table summarizes how information technology can be used to implement a variety of competitive strategies.

These include not only the five basic competitive strategies, but also other ways that companies can use information systems strategically to gain a competitive edge. Following table has examples of how companies used information technology to implement five competitive strategies for strategic advantage.

Lower Costs • Use IT to substantially reduce the cost of business processes. • Use IT to lower the costs of customers or suppliers.
Differentiate • Develop new IT features to differentiate products and services. • Use IT features to reduce the differentiation advantages of competitors. • Use IT features to focus products and services at selected market niches.
Innovate • Create new products and services that include IT components. • Make radical changes to business processes with IT. • Develop unique new markets or market niches with the help of IT.
Promote Growth • Use IT to manage regional and global business expansion. • Use IT to diversify and integrate into other products and services.
Develop Alliances • Use IT to create virtual organizations of business partners. • Develop interorganizational information systems linked by the Internet, extranets, or other networks that support strategic business relationships with customers, suppliers, subcontractors, and others.
Improve Quality and Efficiency • Use IT to dramatically improve the quality of products and services. • Use IT to make continuous improvements to the efficiency of business processes. • Use IT to substantially shorten the time needed to develop, produce, and deliver products and services.
Build an IT Platform • Leverage investment in IS people, hardware, software, and networks from operational uses into strategic applications. • Build a strategic information base of internal and external data collected and analyzed by using IT.
Other Strategies • Use interorganizational information systems to create switching costs that lock in customers and suppliers. • Use investment in IT to build barriers to entry against industry outsiders. • Use IT components to make substitution of competing products unattractive. • Use IT to help create, share, and manage business knowledge.

Strategy	Company	Strategic Information System	Business Benefit
Cost leadership	Levitz Furniture	Centralized buying	Cut purchasing costs
	Metropolitan Life	Medical care monitoring	Cut medical costs
	Deere & Company	Machine tool control	Cut manufacturing costs
Differentiation	Navistar	Portable computer-based customer needs analysis	Increase in market share
	Setco Industries	Computer-aided job estimation	Increase in market share
	Consolidated Freightways	Customer online shipment tracking	Increase in market share
Innovation	Merrill Lynch	Customer cash management accounts	Market leadership
	Federal Express	Online package tracking and flight management	Market leadership
	McKesson Corp.	Customer order entry and merchandising	Market leadership
Growth	Citicorp	Global telecommunications network	Increase in global market
	Wal-Mart	Merchandise ordering by satellite network	Market leadership
	Toys 'Я' Us Inc.	POS inventory tracking	Market leadership
Alliance	Wal-Mart/Procter & Gamble	Automatic inventory replenishment by supplier	Reduced inventory costs/increased sales
	Levi Strauss/Designs Inc.	Electronic data interchange	Just-in-time merchandise replenishment
	Airborne Express/ Rentrak Corp.	Online inventory management/ shipment tracking	Increase in market share

(c) Strategic Use of Information Systems :

(1) Improving Business Process :

One of the strategic business values of information technology is its role in making major improvements in a company's business processes. Investments in information technology can help make a firm's operational processes substantially more efficient, and its managerial processes much more effective. Making such improvements to its business processes could enable a company to cut costs, improve quality and customer service, and develop innovative products for new markets. For example, manufacturing processes for everything from automobiles to watches have been automated and significantly improved by computer-aided design, engineering, production, and manufacturing resource management technologies. In the automobile industry, the process for the production, distribution, and sales of cars and parts and the sharing of vital business data by managers and others has been substantially improved by using the Internet, extranets, and other networks that electronically connect an automobile manufacturer's production and distribution facilities with car dealers and suppliers.

Following table outlines many of the ways that information technology can improve business processes.

IT Capability	How IT Improves Business Processes
Transactional	Transform unstructured processes into routine transactions
Geographical	Transform information quickly and easily across large distances, making processes independent of geography
Automational	Reduce or replace human labor in a process
Analytical	Bring complex analytical methods to bear on a process
Informational	Bring large amounts of detailed information into a process
Sequential	Enable changes in the sequence of tasks, often allowing multiple tasks to be worked on simultaneously
Knowledge	Allow the capture and dissemination of knowledge and expertise to improve a process
Tracking	Allow the detailed tracking of the status, inputs, and outputs of a process
Disintermediation	Connect two parties within a process that would otherwise communicate through an intermediary.

Chrysler's CATIA Pipeline : Chrysler Corporation has reorganized its vehicle development process into multidisciplinary platform teams interconnected by the CATIA Pipeline, a telecommunications network that connects nearly every part of the company's "extended enterprise" to every other, including external suppliers and contractors. The software engine that moves data through the network and manages its database is CATIA (Computer-Aided Three-Dimensional Interactive Application), an integrated computer-aided design, development, engineering, and manufacturing execution system from Dassault Systems of France. Product information flows instantaneously from all directions and in all directions, linking managers, designers, engineers, marketers, service technicians, suppliers, and manufacturing.

The 1998 Dodge Intrepid and Chyrsler Concorde were the first products developed with the CATIA Pipeline. The cars and almost all of their components were electronically designed, tested, and stored in the CATIA database before any physical models or prototypes were made. Chyrsler designers and engineers are able to design and test every part thousands of times, simulate crashes, test air conditioners, plan production processes, and practice servicing procedures-all electronically. More importantly, CATIA determines how any design change affects any others and instantly notifies everyone affected. CATIA has thus made significant improvements to Chrysler's business process. The payoff to Chrysler has been dramatic reductions in costs, and major improvements in production efficiency and in product quality and performance.

Investments in information systems technology can result in the development of unique products and services or processes. This can create new business opportunities and enable a firm to expand into new markets or into new segments of existing markets.

The use of automated teller machines (ATMs) in banking is another classic example of an innovative investment in information systems technology.

Citibank and ATMs : By being first to install ATMs, Citibank and several other large banks were able to gain a strategic advantage over their competitors that lasted for several years.

ATMs lured customers away from other financial institutions by cutting the cost of delivering bank services and increasing the convenience of such services. The more costly and less convenient alternative would have been to establish new bank branch offices. ATMs are also an example of product differentiation, single bank services are now provided in a new way. ATMs raised the cost of competition, which forced some smaller banks that could not afford the investment in new technology to merge with larger banks. ATMs represented an attractive and convenient new banking service produced and distributed to customers by making innovative changes in the delivery of bank services. Thus, information systems technology was used to develop a strategic new distribution process for bank services.

(2) Locking In Customers and Suppliers :

Investments in information technology can also allow a business to lock in customers and suppliers (and lock out competitors) by building valuable new relationships with them. This can determine both customers and suppliers from abandoning a firm for its competitors or intimidating a firm into accepting less-profitable relationships. Early attempts to use information systems technology in these relationships focused on significantly improving the quality of service to customers and suppliers in a firm's distribution; marketing, sales, and service activities. Then businesses moved to more innovative uses of information technology.

Wal-Mart and Others : For example, Wal-Mart built an elaborate satellite network linking all of its stores. The network was designed to provide managers, buyers, and sales associates with up-to-date sales, shipping, inventory, and account status information to improve product buying, inventories, and store management. Then the firm began to use the operational efficiency of such information systems to offer better quality products and services and thereby differentiate itself from their competitors.
Companies like Wal-Mart began to extend their networks to their customers and suppliers in order to build innovative relationships that would lock in their business. This creates inter-organizational information systems in which the Internet, extranets, and other networks' electronically link the computers of businesses with their customers and suppliers, resulting in new business alliances and partnerships. Electronic data interchange (EDI) links between businesses and their suppliers, are a prime example of such strategic linkages. An even stronger link is formed by automatic inventory replenishment systems such as those between Wal-Mart and Procter & Gamble. In that system, Proctor & Gamble automatically replenishes Wal-Mart's in-store stock of Proctor & Gamble products.

(3) Creating Switching Costs :

A major emphasis in strategic information systems has been to find ways to build switching costs into the relationships between a firm and its customers or suppliers. That is, investments in information systems technology have attempted to make customers or suppliers dependent on the continued use of innovative, mutually beneficial inter-organizational information systems. Then, they become reluctant to pay the costs in time, money, effort, and inconvenience that it would take to change to a company's competitors.

SABRE and APOLLO : A classic example is the computerized airline reservation systems, such as the SABRE system of AMR Corporation (American Airlines) and the APOLLO system of COVIA (United Airlines), used by most travel agents. Once a travel agency has invested a substantial sum in installing such an inter organizational system, and travel agents have been trained in its use, the agency is reluctant to switch to another reservation system.

Thus, what seemed to be just a more convenient and efficient way of processing airline reservations became a strategic weapon that gave these providers a major competitive advantage. Not only does an airline reservation system raise competitive barriers and increase switching costs, it also continues to give their providers an advantage in gaining reservations for themselves, even with the enforcement of new legal guidelines to protect competition. Such systems also provide these companies with a major new line of information products. Thus, computer-based reservation services are a major source of revenue for their providers, which charge a variety of fees to travel agencies and airlines who use their systems. Both companies have now extended these systems to the Internet. It will be interesting to see how well their services compete with other airlines and online travel services on the World Wide Web. The low cost and easy access of Internet-based services tend to significantly reduce switching costs.

(4) Raising Barriers to Entry :
By making investments in information technology to improve its operations or promote innovation, a firm could also erect barriers to entry that would discourage or delay other companies from entering a market. Typically, this happens by increasing the amount of investment or the complexity of the technology required to compete in an industry or a market segment. Such actions would tend to discourage firms already in the industry and deter external firms from entering the industry.

Merrill Lynch : Merrill Lynch's cash management account is a classic example. By making large investments in information technology, along with a ground breaking alliance with BancOne, they became the first securities brokers to offer a credit line, checking account, Visa credit card, and automatic investment in a money market fund, all in one account. This gave them a major competitive advantage for several years before their rivals could develop the IT capability to offer similar services on their own. Thus, large investments in computer-based information systems can make the stakes too high for some present or prospective players in an industry.

(5) Leveraging a Strategic IT Platform :

Investing in information technology enables a firm to build a strategic IT platform that allows it to take advantage of strategic opportunities. In many cases, this results when a company invests in advanced computer-based information systems to improve the efficiency of its own business processes. For example, they may develop client/server networks of PC and NC clients and network servers; develop intranets, extranets, and Internet services; hire more IS specialists; and do extensive multimedia training of end users. Then, armed with this technology platform, the firm can leverage investment in information technology by developing new products and services that would not be possible without a strong IT capability.

An important current example is the development of corporate intranets and extranets by many companies, which enables them to leverage their previous investments in Internet browsers, servers, and client/server networks. Another classic example was the development by banks of remote banking services using automated teller machines. This innovative business use of IT was based in part on leveraging their expertise in teller terminal networks, which already interconnected their branches.

(6) Developing a Strategic Information Base :

Information systems also allow a firm to develop a strategic information base that can provide information to support the firm's competitive strategies. Information in a firm's corporate databases has always been a valuable asset in promoting efficient operations and effective management of a firm. However, information about a firm's operations, customers, suppliers, and competitors, as well as other economic and demographic data, stored in data warehouses, data marts, and other corporate databases, is now viewed as a strategic resource. That is, it is used to support strategic planning, marketing, and other strategic initiatives. In much the same way, information about *best business practices* and other business knowledge shared in intranet Web site databases is a strategic knowledge base.

For example, many businesses are now using data mining and online analytical processing to help design targeted marketing campaigns to selectively sell customers new products and services. This is especially true of firms that include several subsidiaries offering a variety of products and services. For example, once you become a customer of a subsidiary of American Express, you quickly become a target for marketing campaigns by their many other subsidiaries, based on information provided by the American Express strategic information resource base. This is one way a firm can leverage its investment in electronic commerce, transaction processing, and customer management systems-by linking its databases to its strategic planning and marketing systems. This strategy helps a firm create better marketing campaigns for new products and services, build better barriers to entry for competitors, and find better ways to lock in customers and suppliers.

9.8. Planning for Information

Complexity of the information resource environment suggests that the planning for information systems is vital for their success. Companies that plan tend to achieve better results than those that do not or plan poorly. In spite of this fact, many companies do not put proper emphasis on information system planning, particularly for developing long-range information systems. With the result, information systems in such companies create chaos and confusion rather than supporting the managerial decision making. Therefore, it is essential that companies develop information system plan to guide in initial development of information systems and making subsequent changes in these systems.

An information system plan describes the structure and content of the information systems and how these can be developed. Since all projects relating to information systems cannot be developed and implemented concurrently, priorities must be set. Since in a dynamic organization, there are more opportunities for information system applications than can be handled at one time, an allocation process must be worked out. Further, a very important fundamental concept of information system planning is that the organization’s strategic plan should be the basis for the information system strategic plan. Therefore, there should be integration of information system plan to organizational plan.

An information system plan has two time perspectives-long range and short range. The long-range plan, which usually covers three to five years, provides general guidelines for direction. The short-range plan provides a basis for specific accountability as to operational and financial performance. Since the short-range plan is derived out of the long-range plan, both the plans should be fully integrated. An information system plan usually, contains the following four sections:

1. Information system objectives and architecture.
2. Inventory of existing information systems.
3. Forecast of developments affecting the plan.
4. Specific plan.

Information System Objectives and Architecture

At the starting level of developing a plan of any type, its objectives should be defined so that those who are responsible for developing the plan are clear as to what they have to achieve through planning exercise. This is true for developing a plan for information systems too. However, information system objectives are not ends in themselves from the organization's point of view because these objectives contribute to the achievement of organizational objectives which are ends in themselves. Therefore, while defining the information system objectives, following factors should be considered :

1. Organizational objectives particularly the long term.
2. Organizational strategies to achieve those objectives,
3. External environment affecting the operation of the organization (such as nature of industry, government regulations, customers, suppliers),
4. Internal organizational constraints (such as management philosophy, organizational culture, etc.), and
5. Assumptions about business risks and potential consequences.

Thus, the information system objectives are defined within the overall organizational objectives. These objectives, in turn, provide the direction for developing information systems. While defining the information system objectives, these should be defined in both broad and operational ways. A broad objective defines what the information systems are going to achieve; how they would contribute to the achievement of organizational objectives. An Operational objective defines what the information systems are going to achieve in a specific time frame. For example, while the overall objective of the information systems may be defined in terms of 'providing information on a timely basis to all organizational units', the operational objective may be defined in terms of 'providing periodic financial reports within 24 hours after the end of the period'.

Based on the objectives, information system architecture is defined. Information system architecture provides a framework for detailed planning. It defines major categories of information and the major information subsystems or applications for the organization as a whole.

Inventory of Existing Information Systems

Inventory of existing information systems indicates the current status of information systems in use. Inventory includes such items as hardware, software, and applications (if the information systems are computerized); analysis of expenses, hardware and software utilization, and personnel utilization; and assessment of strengths and weaknesses of the existing information systems.

The basic objective of inventory is to determine the extent to which the existing systems would contribute to the proposed systems. For example, when an organization is switching from centralized computing to client/server computing, it must identify which of the hardware and software (both system and application) can be used in the latter. Similar is the case with personnel utilization. However, in the case of personnel, some additional problems

arise specially when there is a change of manual to computerized information systems. In such a case, many existing personnel may become redundant unless suitable training is provided to them. Further, the organization has to develop plan to utilize surplus personnel which may result because of computerization.

Forecast of Developments Affecting the Plan

While developing an information system plan, it is necessary that future developments which may affect the implementation of the plan are taken into account. Such developments may be. in the area of information technology, methodology, and environment. Information technology has the greatest influence on the effectiveness of any information system. Therefore, how information technology, both in terms of hardware and Software, would shape in future should be given adequate consideration. Though it is very difficult to predict the nature of technological development at the time of preparing the plan, organizations acting on proactive basis can plan the assimilation of new technology easily because of time lag between technology development and its application. Usually, it happens that technology development is announced much earlier than its commercial use.

Besides information technology, methodology change can also be forecast in advance. In order to incorporate methodology change, it is better to consider alternative system development methodologies in place of or in addition to traditional life cycle methods. Environmental changes, such as change in government regulations, tax laws, competitors' actions, etc. should also be included in so far as they affect information systems.

Specific Plan

After determining the above three factors, the organization can draw a specific plan for information systems. At the initial level, a specific plan may be prepared for a longer term, say up to five years. Based on this, plan may be prepared for shorter term, say for the next year or two years. However, these two-period plans should not be prepared independent of each other but both of these should be fully integrated. This integration can be achieved if the shorter-term plan is derived from the longer-term plan. The specific plan should include hardware acquisition schedule, purchased software schedule for both system software and application software, application software development schedule, software maintenance and conversion schedule, personnel resources required and their recruitment and training schedule, and financial resources required-capital expenditure for acquiring hardware, Software, and other accessories; operating expenditure for operations, maintenance, and new development.

There should be a provision for updating the plan as each year passes, the information system plan requires updating. Future plans are affected by changes in technology, experience with the systems that have been developed, changing needs for new systems, and changes in the organization itself. The plan should be updated in anticipation of these changes rather than the actual changes. This facilitates the organization to be ready to face challenges emerging out of these changes.

INFORMATION SYSTEM GROWTH CYCLE

Every system has a life cycle In which a system develops Into stages. For example, human beings have life cycle consisting of birth, adolescence, youth, adult, maturity, and decay. In the same way, an Information system has a life cycle with different stages. Nolan has presented a stage model of Information system life cycle. Nolan stage model is a framework for Information system planning that matches various features of Information systems to

stages of growth. It is a contingency theory which states-if these features exist, then the information system Is In this stage. It states that an organization must go through each stage of growth before It can progress to the next one. Thus, the stage model provides a set of limits if the organization's current stage of growth can be diagnosed.

Information System Growth Stages

Nolan originally presented four stages of Information system life cycle-Initiation, expansion (or contagion), formalization (or control), and maturity (or Integration). In a subsequent model, Nolan expanded these four stages into six stages-initiation, contagion, control, Integration, data administration, and maturity. Management responses to growth in computing are reflected In different levels of control or slack with each stage. Control is characterized by management policies and systems which ensure efficiency of computing use. Slack is the lack of control and the availability of resources to experiment with application features not required to perform basic processing. Table 3.1 shows the levels of control or slack In different stages of Information system growth model.

Table 9.1: **Levels of control or slack in different stages**

Stage	*Levels of control or slack*
Initiation	Low control and some slack; little or no information system planning.
Contagion	Greater slack in order to encourage use; lack of planning; costs rise and costs from lack of integration become visible.
Control	High level of control; information system planning is given increased emphasis.
Integration	Emphasis on integration; use of databases; emphasis on user control of information system costs.
Data administration	Focus on data administration; some slack to encourage development of systems which contribute to strategic advantage to the organisation.
Maturity	Application portfolio is complete and matches the organisational objectives.

While proposing stage model of information system growth cycle, Nolan has made certain assumptions about the growth dynamics of movement through the stages. These assumptions are as follows:

1. Organizational learning permits movement through stages. Organizational learning is the process by which an organization identifies action-outcome relationships, identifies and corrects errors, stores the experience in organizational personnel who teach new employees, and stores the systems, procedures, rules, computer programs, and other forms of transferring experience. Thus, organizational learning exhibits adaptive behaviour. This adaptive behaviour is useful in moving from one stage to another stage of information system growth cycle. For example, limited experimentation of stage one (initiation) is the basis for the second stage (contagion), and contagion stage allows diffusion of the technology before controls are applied.

2. Various stages of information system growth cycle cannot be skipped because experience is necessary before the organization is ready for the next stage. If experimentation is not performed. there are no early users to promote contagion. If the organization goes from

initiation to control directly, technology diffusion does not occur because the control stifles widespread trial-and-error use.

3. Although there are certain natural growth processes involved, various stages of growth model can be planned, coordinated, and managed to move through stages efficiently and effectively. Organizational culture, leadership styles, and power relationships shift to meet the needs of each stage. Thus, various stages represent a sequence for planned and managed change.

Nolan has also proposed that major changes in information technology eliminate the maturity stage. With the introduction of new hardware, software, and system design, the organization starts on a new growth curve as shown in Figure 3.1.

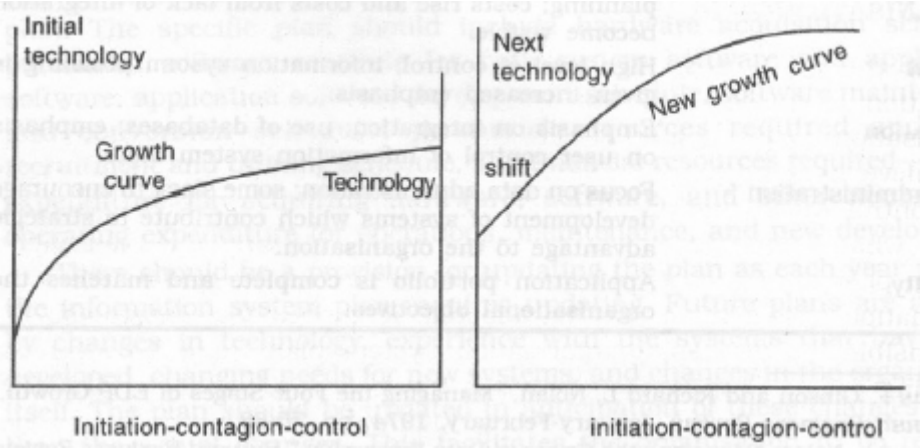


Figure 9.1: Repeating stages after technology shift.

Using Stage Model in Information System Planning

The stage model has significant relevance in information system planning. It can be used in diagnosis of current stage of growth and in planning changes in controlled way to move to the next stage. In an organization, usually, not all application subsystems grow at the same rate: for example, financial information system may be in stage three (control) with controlled growth, while marketing may require encouragement for new applications which need more slacks. Thus. in practice, shifts in stages and their accompanying features occur gradually and at different paces. The stage model describes the logic of change and the destination that is to be achieved. It presents the logic of information system growth over different stages. However, the stage model does not specify the mechanisms of change from one stage to another stage. To that extent, the model lacks specificity. Therefore, the diagnostic measurements and prescriptive elements of the model should be viewed as general guidelines for information system planning.

9.8.1 Techniques for Information Systems Planning :

A number of techniques have been proposed for information system planning. Each of these techniques tries to identify the flow of activities for developing a long-rage information system plan. These techniques are as follows:

1. Derivation of information system plan from organizational plan.
2. Strategic grid.
3. Strategy set transformation.

(1) DERIVATION OF INFORMATION SYSTEM PLAN FROM ORGANISATIONAL PLAN :

One of the most useful techniques of information system planning is derivation of information system plan from organizational plan. Every organization has some kind of plan that reflects its objectives and strategy to achieve those objectives. The implementation of strategy brings results and control system analyses whether the results are in tune with objectives: If not what additional efforts are required. By aligning the information system plan to organizational plan, objectives and strategy for developing information system plan may be adopted. It implies that those who are responsible for developing information system plan must be aware of planning process and various activities involved in it so that information systems are geared to these activities. Figure 3.2 presents organizational planning process.

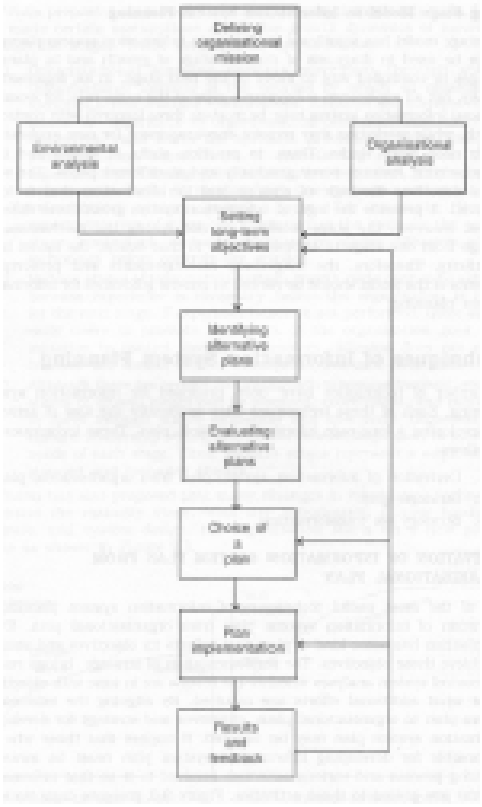


FIGURE 9.2: Organizational planning process

Various activities involved in organizational planning process should not be taken as independent activities and their flow only in one direction. Rather these should be taken in an integrated way in which two activities should be considered mutually interacting having two-way impact. The information system plan should be such that it provides relevant information at each activity level and its mutual interaction with other activities. A brief discussion of various activities of planning, process and their information requirements is presented below.

Defining Organizational Mission : Organizational mission is the fundamental purpose that explains why an organization exists and sets it apart from other organizations. It is a general enduring statement of the organization's intent and embodies the strategic decision makers' business philosophy. Organizational mission becomes the cornerstone for organizational operations. The scope of these operations is defined in terms of markets and products, that is, which markets will be served by the organization by offering which products. Organizational mission is enduring and, therefore, it changes over a long period of time depending on the

environmental and internal organizational factors. Information systems play little role in defining organizational mission.

I

Environmental Analysis : The second element of organizational planning process is environmental analysis. Since an organization operates in a society, it has to interact with various factors lying in the society, such as customers, suppliers, financiers, competitor, government, and other organs of the society. In the planning process, forecast is made about the likely future behaviour of these factors. However, this forecast is not made in vacuum rather it is based on information. Here the role of information systems is vital because that make relevant information available. If an organization scans its environment intensively, the information systems must be able to provide relevant mechanism for such scanning.

Organizational Analysis : Organizational analysis identifies the strengths weaknesses of the organization so that the organization is able to take advantages by using its strengths, and at the same time, taking measures to overcome its weaknesses. Organizational strengths and weaknesses are measured in all the functional areas-production, marketing, finance, and personnel-as well as its operating systems, procedures, etc. Here, information systems play significant role in identifying such strengths and weaknesses by collecting and analyzing internal information.

Setting Long-term Objectives : Based on organizational mission, environmental analysis, and organizational analysis, long-term objectives of the organizations are set. These long-term objectives may be set for a plan period (five years or so) or even beyond that. Some organizations define their objectives beyond a plan period which provide guidelines for setting objectives for plan periods. By analyzing the information from different sources, long-term objectives are set so that they are more realistic and meaningful.

Identifying Alternative Plans : Combination of organizational mission, environmental analysis, and organizational analysis enables the organization to generate various alternative plans which may help it achieve its long-term objectives. At this level, the aim is to generate as many alternatives as possible so that the organization has flexibility in choosing a plan for implementation. Information systems help in identifying such alternative plans by providing relevant information.

Evaluating Alternative Plans : After identification of various alternative plans, these are evaluated to find out which one is best in the given circumstances. Since all the plans cannot be implemented, it is desirable to select the one that meets the criteria of various decision factors. For evaluating different alternatives, successive step method is followed. Those plans which do not meet the initial decision criteria, (investment requirements, degree of risks, profitability, etc.) are eliminated at the first step of evaluation. The remaining plans go to the next step where the same process is repeated. Thus, screening out the plans results into only few plans which require detailed evaluation in terms of their payoff, risk involved, and so on. Information systems provide help in evaluating various alternative plans by analyzing their impact on the organization.

Choice of a Plan : When various alternative plans are evaluated, one of these plans is chosen for implementation. The chosen plan should meet the requirements of the organization as well as the personal aspirations and preferences of key decision makers. Because of these personal aspirations and preferences, sometimes, final choice of a plan does not remain fully

objective. Information systems apply only objective factors in choosing a plan but do not take subjective factors into consideration.

Plan Implementation : Plan implementation involves putting a plan into action. For putting the plan into action, a detailed schedule of time is worked out, time-wise resource requirement is worked out, and finally, the plan is executed. During execution period, information systems measure the progress of plan execution in terms of time schedule as well as in terms of resource application. If there is any deviation between predetermined and actual time schedule and resource application, the information systems should have mechanisms to detect such deviation and communicate it promptly so that corrective actions are taken for the remaining portion of plan execution.

Results and Feedback : After the plan is implemented, it starts producing results. The information systems should monitor such results and provide feedback to management whether these results correspond with the desired results which were set at the time of choosing the plan. If the desired results and actual results show deviation, the information systems should detect the deviation and analyze the causes of such a deviation. Once the plan is executed, finding of actual results, comparing these with desired results, analyzing causes for deviation, and providing feedback to management become the regular function of the information systems.

Derivation of information plan from organizational plan is a good technique for information system planning because the information systems can pinpoint on those aspects on which managers need information, the time at which they need it, and the form in which they need it. However, this presents some operational problems too. *First,* those who are responsible for information system design are not well acquainted with how actually organizational planning takes place. Similarly, managers who are responsible for organizational planning are not well acquainted with how information systems work. Thus, there is likelihood of mismatch between what managers need as perceived by system designers and as perceived by the managers themselves. In order to overcome this problem, both information system specialists and managers should join hands even at the stage of planning for information systems. *Second,* in many organizations, choice of a plan does not follow the process described here. In such organizations, many plans emerge as process of mental exercise of some key decision makers. In such a case, only, the details of plan execution are worked out and working out of these details is supported by the information systems.

STRATEGIC GRID

Another technique of information system planning is the strategic grid, developed by McFarlan and McKenney, often called McFarlan-McKenney strategic grid. The strategic grid takes into account strategic impact of existing operating applications and strategic impact of planned application development portfolio. Both of these dimensions may have either high or low strategic impact on the information systems. By combining both these dimensions, four types of information system planning situations can be identified as shown in Figure 3.3.

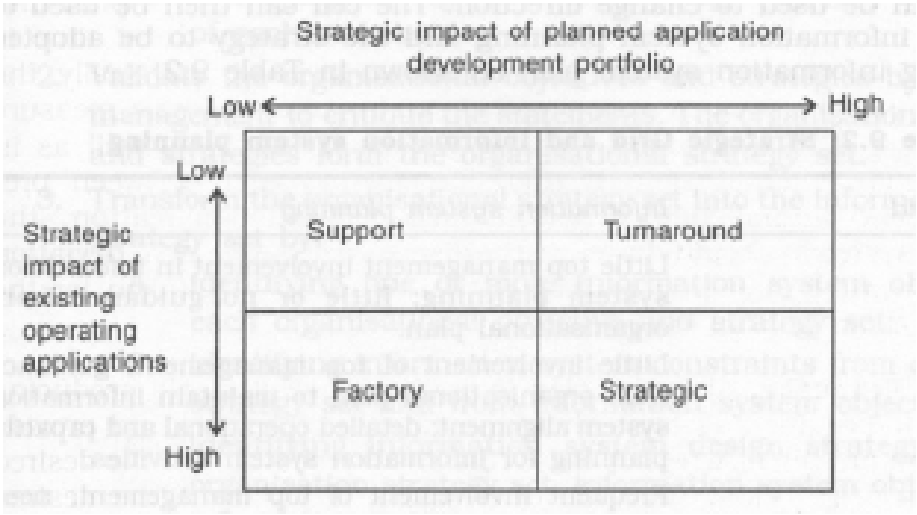


FIGURE 9.3: McFarlan-McKenney strategic grid

Each of the four cells of strategic grid defines the position of the information system activity relative to the organization as follows:

Support : When both dimensions of impact-strategic impact of existing operating applications and strategic impact of planned, application development portfolio-are low, information system applications that -support the activities of the organization are required. These systems emphasize traditional data processing applications. Information system activities are not vital to critical operations and are not included as part of future strategic directions.

Factory : When strategic impact of planned application portfolio is low but strategic impact of existing operating applications is high, factory cell of information systems is relevant. In this situation, information system applications are vital to the successful functioning of well-defined and well-accepted activities. However, information systems are not part of future strategic directions.

Turnaround : When strategic impact of planned application development portfolio is high but strategic impact of existing operating applications is low, information systems fall in turnaround cell. Turnaround is a transition state from support to strategic. The organization has had support-type applications, but is now planning for applications vital to strategic success of the organization.

Strategic : When strategic impact of planned application development portfolio as well as strategic impact of existing operating applications are high, strategic information systems are relevant. Information system activities are critical to the current competitive strategy and to the future strategic directions of the organization. Existing information system activities are part of the new strategic directions.

Strategic grid provides an analysis of current and planned portfolio status. It can be used to change direction. The cell can then be used to suggest the information system planning and the strategy to be adopted for preparing information system plan as shown in Table.

Table 9.2: Strategic Grid and information system planning

Position in grid	*Information system planning*
Support	Little top management involvement in information system planning; little or no guidance from organisational plan.
Factory	Little involvement of top management; guidance from organisational plan to maintain information system alignment; detailed operational and capacity planning for information system activities.
Turnaround	Frequent involvement of top management; need for smooth functioning of information system activities; guidance from organisational plan.
Strategic	Significant top management involvement; integration of organisational planning and information system planning.

The strategic grid of information system is a diagnostic tool to understand the role of information systems in an organization. The position in the grid explains the level of involvement of top management in information system planning and the relationship between information system planning and organizational planning. However, strategic grid suffers from one basic limitation. It merely explains what is happening rather than what should happen. If an organization desires to be more strategic in its use of information systems, the grid does not explain how this can be done.

STRATEGY SET TRANSFORMATION

Sometimes, it is not possible to derive information system objectives and plan based on organizational plan. This happens more so when organizational plan does not emerge as a sequential process and organization's strategic position is not specified clearly. In this situation, information system planning cannot derive meaningful clues from organizational plan and strategy. Therefore, strategy set transformation approach is used for information system planning. King has provided a model of strategy set transformation which helps in defining information system objectives and the process that can be adopted for its planning.

Strategy set transformation proceeds in the following manner :

1. Explicate the organization's strategy set by :

A. Delineating the organization's stakeholders-owners, employees, suppliers, customers, etc.

B. Identifying the objectives of each stakeholder and

C. Identifying the organizational strategy to satisfy the objectives of each stakeholder.

2. Validate the organizational objectives and strategies by asking top management to critique the statements. The organizational objectives and strategies form the organizational strategy set.

3. Transform the organizational strategy set into the information system strategy set by:

A. identifying one or more information system objectives for each organizational objective and strategy set.

B. identifying information system constraints from organization strategy set and from information system objectives:

C. identifying information system design strategy based on organization strategy set, information system objectives, and information system constraints.

How strategy set transformation process can be used for information system planning can be explained by an example. Suppose an organization desires to improve its cash flow in order to pay for its creditors (stakeholder) and improve organizational profitability (meeting owners' objectives). The organizational strategy to improve cash flow is to collect from its debtors fast. Based on this, information system objective may be to improve billing.

Strategic organizational attributes relative to use *of* computerized information systems and decisions models will be reflected in information system constraints affecting the billing system. These can be expressed in information system design strategies, such as pilot projects for training, prototyping for system development, etc.

9.8.2 Strategic Approach for Determining Information Requirements

For information system planning, an organization has to determine its information requirements. Such requirements must be defined for the organization as a whole as well as for its different subsystems. To ensure that the information systems play effective role in generating competitive advantage to the organization, it is essential that the organization adopts strategic approach to identify its information requirements. Strategic approach *of* information requirement determination takes both environmental as well as organizational factors into account. A strategic approach for determining information requirements takes into account the following factors:

1. Critical success factors.
2. Competitive forces.
3. Value chain.

CRITICAL SUCCESS FACTORS

Critical success factor approach *of* determining information requirements argues that the information requirements *of* an organization are determined by a small number *of* critical success factors (CSFs) relevant to the organization and the industry in which it operates. CSFs are those characteristics, Conditions, or variables which when maintained and sustained, can have significant impact on the success *of* an organization competing in a particular industry. A CSF may be a characteristic such as product features, a condition such as high capital investment, or any other variable. A basic nature *of* CSFs is that they differ from industry to industry-consumer goods versus industrial goods, differentiated versus undifferentiated industries, local versus global industries and so on. The following table presents some examples *of* CSFs relevant for different industries.

Table : **Critical success factors in different industries**

Industry	*Critical success factors*
Toothpaste	Quality in terms of—form, flavor, foam, and freshness, and wide-area distribution network, high level of promotion, and brand loyalty.
Food processing	High quality product, packaging, efficient distribution network, and sales promotion.
Shoe	High quality product, cost efficiency, sophisticated retailing, flexible product mix, and creation of product image.
Automobile	Styling, strong dealer network, manufacturing cost control, and ability to meet environmental standards.
Courier service	Speedy dispatch, reliability, and price.

Using industry CSFs. managers can develop critical success factors in the form of organizational characteristics which match with industry CSFs. For example, if an industry CSF is in the form of wide-area distribution network, managers set objective in terms of developing this distribution network. Similarly, objectives can be set for all CSFs. In order to use CSF approach for identifying information requirements, managers need to generate as much information as possible by going through the following ways:

1. CSFs can be identified based on logic, heuristics, or even a rule of thumb rather than through any theoretical model. These are based on long years of managerial experience which leads to the development of intuition, judgment, and hunch.
2. CSFs can also be identified internally in the organization by using creative techniques like brainstorming, or interviewing the key managers in the organization.
3. CSFs can be deduced from other companies' statements, expert opinions. organizational success stories. etc. When CSFs are identified, managers set objectives in these areas which, in turn, become the basis for determining the information requirements.

In fact, the basic premise in using CSF approach is that there is a small number of objectives that managers can easily identify and information systems focus on those objectives. For example, if an organization operating in toothpaste industry has set its objective to have certain rate of return on investment (first-level objective), it has to define its market share (second -level objective). In order to achieve its second-level objective, it has to define new product development (third-level objective). Since product is the source of generating revenue, product features must match the CSFs of the toothpaste industry (in terms of form, flavour, foam, and freshness).

Similarly, objectives can be set in relation to distribution network, product promotion, etc. At all these levels, different types of information are required.

Advantages of CSF Approach

There are certain advantages of using CSF approach in identifying the information requirements:

1. CSF approach produces a smaller data set to analyze for determining information requirements. Rather than going through a broad enquiry into what information is required by different managers.

CSF approach focuses on a small number of items.

2. CSI approach can be tailored to the structure of each industry, with different competitive strategies producing different information systems. It also depends on the industry position and even the geographical locations. Therefore, this approach produces systems that are more tailored to the organization.
3. CSF approach takes into account the changing environment with which the organization and its managers must deal. It forces the managers to have a look at the environment and consider how their analysis of it shapes their information needs.
4. CSF approach brings consensus among top managers about what is important to measure to gauge the organizational success. This enables the managers to focus their attention on how information should be handled.

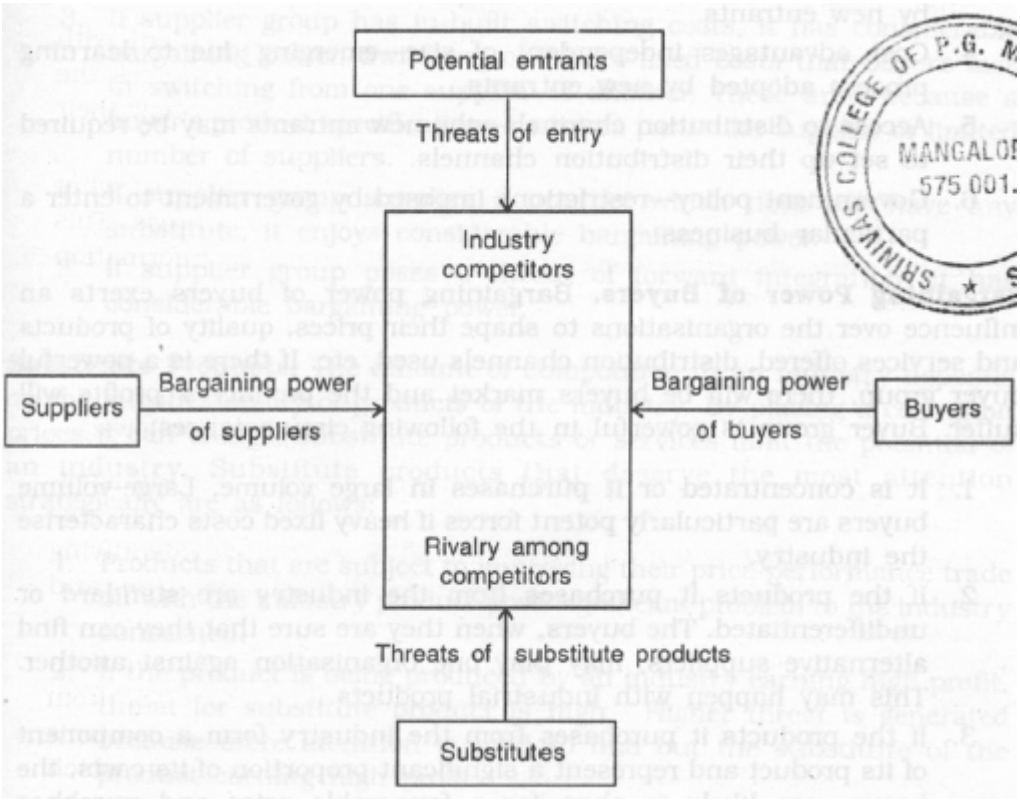
Limitations of CSF Approach

CSF approach suffers with some limitations too which are as follows:

1. There is no rigorous method of identifying CSFs either industry wise or organization-wise. Whatever factors managers may perceive as being critical may not truly be critical. Therefore, for identifying various CSFs, managers need high-level of imagination and experience.
2, CSF approach focuses more on managers individually rather than focusing on the organization as a whole. What might be a CSF from a manager's point of view, may not be a CSF from the organization's point of view. Therefore, confusion arises as to the basis on which information requirement is to be assessed. Thus, this approach does not provide the base for aggregating individual CSFs into a clear organizational pattern relevant for information system design.
3. CSF approach is specifically useful for higher-level information systems-decision support systems and executive information systems. It assumes that transaction processing systems have already been well developed in the organization. If that is so, CSF approach is useful otherwise it leaves a vacuum.

COMPETITIVE FORCES

Many forward-looking organizations design their information systems to counter the threats generated by competitive forces and develop competitive advantage. Often competing organizations talk about the nature of competition in terms of their existing competitors. To some extent, this may be true. However, competition is not manifested only in other players in the market; it is rooted in its underlying economics, and competitive forces exist that go well beyond the establ1shed players in a particular industry. Buyers, suppliers, potential entrants, and substitute products. all are competitors in the sense that they may be more or less prominent or active depending on the nature of the industry. Michael Porter has identified five forces that shape competition in an industry as shown in following Figure.



Threats of Entry :

It is a famous saying that no business remains more attractive than others over the long run. This happens because if the industry is very profitable, there will be entry of many organizations in the field and position will become normal like any other industry. New entrants to an industry bring new capacity, the desire to gain market share, and have substantial resources. However, there are different kinds of barriers for newcomers in a field. If these barriers to the entry are high and a newcomer can expect sharp retaliation from the entrenched competitors, obviously he will not pose a serious threat of entry. There are six sources of barriers to entry.

1. Economies of scale-emerging from high volume of production, resulting into economies in production, research, marketing, financing, and other part of business.
2. Product differentiation-strategy adopted by existing players to differentiate their products from those of new entrants.
3. Capital requirements-the need to invest large financial resources by new entrants.
4. Cost advantages independent of size-emerging due to learning process adopted by new entrants.
5. Access to distribution channels-the new entrants may be required to set up their distribution channels.
6. Government policy-restrictions imposed by government to enter a particular business.

Bargaining Power of Buyers :

Bargaining power of buyers exerts an influence over the organizations to shape their prices. quality of products and services offered. distribution channels used. etc. If there is a powerful buyer group, there will be buyers market and the producers' profits will suffer. Buyer group is powerful in the following circumstances:

1. It is concentrated or it purchases in large volume. Large-volume buyers are particularly potent forces if heavy fixed costs characterize the industry.

2. If the products it purchases from the industry are standard or undifferentiated. The buyers when they are sure that they can find alternative suppliers, may play one organization against another.
This may happen with industrial products.
3. If the products it purchases from the industry form a component of its product and represent a significant proportion of its costs, the buyers are likely to shop for a favorable price and purchase selectively.
4. If buyers earn low profit, they will be more price-sensitive. In case of their high profit, they will be less price-sens1t1ve.
5. Where industry's product is unimportant to the quality of buyers' product, they will be more price-sensitive.
6. If the buyers pose a problem of backward integration, they will dominate in dealing with the industry in such a case. Such possibility is more in the case of textiles, automobiles, etc.

Substitute Products :
The amount of competition in an industry depends on the substitutability of products of the industry. By placing a ceiling on prices it can charge, substitute products or services limit the potential of an industry. Substitute products that deserve the most attention strategically are as follows:
1. Products that are subject to improving their price-performance trade off with the industry product pose significant problem to the industry concerned.
2. If the product is being produced by an industry earning high profit, threat for substitute product is high Higher threat is generated because more attention is paid to find out the substitute of the product earning high profit.

Rivalry for Position :
Various factors, discussed above, are mostly external form of competition and operate as homogenizing factors for all the competitors in an industry. Competition from within, that is among different players, is the most crucial factor which every organization should take into account. Rivalry among existing competitors takes the familiar form of jokeying for position, that is, increasing market share at the cost of competitors. Intense rivalry is related to a number of factors in an industry which are as follows:

1. There are numerous competitors in an industry and all of them are trying for the same end-result, that is, increasing their sales and capturing higher market share.
2. Often industry growth is slower as compared to the rate of growth in product supply offered by numerous competitors. With the result, rivalry becomes keen among competitors.
3. The product may lack differentiation and buyers are likely to switch over from one brand to another, based on price-performance relationship.
4. When exit barrier is high because of investment locked up in specialized assets, the companies have to keep their operation on even if they are incurring losses. In order to reduce these losses, companies may go for intense marketing.
5. Different competitors use different strategies based on pricing, product innovation, promotion, and other forms of differentiation. Each of them has different idea about how to do business, how to compete. and how to run head-on into each other.

Competitive Force Model and Information Systems
After analyzing, the competitive forces, an organization requires to develop information systems that should provide relevant information to counter the threats posed by these forces

or likely to pose threats in future. Thus, an organization must have information on the following aspects:

1. Measuring performance of own products.
2. Measuring performance of competitors' products.
3. Reactions of buyers and suppliers.

Measuring Performance of Own Products : An organization requires information to measure the performance of its own products. For each product, information is required region-wise and customer-wise over a period of time to make a comparative analysis. Further, the information is required for the industry as a whole in which the organization operates to gauge the performance vis-a-vis total industry performance. If the organization has multiple products, such information is required for each product. Starting with data processing systems which provide base for structured information, the organization can design structured information systems which generate structured reports.

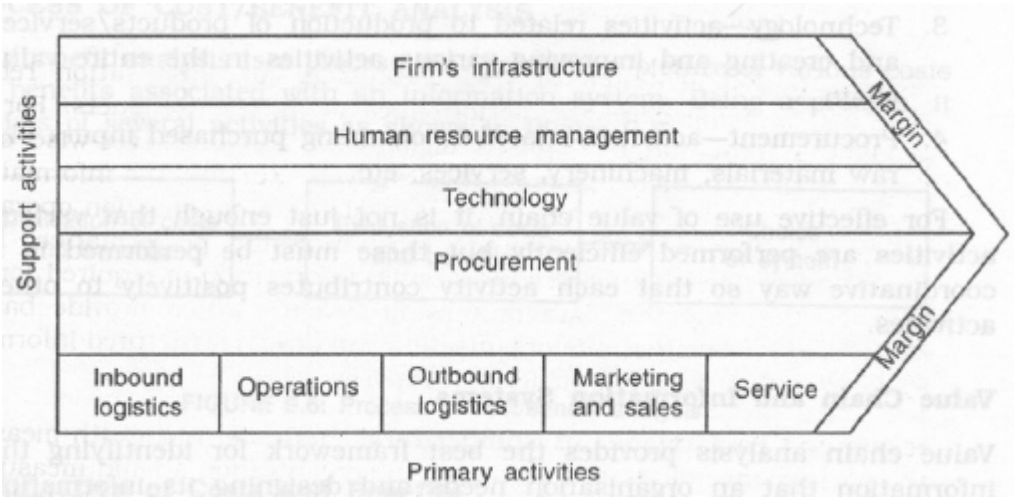
Measuring Performance of Competitors' Products : Along with measuring the performance of its own products, the organization should measure the performance of competitors' products. Though there are certain industries where concerned associations provide the information about market share of different players, information is available quite late which has more of historical relevance and less of strategic relevance. Same is the case with various marketing research agencies which publish information quite late.

In order to overcome this problem, the organization should develop its own marketing research information systems which may pinpoint what product a buyer buys and the reason why he buys. This information enables the organization to position and promote its products in a better way.

Reactions of Buyers and Suppliers : The organization is required to know the reactions of its buyers and suppliers. This can be done by developing wide area network to link buyers and suppliers so that there is continuous dialogue between the organization and its buyers and suppliers. While the number of suppliers may be limited, this may not be the case with buyers particularly in consumer products. Therefore, in such a case, the organization can link itself with distributors. Wide area network not only ensures continuous interaction with buyers and suppliers. it also enables the organization to schedule delivery and order placing.

VALUE CHAIN

Value chain analysis helps an organization to define the information which it needs to operate efficiently and thereby developing competitive advantage. Every organization performs a chain of activities. These activities are interrelated, and each activity creates a value important to the whole chain. Based on this, Porter has proposed the value chain to create more customer value. Accordingly, every organization is a collection of activities that are performed to design. Produce, market. Deliver, and support its products. The value chain identifies nine strategically relevant activities that create value in a business. These nine value-creating activities consist of five primary activities and four support activities as shown in following figure.



The value chain analysis is based on a typology of primary and support activities. Primary activities are the activities directly involved in the creation and transfer of products and services to the customers. Each value configuration has its own set of primary activities. Support activities enable and improve the performance of the primary activities and comprise procurement, technology development, human resource management and firm infrastructure (Porter, 1985).

In the *value chain* model the basic logic of value creation is the transformation of input into products, mainly through sequential processes. The evaluation of the product and related services is the source of customer value. An example is the assembly line using long-linked technology to produce standard products at low cost. Primary activities of a value chain are inbound logistics, operations, outbound logistics, marketing & sales, and service.

9. 8.3. Risks in Information Systems :

Defining the values must be supplemented by assessment of the risks associated with the realization of values from the **IT** infrastructure. Broadly, there are four types of risks, namely, organizational risk, **IT** infrastructure risk, definitional risk and technical feasibility risk.

1. *Organizational risk :* The value of the **IT** infrastructure to the performance of the enterprise depends upon a host of environmental factors in the organization. The availability of necessary skills for implementation of information system projects and exploitation of IT infrastructure is sometimes a major constraint in the success of a information system project. Many organizations find resistance to the use of IT infrastructure within the organization, even when the necessary skills are available or are not very difficult to develop. Such a resistance, generally, is caused by the fears that might be created due to communication gap regarding implications of using IT infrastructure for a given application on the achievements of personal goals of the personnel associated with the application. For example, use of IT infrastructure in Indian banking industry faced a lot of resistance in the beginning from staff at various levels. The resistance was caused primarily due to the fear of possible retrenchments when the automation results in reduced manpower requirement.

Such resistance causes non-utilization or underutilization of IT infrastructure resulting in failures of applications in delivering the benefits of IT. The success in realization of benefits also depends upon the work culture in the enterprise. Installation of e-mail facility did not improve the communication system in the organization and the infrastructure remained

grossly underutilized in some organizations where interpersonal communication was restricted. In other cases, where there existed an environment of openness in communication, it was a complete success.

2. *IT infrastructure risks :* Sometimes, the architecture of the existing IT infrastructure and the strategies of the on-going information systems are such that they are not in tune with the proposed information system project. Some projects have greater degree of dependence on the existing IT infrastructure. The degree of IT infrastructure risk is greater in such cases. However, if the proposed
projects fit easily into the overall plan of the existing IT infrastructure, the probability of success is even higher. For example, the success of a customer information support system will depend upon the strength of the sales information system, production information system, financial accounting information system, etc. If these information systems are not mature, there is a greater risk of customer information system not realizing the anticipated benefits. Rather, it may add more confusion to the existing chaos.

3. *Definitional risk :* The specific objectives that are sought to be achieved through the proposed, information system projects are to be defined properly or communicated to and received by the information system designers. Any ambiguity in the objectives and related details regarding the project may cause the projects not to deliver what was evaluated at the time of acceptance of the proposal. The definitional risks are greater in the case of projects that are complex in nature and relate to less tried processes. The definitional risks are lower in case of well established process, other things remaining equal. There is no dearth of cases wherein there is huge gap between what was targeted and what was finally delivered by the information systems. A market intelligence system, for example, aims at offering information regarding the rivals' plans may finally turn out to be a simple application aggregating the sales figures and analyzing trends in market shares. This may happen due to communication gap at the time of designing the application and definitional problems relating to what constitutes a market intelligence.

4. *Technical risk :* The rapid advancements in the information technology occurring in hardware; software and data organization, make the new technologies very attractive in terms of stated return to cost ratios. There is always a temptation to jump into to new technology bandwagon. In fact, adoption of new technology in most of the cases is the obvious decision as the new technology seems to be distinctly superior to the old one. However, there is always a risk of adopting new and untried technologies. The projects that involve
use of untried technologies are more risky than the ones that use well established and commercially tried technologies. Thus, the process of evaluating information system proposals involves definition and measurement of values for the tangible and intangible benefits of the system. These values are matched against the potential sources of risks of failures of information systems in achieving these values.

9.9. Decision Support Systems

1. Introduction to Decision Making :

Decision making is an indispensable component of management process and managers' life is filled with making decisions after decisions. Managers see decision making as their central job because they constantly choose what is to be done, who is to do, when to do, where to do, and how to do.

William Moore has equated it with management when he says that "management means decision making".

The word decision has been derived form the Latin word *'decidere'* which means a cutting away or a cutting off. Thus, a decision involves a cut of alternatives between those that are desirable and those that are not desirable. The decision is a kind of choice of a desirable alternative. Decision making is a process to arrive at a decision; the process by which an individual or organization selects one position or action from several alternatives.

Shull et al. have defined decision making as follows: "Decision making is a conscious process involving both individual and social phenomena based upon factual and value premises which concludes with a choice of one behavioral activity from among one or more alternatives with the intention of moving toward some desired state of affairs."

Decision making thus, is an act of projecting one's own mind upon an opinion or a course of action. In decision making, three aspects of human behaviour are involved: (1) cognition-activities of mind associated with knowledge; (2) conation-the action of mind implied by such words as willing, desire, and aversion; and (3) affection-the act of mind associated with emotion, feeling, mood, and temperament. Based on the above concept of decision making, its features can be derived as follows:

1. Decision making implies that there are various alternatives and the most desirable alternative is chosen to solve the problem or to arrive at expected results. A problem situation which does not have alternatives is not really a problem requiring a solution though the problem may be quite injurious.
2. Existence of alternatives suggests that the decision maker has freedom to choose an alternative of his liking through which his purpose is served.
3. Decision making may not be completely rational but may be judgemental and emotional in which personal preferences and values of the decision maker play significant role.
4. Decision making is a goal-directed process. It implies that the decision maker attempts to achieve some results through decision making.

2. TYPES OF DECISIONS

Decision making is involved in every walk of life; it is relevant in organisational as well as non-organisational context. In organizational context. decisions may vary from major ones like determination of organisational objectives or deciding about major projects to specific decisions about day-to-day operations. Therefore, there are different decisions which are made by managers in the organisations.

There are different ways in which decisions may be classified. One way of classifying these decisions is to group them into routine and nonroutine. In another way, these decisions are classified as programmed and non-programmed. These are further classified as strategic and tactical or operational decisions. Strategic decisions are non-programmed and nonroutine while tactical (also known as operational) decisions are mostly routine and programmed.

Programmed Decision

A programmed decision. also known as structured decision. is routine and repetitive and is made within the framework of organisational policies and rules. These policies and rules are established well in advance. to solve recurring problems in the organisation. For example. the problem relating to promotion of employees is solved by promoting those employees who meet promotion criteria. These criteria are established by promotion policy and the managers have just to decide which employees meet promotion criteria and the decision is made accordingly. Programmed decisions are comparatively easier to make as these relate to the problems which are solved by considering internal organisational factors. Such decisions are made by managers at comparatively lower levels where the factors affecting decision making are static and well-structured.

Non-programmed Decision

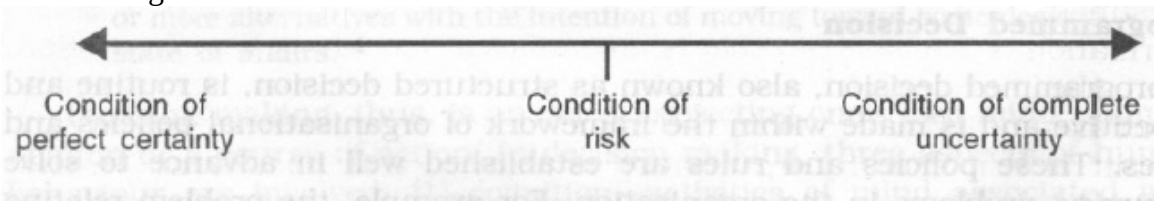
A non-programmed decision. also known as unstructured decision is relevant for solving unique/unusual problem in which various alternatives cannot be decided in advance. For such a decision. the situation is not well-structured and the outcomes of various alternatives cannot be arranged in advance. For example, if an organisation wants to take actions for growth, it may have several alternative routes like going for a grass-route project or taking over an existing company. In each situation. the managers have to evaluate the likely outcomes of each alternative to arrive at a decision. For evaluating the likely outcomes of these alternatives. The managers have to consider various factors, many of which lie outside the organisation. A common feature of non-programmed decisions is that they are novel and non-recurring and, therefore, readymade solutions are not available. Since these decisions are of high importance because of their long-term consequences, these are made by managers at higher levels in the organisation.

Semi-programmed decisions :

In these types of decision, at least one but not more than two of the above stages can be handled by a well defined preset procedure. An example of such a decision is the intelligence phase, which is well structured, having diverse kinds of variance analysis. Here a comparison with a budget is undertaken in a well defined way to indicate the need for a decision. Subsequent stages of design and choice are, however, not handled by any set procedure.

3. DECISION-MAKING CONDITIONS

Decision making involves selection of an alternatives which is put into action and whose impact is known in future period. Thus, the decision maker makes the decision for future conditions. In fact. a decision is not a process of making the future decision but a means of reflecting the future in today's decision. The future conditions for a decision vary along a continuum ranging from condition of perfect certainty to condition of complete uncertainty as shown in Figure 9.4.



In each of these conditions, knowledge of outcome of the decision differs. An outcome defines what will happen if a particular alternative or course of action is chosen and implemented. Knowledge of outcome of each decision alternative is important when there are multiple alternatives and only one alternative is to be chosen. In the analysis for decision making, three types of knowledge with respect to outcomes are usually distinguished as shown in Table.

Table 9.4 : **Outcomes in different decision-making conditions :**

Conditions	*Nature of outcomes*
Certainty	Complete and accurate knowledge of the outcome of each alternative as there is only one outcome of each alternative.
Risk	Multiple outcomes for each alternative can be identified and probability of occurrence can be attached to each outcome.
Uncertainty	Multiple outcomes for each alternative can be identified but there is no knowledge of the probability to be attached to each outcome.

Since there is variation in the knowledge of outcomes of different alternatives in different decision-making conditions, decision making strategy differs in each case.

Certainty

When the decision maker knows exactly which nature of state will occur, a condition of certainty exists. This means that the decision maker will be able to make perfectly accurate decision time after time. Such a condition exists when decision involves action in immediate future, and the decision maker has made such a decision a number of times with the same results. Under this condition, the information required for decision making is highly structured and structured decision-making techniques are applied.

Usually. such structured decisions are made at lower management in the organisation at which level, personnel are engaged in routine and repetitive functions.

Risk

Most of the major organisational decisions, particularly involving high investment. are made under the condition of risk in which only some information is available but that is not sufficient to answer overall question about the outcome of the decision. In such a condition, the decision maker has to decide two things-amount of risk involved in a decision and amount of risk that the organisation is ready to assume. Amount of risk involved can be calculated by risk analysis while the organisation's propensity to take risk depends on its risk taking ability and risk taking attitudes. Thus. in the condition of risk, part of the information can be in structured form while part of the information may be in unstructured and qualitative form. Thus, the decision cannot be perfectly structured but it cannot also be perfectly unstructured but it is semi-structured. Usually, semi-structured decisions are made at higher middle and top levels of the organisations. Since many qualitative information is used for making semi-structured decisions, these are influenced by personal preferences of the decision maker.

Uncertainty

If a decision involves a condition about which the decision maker has no information about the relative chances of any single outcome, he is said to be operating under condition of uncertainty. Since the decision maker does not have any information on which he can develop any analysis for decision making, the best he can do is to be aware that he has no chance of predicting the events. Thus, the type of information that the decision maker can use is highly unstructured and even fragmented. Thus, it can be seen that a decision may be either structured, semi-structured, or unstructured and not only structured or unstructured.

Further, the degree of structuring in a decision can be seen in terms of continuum in which degree of structuring varies as shown in Table :

Table 9. 5: **Managerial decisions, level of structuring and support systems**

Manage-ment level	*Nature of decision*	*Level of structuring*	*Support systems required*
Top	Strategic	Low	Strategic information systems/Executive support systems/Expert systems
↑	↑	↑	Decision support systems
↑	↑	↑	Structured information systems
Lower	Operational	High	Transaction processing systems

4. DECISION-MAKING PROCESS

When a manager makes a decision, it is, in effect, the organisation's response to a problem. As such, a decision should be thought of as a means rather than an end. Every decision is the outcome of a dynamic, process which is influenced by multiple forces. However. what are the different stages of this process, there is no unanimity. Herbert Simon, an expert on decision making has proposed three phases of decision making intelligence, design, and choice. As against these phases, Rubenstein and Haberstroh have proposed five phases-recognition of problem or need for a decision, analysis and statement of alternatives, choice among the alternatives, communication and implementation of decision, and follow-up and feedback results of decision.

For our further analysis, three phases of decision making as proposed by Simon will be taken in which the fourth phase of decision implementation is added because mere choice of an alternative does not complete decision-making process unless managers as decision makers commit resources for implementing a decision. Based on this, decision making process has been presented in Figure 9.6.

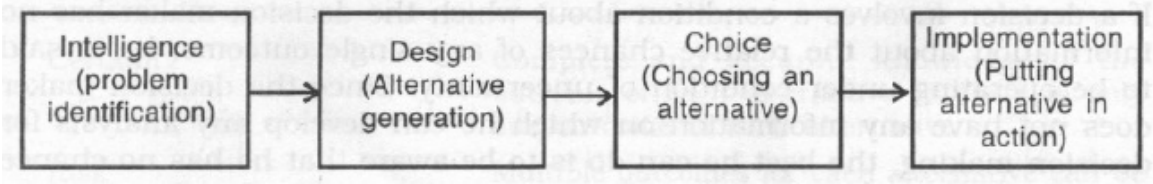


Figure 9.6 : Phases in decision-making process.

Various phases of decision-making process presented in Figure 9.6 are more relevant for non-programmed decisions. Problems that occur infrequently are unstructured and are characterized by a great deal of uncertainty regarding the outcomes of various alternatives, require the managers to utilize the entire process. For frequently occurring structured problems, it is not necessary to consider the entire process because decision rules are developed to handle such problems and it is not necessary to develop and evaluate various alternatives each time such a problem arises.

Let us now discuss the various phases, problems involved there in, and the type of information systems required to furnish information to overcome these problems.

(a) Intelligence Phase :

Intelligence phase of decision-making process involves searching the environment for conditions calling or decisions. This is related with the identification and formulation of the problem which is to be solved by the decision. A problem is the gap between present state of affairs and desired state of affairs on the subject-matter of decision. Problem finding is a difficult proposition as a famous writer, Charles Kettering, suggests when he observes, "it is not that people, can't see the solution; it is that they can't see the problem." Problem finding is just like the diagnosis of a patient by a doctor. When the doctor makes a diagnosis, he has a

normal, healthy person in his mind and he also has fairly clear concept of what a healthy person is. With this model as the desired result, he looks for disparities in the patient's actual state of health or factors which indicate whether his future health will fall short of normal. In the case of organizational decision making, however, a decision maker cannot rely on a commonly accepted norm such as a healthy person. In organizational context, a problem exists whenever one faces a question whose answer involves doubt and uncertainty. In order to overcome this doubt and uncertainty, the manager, as a decision maker, develops some models of what is desired, differences between desired and reality are identified, and differences are evaluated to find out- whether they constitute a problem.

Pounds has identified four types of models that produce expectations against which reality is measured:

1. Historical models in which the expectation is based on an extrapolation of past experience.
2. Planning models in which the plan is the expectation.
3. Models of other people in the organization, such as superiors, subordinates, other departments, etc.
4. Extra organizational models in which expectations are derived from competition, customers and professional organizations.

When a problem is identified, it remains vague at the initial stage. In order to make it more clear and specific, problem formulation is required so that design and choice phases operate on the right problem. At this stage, the problem identified earlier, is defined more precisely and some complexity is reduced.

MacGrimmon and Taylor have suggested four strategies for reducing complexity and formulating a problem :

1. Determining the boundaries (clearly identifying what is included in the problem).
2. Examining changes that may have precipitated the problem.
3. Factoring the problem into smaller sub-problems.
4. Focusing on controllable elements.

For this phase of decision making, information requirement is in the form of exception reporting, that is, what kind of deviation exists between desired state of affairs and actual state of affairs. Such type of information is provided by structured information- systems that deliver a wide variety of detailed information.

(b) Design Phase :

Design phase of decision making involves generation of possible alternatives through which the problem can be solved. A problem can be solved in several ways, however, all the ways cannot be equally satisfying. Further, if there is only one way of solving a problem, no question of decision arises. Therefore, the decision maker must try to find out the various alternatives available in order to get the most satisfactory result of a decision. Identification of various alternatives not only serves the purpose of selecting the most satisfactory one, but it also avoids bottlenecks in operation as alternatives are available if a particular decision goes wrong. However, it should be borne in mind that - it may not be possible to consider all alternatives either because some of the alternatives cannot be considered for selection because of obvious limitations of the decision maker or information about all alternatives may not be available. Therefore, while generating alternatives, the concept of limiting factor should be applied. A limiting factor is one which stands in the way of accomplishing a desired objective. If these factors are identified, managers will confine their search for alternatives to those which will overcome the limiting factors. For example, if an organisation has limitation in raising sizable finances, it cannot consider projects involving high investment.

A decision maker can use several sources for identifying alternatives his own past experience, practices followed by others, and using creative techniques. Past experience. applied in most cases of decision making, takes into account the actions taken by the decision maker in the past with obvious differences between the former challenges and the present one. The successful action of the past may become an alternative for the future. This is a very simple approach but has obvious limitations because there may be so much chances in the decision context that old action becomes totally irrelevant. Copying from the experiences of others is another way of generating alternatives. Thus, alternatives used by successful decision makers can be thought of as alternatives of decision making. This is also practiced by many organizations after making suitable amendments in the light of changed decision context. Importing of technology from foreign countries with suitable changes is good example of this type of alternatives. The third method of generating alternatives is through creative process where various exercises are taken to generate entirely new ideas.

The design phase of decision making may require more intelligence so that the manager can decide if a particular alternative is suitable for solving the problem. This phase may entail more carefully specified and directed information activities which are, generally, provided by decision support systems as they operate on simple models and can be operated with limited data.

(c) Choice Phase :

Choice phase of decision making involves choice of an alternative which can be put into action to solve the problem. For choosing an alternative which aims at solving the problem in the most appropriate way in a given situation, the manager must evaluate all the alternatives generated at the design stage. However, all alternatives available for decision making will not be taken for detailed evaluation because of the obvious limitations of managers in evaluating all alternatives. The energy of managers is limited and psychologically most of them prefer to work on plans that have good prospect of being carried out. In narrowing down the number of alternatives, two approaches can be followed-constraint on alternatives and grouping of alternatives of similar nature. The decision maker develops a list of limits that must be met by a satisfactory solution. He may treat these limits as constraints, that is, he may check proposed alternatives against limits, and if an alternative does not meet them, he can discard it. In the second approach, various alternatives can be grouped into classes on some specific criteria important to decision making. A representative alternative from one group may be selected for further analysis. After identifying the group that shows up the best, decision maker can concentrate on alternatives within this group. This method is very helpful in decision making regarding the location of plant. Warehouse, etc.

Having narrowed down the alternatives which require serious consideration, the decision maker will go for evaluating how each alternative may contribute towards the solution of the problem or objectives supposed to be achieved by implementing the decision. Evaluation of various alternatives dissects an alternative into various tangible and intangible factors. Tangible factors are those which can be quantified because they are quite obvious like the cost per unit investment required, output to be received, etc. Such factors can be measured easily though their happening may not be measured with certainty; for example, demand projection at a given price in a particular alternative. As against these, intangible factors are mostly qualitative and cannot be measured in terms of quantity. Therefore, some definitions can be used for such factors. For example. in a plant location various non-economic factors like psychological problem arising out of displacement of persons from the plant site, ecological balance, etc. have to be taken into account which cannot be quantified. In evaluating an alternative, both these factors have to be taken into account.

Evaluation of various alternatives presents a clear picture as to how each of these contributes to solution of the problem. A comparison is made among likely outcomes of the various

alternatives and the most appropriate one is chosen. Choice aspect of decision making is, thus, related to deciding the most acceptable alternative which fits with the organizational objectives. It may be seen that the chosen alternative should be acceptable in the light of organizational objectives, and it is not necessary that the chosen alternative is the best one. At the choice phase of decision making, the manager requires information tools that can keep track of the consequences, costs, and opportunities by each alternative generated at the design phase. The manager requires a larger decision support system to develop more extensive data on a variety of alternatives and to use complex analytical models to account for all the consequences.

(d) Implementation Phase :

Once an alternative is chosen. it is implemented, that is, it is put into action. Truly speaking, the actual process of decision making ends with the choice of an alternative through which the objectives can be achieved. However, decision making, being a continuous and ongoing process, must ensure that the problem has been solved and the objectives have been achieved by the chosen alternative. Unless this is done, managers will never know what way their choice has contributed. Therefore, the implementation of decision may be seen as an integral aspect of decision. Once the creative and analytical aspects of decision making through which an alternative has been chosen are over the managerial priority is one of converting the decision into something effective. This is the implementation aspect of decision making. The basic difference between decision making as an analytical process and implementation is that the former requires the use of conceptual skills since it translates the abstract ideas into reality. For example, suppose that there is a change in consumers tastes. This change is very abstract and cannot be seen unless some specific techniques and measurements are applied. How this change can provide opportunity to the organization is mostly a conceptual exercise requiring managers to interpret what changes are taking place and what products or services w1ll be preferred in the changed situation.

Implementation. on the other hand, relates to putting a decision into practice so that objectives of decision are achieved. This practice will provide further feedback for evaluating the soundness of the decision and if need be, a change in the decision. Implementation of a decision requires the communication to subordinates, getting acceptance of subordinates over the matters involved in the decision, and getting their support for putting the decision into action. The decision should be effected at appropriate time and in proper way to make the implementation more effective. The effectiveness of implementation is important because it is only effective action through which organizational objectives can be achieved. When a decision is put into action, it brings certain results. These results provide indication whether decision making and its implementation is proper. Therefore, managers should take follow-up action in the light of feedback received from the results. If there is any deviation between objectives and results this should be analyzed and factors responsible for this deviation should be located. The feedback may also help in reviewing the decision when conditions change which may require change in the decision.

At the implementation phase, managers can use structured information system that provides routine reports on the progress of a solution. This system should also indicate the difficulties that arise, resource constraints, and possible corrective actions. For this purpose. information systems may -range from integrated management information systems to much smaller systems as well as project planning software operating on microcomputers.

Table 9.3 presents the summary of decision-making phases. Information requirement. and supporting information systems.

Table 9.7: Decision-making phases. Information required and supporting information systems

Decision-making phase	*Information required*	*Supporting information systems*
Intelligence	Exception reporting	Structured information systems
Design	Specified and directed information	Decision support systems and executive support systems
Choice	Information for evaluation	Large models of decision support systems
Implementation	Graphics and charts for monitoring	Integrated information systems, microcomputers and mainframe decision aids

METHODS OF DECIDING AMONG ALTERNATIVES

There are different methods to evaluate various alternatives through which a problem can be solved. In evaluating alternatives, an attempt is made to find out the likely outcome of each alternative so that the alternative which is likely to provide maximum outcome is chosen. In evaluating the likely outcomes of various alternatives, generally, following methods are used:

1. Optimization techniques.
2. Pay-off matrices.
3. Decision tree.
4. Game theory.
5. Elimination by aspects.
6. Decisional balance sheet.

5. Decision Supporting Systems (DSS) :

DSS are an application of Herbert Simon model. In this mode, there are 3 phases ie; intelligence, design and choice. The DSS basically helps the information system in the intelligence phase where the objective is to identify the problem and then go to the design phase for solution. The choice of selection criterion varies from problem to problem. Therefore, it is required to go through these phases again and again till a satisfactory solution is found. These systems are helpful in making a decision and also its performance evaluation. These systems can be used to validate the decision by performing the sensitivity analysis on various parameters of the problem.

In decision making, programmed decisions, because of its rule base structure, can be computerized, as inputs, processing methodology, analysis and choice of decision making are predetermined. DSS can be built around the rule in case of programmed decision situation, while in non programmed decisions, the rules are not fixed or predetermined and requires the user to go through the decision making cycle as indicated in the Herbert Simon model, every time.

5.1 DSS definition

The term, decision support system refers to a class of systems, which support the process of decision making. The emphasis is on support rather than on automation of decisions. DSS allows the decision maker to retrieve data and test alternative solutions during the process of problem solving.

DSS can also be defined as a set of well integrated, user friendly, computer based tools that combine data with various decision making models – qualitative and quantitative – to solve semi structured and unstructured problems.

5.2 DSS characteristics

The following are the desirable characteristics for a DSS :

- DSS helps the decision maker in the decision making process
- DSS is designed to solve semi structured and unstructured problems
- DSS supports decision makers at all levels, but is most effective at the tactical and strategic levels
- DSS makes general purpose models, simulation capabilities and other analytical tools available to the decision maker
- DSS is an interactive, user friendly system that can be used by the decision maker with little or no assistance from an MIS professional
- DSS can be readily adapted to meet the information requirements for any decision environment
- DSS provides the mechanisms to enable a rapid response to a decision makers request for information
- DSS has the capability to interface with the corporate database
- DSS is not executed in accordance with pre-established production schedule
- DSS is flexible enough to accommodate a variety of management styles
- DSS facilitates communication between levels of decision making

5.3 Types of DSS

The different types of decision support system are as follows :

(a) **Status inquiry systems** : The number of decisions in the operational management and some at the middle management are such that they are based on one or two aspect of a decision making situation. It does not call for any elaborate computations, analysis, choice etc for decision making. If the status is known, the decision is automatic ie; status and solution is a unique relation.

(b) **Data analysis systems** : These decision systems are based on comparative analysis and makes use of a formula or an algorithm. But, these processes are not structured and therefore, vary. The cash flow analysis, inventory analysis and the personnel inventory systems are examples of the analysis systems. The use of simple data processing tools and business rules are required to develop this system.

(c) **Information analysis system** : In this system, the data is analysed and the information reports are generated. The reports might be having some exceptions as a feature. The decision makers use these reports for assessment of the situation fro decision making. The sales analysis, accounts receivables system, market research analysis are examples of such systems.

(d) **Accounting Systems** : These systems are not necessarily required for decision making but they are desirable to keep track of the major aspects of the business or a function. The content of these systems is more of data processing, which leads to formal reporting, with exceptions if necessary. These systems account items such as cash, inventory, personnel and so on, and relate it to norms developed by the management for control and decision making.

(e) **Model based systems** : These system are simulation models or optimization models for decision making. These decisions, generally are one time and infrequent, and provide general guidelines for operation or management. The product decision mix decision, material mix, job scheduling rules, resource or asset or facilities planning systems are the examples.

5.4 Components of DSS

There are three main software components of a DSS. These are
(a) database management system (DBMS)
(b) model management system
(c) support tools.

(a) **Database Management Systems** : To solve a problem, the necessary data may come from internal or external databases. In an organization, internal data are generated by systems such as TPS and MIS; external data come from a variety of sources such as newspapers, online data services, databases (financial, marketing, manufacturing, human resource etc). Some examples of external data are government regulations, tax codes, census figures, competitors, market shares, economic indicators, interest rates, and inflation. The data in the DSS database are managed by the DBMS, which covers compilation of data, manipulation of data, data generation, data updating, data maintenance and dissemination of data.
(b) **Model Management Systems** : Model management system stores and accesses models that managers use to make decisions. Such models are used for designing a manufacturing facility, analyzing the financial health of an organization, forecasting demand for a product or service, and determining the quality of a particular batch of products. Although most models are quantitative, decision makers use qualitative models also to make decisions.

The model builder, a component of many model bases, provides a structured framework for developing models by helping decision makers identify the variables and the interrelationships among the variables in the model. A model builder creates, identifies, processes, stores, updates, and maintains different decision making models and ensures that these models are consistently applied when decisions are made. The model builder also contains a model dictionary for consistency in the definitions and uses of models. Some models that decision makers use to make decisions are: statistical models, production models, marketing models, human resource models, financial and accounting models, and strategic models. These models are extensively used in different functional areas of a business.
(c) **Support Tools** : Support tools like online help, pull down menus, user interfaces, graphical analysis, error correction mechanisms, facilitate the user interactions with the system. Interfaces are an important support tool especially in the case of a DSS. Better the interface, the greater will be the chances of system being accepted by the user. Although managers recognize the power and potential of DSS, the main problem to its adoption is a lack of people with training in computer technologies. In such an environment, good interfaces can make or break the system.

5.5 Functions of DSS

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

- Model building
- 'What if' analysis
- Goal seeking
- Risk analysis
- Graphical analysis.

(a) **Model building**: This allows decision makers to identify the most appropriate model for solving the problem on hand. It takes into account input variables, interrelationships among the variables, problem assumptions and constraints. For example, a marketing manager of a television manufacturing company is charged with the responsibility of developing a sales forecasting model for color TV sets. A model builder uses a structured framework to identify variables like demand, cost and profit, analyze the relationships among these variables,

identify the assumptions, if any (e.g., assume the prices of raw materials will increase by 5% over the forecasting period), and identify the constraints like the production capacity of the plant. All this information is then integrated by a system into a decision making model, which can be updated and modified whenever required.

(b) **'What-if' analysis** : This is the process of assessing the impact of changes to model variables, the values of the variables, or the interrelationships among variables. This helps managers to be proactive, rather than reactive, in their decision making. This analysis is critical for semi-structured and unstructured problems because the data necessary to make such decisions are often either not available or incomplete. Hence, managers normally use their intuition and judgment in predicting the long-term implications of their decisions. Managers can prepare themselves to face a dynamic business environment by developing a group of scenarios (best-case scenario, worst-case scenario and realistic scenario).

(c) **Goal seeking** : It is the process of determining the input values required to achieve a certain goal. For example, house buyers determine the monthly payment they can afford (say for example, Rs. 5,000) and calculate the number of such payments required to pay the desired house.

(d) **Risk analysis** : It is a function of DSS that allows managers to assess the risks associated with various alternatives. Decisions can be classified as low risk, medium risk, and high risk. A DSS is particularly useful in medium risk and high risk environments.

(e) **Graphical analysis** : This helps managers to quickly digest large volumes of data and visualize the impacts of various courses of action. S L Jarvenpaa and G W Dickson studied the relative advantages and disadvantages of tabular and graphic output. They recommended the use of graphs when:

- Seeking a quick summary of data
- Detecting trends over time
- Comparing points and patterns at different variables
- Forecasting activities
- Seeking relatively simple impressions from a vast amount of information.

The researchers suggested that a tabular presentation be used when it is necessary to read individual data values.

Jarvenpaa and Dickson has also offered the following tips when choosing between the various types of graphs:

- Line or bar charts are preferred for summarizing data.
- Grouped line or bar charts are good for showing trends over time.
- Grouped bar charts are better than pie charts for presenting parts of a whole.
- Grouped line or bar charts are good for comparing patterns of variables.
- Use horizontal rather than vertical bars when comparing variables.
- Use single line or bar charts to compare individual data points between variables
- Put data values on the top of the bars in a bar chart for easier reading.

Note :

Types of decisions

There are three types of decisions

- Programmed decisions
- Non programmed decisions
- Semi programmed decisions

(1) **Programmed decisions** : The decisions in which a problem is solved by a predefined procedure or algorithm. These decisions are repetitive and routine in nature and are capable of being modeled mathematically in their entirety.

The examples of such decisions are :
(i) preparation of pay in accordance with the laid out regulations
(II) inventory ordering.
To arrive at the programmed decisions, a solution manual to problems is prepared to help the users. Some characteristics of such decisions are :
(i) These decisions can be delegated
(ii) The cost of solving a problem is low compared to non-programmed rules
(iii) Such decisions can be made with the help of the computer system.
(2) **Non programmed decisions** : These decisions are unstructured, occasional, of high consequence, complex and involve major commitments. There is no predefined program or set decision rule or algorithm available to solve these problems automatically.
The examples of such decisions are :
(i) advertising budget
(ii) new product decisions
(iii) acquisition of capital projects
Some characteristics of such decisions are
(i) These decisions are novel and difficult to structure in logical mathematical terms.
(ii) These decisions cannot be delegated, and are based on management direction, thinking and deliberations, e.g., purchase of scarce and capital items under fluctuating price conditions cannot be delegated
(iii) Computers cannot be used directly for such decisions. However, they may be used to process large volumes of necessary data.
(3) **Semi programmed decisions** : In these types of decision, at least one but not more than two of the above stages can be handled by a well defined preset procedure. An example of such a decision is the intelligence phase, which is well structured, having diverse kinds of variance analysis. Here a comparison with a budget is undertaken in a well defined way to indicate the need for a decision. Subsequent stages of design and choice are, however, not handled by any set procedure.

9.10 Electronic Commerce :

9.10.1 Introduction :

WHAT IS E-COMMERCE?
E-commerce—the use of the Internet and the Web to transact business. More formally, it is digitally enabled commercial transactions between and among organizations and individuals. Digitally enabled transactions include all transactions mediated by digital technology. For the most part, this means transactions that occur over the Internet and the Web. Commercial transactions involve the exchange of value (e.g., money) across organizational or individual boundaries in return for products and services. Exchange of value is important for understanding the limits of e-commerce. Without an exchange of value, no commerce occurs.

THE DIFFERENCE BETWEEN E-COMMERCE AND E-BUSINESS
There is a debate among consultants and academics about the meaning and limitations of both e-commerce and e-business. Some argue that e-commerce encompasses the entire world of electronically based organizational activities that support a firm's market exchanges—including a firm's entire information system's infrastructure. Others argue, on the other hand, that e-business encompasses the entire world of internal and external electronically based activities, including e-commerce.

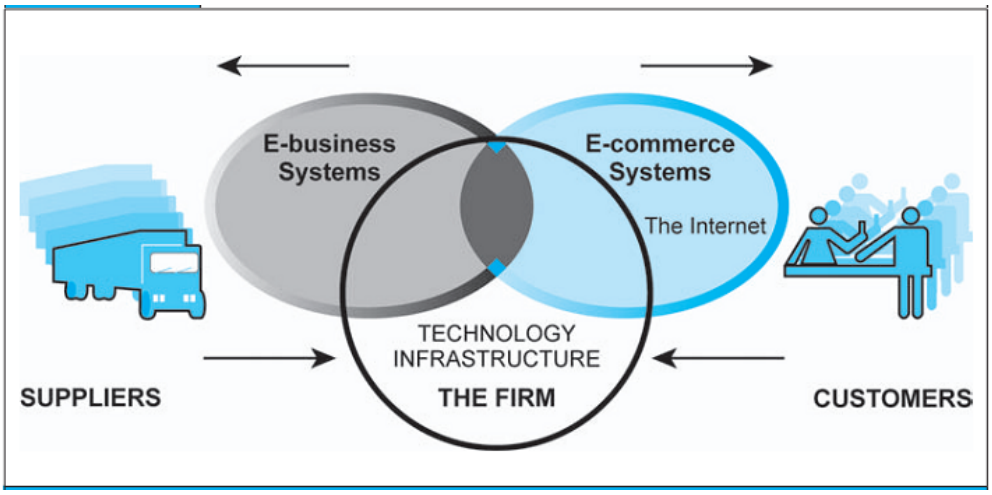


Fig. 9.10 : Difference between E-commerce & E-Business.

SEVEN UNIQUE FEATURES OF E-COMMERCE TECHNOLOGY :

Each of the dimensions of e-commerce technology and their business significance listed in Table 9.8 deserves a brief exploration, as well as a comparison to both traditional commerce and other forms of technology-enabled commerce.

1. Ubiquity

In traditional commerce, a marketplace is a physical place you visit in order to transact. For example, television and radio typically motivate the consumer to go someplace to make a purchase. E-commerce, in contrast, is characterized by its ubiquity: it is available just about everywhere, at all times. It liberates the market from being restricted to a physical space and makes it possible to shop from your desktop, at home, at work, or even from your car, using mobile commerce. The result is called a marketspace—a marketplace extended beyond traditional boundaries and removed from a temporal and geographic location. From a consumer point of view, ubiquity reduces transaction costs—the costs of participating in a market. To transact, it is no longer necessary that you spend time and money traveling to a market. At a broader level, the ubiquity of e-commerce lowers the cognitive energy required to transact in a marketspace. Cognitive energy refers to the mental effort required to complete a task. Humans generally seek to reduce cognitive energy outlays. When given a choice, humans will choose the path requiring the least effort—the most convenient path (Shapiro and Varian, 1999; Tversky and Kahneman, 1981).

2. Global Reach

E-commerce technology permits commercial transactions to cross cultural and national boundaries far more conveniently and cost-effectively than is true in traditional commerce. As a result, the potential market size for e-commerce merchants is roughly equal to the size of the world's online population (over 1 billion in 2005, and growing rapidly, according to the Computer Industry Almanac) (Computer Industry Almanac, Inc., 2006). The total number of users or customers an e-commerce business can obtain is a measure of its reach (Evans and Wurster, 1997). In contrast, most traditional commerce is local or regional—it involves local merchants or national merchants with local outlets. Television and radio stations, and newspapers, for instance, are primarily local and regional institutions with limited but powerful national networks that can attract a national audience. In contrast to e-commerce technology, these older commerce technologies do not easily cross national boundaries to a global audience.

3. Universal Standards

One strikingly unusual feature of e-commerce technologies is that the technical standards of the Internet, and therefore the technical standards for conducting e-commerce, are universal

standards—they are shared by all nations around the world. In contrast, most traditional commerce technologies differ from one nation to the next. For instance, television and radio standards differ around the world, as does cell telephone technology. The universal technical standards of the Internet and e-commerce greatly lower market entry costs—the cost merchants must pay just to bring their goods to market. At the same time, for consumers, universal standards reduce search costs—the effort required to find suitable products. And by creating a single, one-world marketspace, where prices and product descriptions can be inexpensively displayed for all to see, price discovery becomes simpler, faster, and more accurate (Bakos, 1997; Kambil, 1997). And users of the Internet, both businesses and individuals, experience network externalities—benefits that arise because everyone uses the same technology. With e-commerce technologies, it is possible for the first time in history to easily find many of the suppliers, prices, and delivery terms of a specific product anywhere in the world, and to view them in a coherent, comparative environment. Although this is not necessarily realistic today for all or many products, it is a potential that will be exploited in the future.

4. Richness :

Information richness refers to the complexity and content of a message (Evans and Wurster, 1999). Traditional markets, national sales forces, and small retail stores have great richness: they are able to provide personal, face-to-face service using aural and visual cues when making a sale. The richness of traditional markets makes them a powerful selling or commercial environment. Prior to the development of the Web, there was a trade-off between richness and reach: the larger the audience reached, the less rich the message (see Figure 1.2).

5. Interactivity

Unlike any of the commercial technologies of the twentieth century, with the possible exception of the telephone, e-commerce technologies allow for interactivity, meaning they enable two-way communication between merchant and consumer. Television, for instance, cannot ask viewers any questions or enter into conversations with them, and it cannot request that customer information be entered into a form. In contrast, all of these activities are possible on an e-commerce Web site. Interactivity allows an online merchant to engage a consumer in ways similar to a face-to-face experience, but on a much more massive, global scale.

6. Information Density

The Internet and the Web vastly increase information density—the total amount and quality of information available to all market participants, consumers, and merchants alike. E-commerce technologies reduce information collection, storage, processing, and communication costs. At the same time, these technologies increase greatly the currency, accuracy, and timeliness of information—making information more useful and important than ever. As a result, information becomes more plentiful, less expensive, and of higher quality. A number of business consequences result from the growth in information density. In e-commerce markets, prices and costs become more transparent. Price transparency refers to the ease with which consumers can find out the variety of prices in a market; cost transparency refers to the ability of consumers to discover the actual costs merchants pay for products (Sinha, 2000). But there are advantages for merchants as well. Online merchants can discover much more about consumers; this allows merchants to segment the market into groups willing to pay different prices and permits them to engage in price discrimination—selling the same goods, or nearly the same goods, to different targeted groups at different prices. For instance, an online merchant can discover a consumer's avid interest in expensive exotic vacations, and then pitch expensive exotic vacation plans to that consumer at a premium price, knowing this person is willing to pay extra for such a vacation. At the same time, the online merchant can pitch the same vacation plan at a lower price to more price-

sensitive consumers (Shapiro and Varian, 1999). Merchants also have enhanced abilities to differentiate their products in terms of cost, brand, and quality.

7. Personalization/Customization

E-commerce technologies permit personalization: merchants can target their marketing messages to specific individuals by adjusting the message to a person's name, interests, and past purchases. The technology also permits customization— changing the delivered product or service based on a user's preferences or prior behavior. Given the interactive nature of e-commerce technology, much information about the consumer can be gathered in the marketplace at the moment of purchase. With the increase in information density, a great deal of information about the consumer's past purchases and behavior can be stored and used by online merchants. The result is a level of personalization and customization unthinkable with existing commerce technologies. For instance, you may be able to shape what you see on television by selecting a channel, but you cannot change the contents of the channel you have chosen. In contrast, the online version of the Wall Street Journal allows you to select the type of news stories you want to see first, and gives you the opportunity to be alerted when certain events happen. Now, let's return to the question that motivated this section: Why study e-commerce? The answer is simply that e-commerce technologies—and the digital markets that result—promise to bring about some fundamental, unprecedented shifts in commerce. One of these shifts, for instance, appears to be a large reduction in information asymmetry among all market participants (consumers and merchants). In the past, merchants and manufacturers were able to prevent consumers from learning about their costs, price discrimination strategies, and profits from sales. This becomes more difficult with e-commerce, and the entire marketplace potentially becomes highly price competitive. In addition, the unique dimensions of e-commerce technologies listed in Table 9.8 also suggest many new possibilities for marketing and selling—a powerful set of interactive, personalized, and rich messages are available for delivery to segmented, targeted audiences. E-commerce technologies make it possible for merchants to know much more about consumers and to be able to use this information more effectively than was ever true in the past. Potentially, online merchants could use this new information to develop new information asymmetries, enhance their ability to brand products, charge premium prices for high-quality service, and segment the market into an endless number of subgroups, each receiving a different price. To complicate matters further, these same technologies make it possible for merchants to know more about other merchants than was ever true in the past. This presents the possibility that merchants might collude on prices rather than compete and drive overall average prices up. This strategy works especially well when there are just a few suppliers.

Table 9.8 : Seven unique features of E-Commerce Technology

S.No.	E-Commerce Technology Dimension	Business Significance
1	**Ubiquity—**Internet/Web technology is available everywhere: at work, at home, and elsewhere via mobile devices, anytime.	The marketplace is extended beyond traditional boundaries and is removed from a temporal and geographic location. "Marketspace" is created; shopping can take place anywhere. Customer convenience is enhanced, and shopping costs are reduced.
2	**Global reach—**The technology reaches across national boundaries, around the earth.	Commerce is enabled across cultural and national boundaries seamlessly and without modification. "Marketspace" includes potentially billions of consumers and millions of businesses worldwide.

3	**Universal standards—**There is one set of technology standards, namely Internet standards.	There is one set of technical media standards across the globe.
4	**Richness—**Video, audio, and text messages are possible.	Video, audio, and text marketing messages are integrated into a single marketing message and consuming experience.
5	**Interactivity—**The technology works through interaction with the user.	Consumers are engaged in a dialog that dynamically adjusts the experience to the individual, and makes the consumer a co-participant in the process of delivering goods to the market.
6	**Information density—**The technology reduces information costs and raises quality.	Information processing, storage, and communication costs drop dramatically, while currency, accuracy, and timeliness improve greatly. Information becomes plentiful, cheap and accurate.
7	**Personalization/Customization—** The technology allows personalized messages to be delivered to individuals as well as groups.	Personalization of marketing messages and customization of products and services are based on individual characteristics.

9.10.2 Types :

There are a variety of different types of e-commerce and many different ways to characterize these types. Table 1.3 lists the five major types of e-commerce.

For the most part, we distinguish different types of e-commerce by the nature of the market relationship—who is selling to whom. The exceptions are P2P and m-commerce, which are technology-based distinctions.

Business-to-Consumer (B2C) E-commerce

The most commonly discussed type of e-commerce is Business-to-Consumer (B2C) e-commerce, in which online businesses attempt to reach individual consumers. Even though B2C is comparatively small ($140–$170 billion in 2005), it has grown exponentially since 1995, and is the type of e-commerce that most consumers are likely to encounter. Within the B2C category, there are many different types of business models. Chapter 2 has a detailed discussion of seven different B2C business models: portals, online retailers, content providers, transaction brokers, market creators, service providers, and community providers.

Business-to-Business (B2B) E-commerce

Business-to-Business (B2B) e-commerce, in which businesses focus on selling to other businesses, is the largest form of e-commerce, with over $1.5 trillion in transactions in the United States in 2005. There was an estimated $13 trillion in business-to-business exchanges of all kinds, online and offline, in 2002, suggesting that B2B e-commerce has significant growth potential (eMarketer, Inc., 2003).

The ultimate size of B2B e-commerce could be huge. There are two primary business models used within the B2B arena: Net marketplaces, which include e-distributors, e-procurement companies, exchanges and industry consortia, and private industrial networks, which include single firm networks and industry-wide networks.

Consumer-to-Consumer (C2C) E-commerce

Consumer-to-Consumer (C2C) e-commerce provides a way for consumers to sell to each other, with the help of an online market maker such as the auction site eBay.
Given that in 2005, eBay generated more than $44 billion in gross merchandise volume around the world, it is probably safe to estimate that the size of the global C2C market in 2006 will be over $50 billion (eBay, 2006). In C2C e-commerce, the consumer prepares the product for market, places the product for auction or sale, and relies on the market maker to provide catalog, search engine, and transaction-clearing capabilities so that products can be easily displayed, discovered, and paid for.

Peer-to-Peer (P2P) E-commerce
Peer-to-peer technology enables Internet users to share files and computer resources directly without having to go through a central Web server. In peer-to-peer's purest form, no intermediary is required, although in fact, most P2P networks make use of intermediary "super servers" to speed operations. Since 1999, entrepreneurs and venture capitalists have attempted to adapt various aspects of peer-to-peer technology into Peer-to-Peer (P2P) e-commerce. To date there have been very few successful commercial applications of P2P e-commerce with the notable exception of illegal downloading of copyrighted music.
Napster.com, which was established to aid Internet users in finding and sharing online music files, was the most well-known example of peer-to-peer e-commerce until it was put out of business in 2001 by a series of negative court decisions.
However, other file-sharing networks, such as Kazaa and Grokster, quickly emerged to take Napster's place. These networks have also been subjected to legal challenge. For instance, in 2002, the Recording Industry of America, a trade organization of the largest recording companies, filed a federal lawsuit against Kazaa and Grokster for violating copyright law by enabling and encouraging members to exchange copyrighted music tracks without compensation to the copyright holders. The Supreme Court issued a decision in the case against the file-sharing networks in June 2005. Read the case study at the end of the chapter for a further look at how file-sharing networks work and the legal issues surrounding them.

Mobile Commerce (M-commerce)
Mobile commerce, or m-commerce, refers to the use of wireless digital devices to enable transactions on the Web. Described more fully in Chapter 3, m-commerce involves the use of wireless networks to connect cell phones, handheld devices such Blackberries, and personal computers to the Web. Once connected, mobile consumers can conduct transactions, including stock trades, in-store price comparisons, banking, travel reservations, and more. Thus far, m-commerce is used most widely in Japan and Europe (especially in Scandinavia), where cell phones are more prevalent than in the United States; however, as discussed in the next section, m-commerce is expected to grow rapidly in the United States over the next five years.

MAJOR TYPES OF E-COMMERCE :
1. B2C—Business-to-Consumer Amazon.com is a general merchandiser that sells consumer products to retail consumers.
2. B2B—Business-to-Business ChemConnect.com is a chemical industry exchange that creates an electronic market for chemical producers and users.
3. C2C—Consumer-to-Consumer eBay.com creates a marketspace where consumers can auction or sell goods directly to other consumers.
4. P2P—Peer-to-Peer Gnutella is a software application that permits consumers to share music with one another directly, without the intervention of a market maker as in C2C e-commerce.

5. M-commerce—Mobile commerce Wireless mobile devices such as PDAs (personal digital assistants) or cell phones can be used to conduct commercial transactions.

TYPE OF E-COMMERCE	EXAMPLE
B2C—Business-to-Consumer	Amazon.com is a general merchandiser that sells consumer products to retail consumers.
B2B—Business-to-Business	ChemConnect.com is a chemical industry exchange that creates an electronic market for chemical producers and users.
C2C—Consumer-to-Consumer	eBay.com creates a marketspace where consumers can auction or sell goods directly to other consumers.
P2P—Peer-to-Peer	Gnutella is a software application that permits consumers to share music with one another directly, without the intervention of a market maker as in C2C e-commerce.
M-commerce—Mobile commerce	Wireless mobile devices such as PDAs (personal digital assistants) or cell phones can be used to conduct commercial transactions.

Business-to-Government (B2G) e-commerce can be considered yet another type of e-commerce. For the purposes of this text, we subsume B2G e-commerce within B2B e-commerce, viewing the government as simply a form of business when it acts as a procurer of goods and/or services.

9.10.3 Advantages :

Advantages for traders

1. Competition

The possibility of the small companies to compete with the large companies Due to small expenses incurred by a virtual shop small companies are confronting with one less barrier in penetrating the markets already dominated by the large companies. More than this due to her flexibility and perception towards new the small company has a major advantage in comparison with a large one dominated by beurocracy and conservatorism.

2. Permanent contact with customers for 24 hours and 7 days

Comparing with the common employees who need salaries, a working time table, vacation, with a varying productivity and being subjective a web site is offering information about the company and her products or she is taking and processing orders for 24 hours of 24 and 7 days of 7 continuously with minim costs. This is bringing an advantage, too in case of the 297 expansion on the foreign markets when the hourly difference making more difficult the contacts between the companies. It also improves the communication with the customers that have not to observe a strict time table thus being able to obtain information and place orders any time.

3. International markets penetration facilities

The world network is not limited by borders, it does not belong to anyone and the access and publication costs are extremely low. The communication with a customer positioned to the opposite pole of the world is as easy as the communication with someone in the next room. Any producer now can sell his products in any country by the means of the web site and no

contacts with local companies or large investments are necessary anymore.

4. The decrease of the functioning costs

These costs may be drastically diminished by the automatics of the orders process. There is also the possibility of a total automatics by the integration with the administration system thus leading to the increase of the general productivity of the company.

5. New possibilities for performing a direct marketing (one-to-one)

Comparing with a human being the computer may retain not only the name and personal data of all customers as well as their preferences being capable to adapt the offer and products presentation according to each customer's profile. The study of the customers on internet may be achieved using all available data such as: location, type of browser and operation system, the site where they do come from navigation habits but the customers will not realize at all that they are subject of such studies. This is why many consider this as an infringement of the personal intimacy.

Advantages for buyers :

1. Availability for 24 hours of 24 and 7 days of 7

This availability independent on a certain program represents a major advantage for the clients who can purchase during night too when they are not busy with other urgent problems (job, household).

2. Facilities

Due to the electronic commerce there is no need to go to the commercial places or to the shop next to corner. Everybody may place orders from home sitting in front of the PC and thoroughly analyzing and comparing different products.

3. Access to information and different products without any restrictions

The apparition of the electronic commerce gave a new meaning of the term 'globalization'. For example in order to buy handcrafted items from Madagascar it is not necessary to travel to that destination but only to open the browser at the address of a shop that is trading such items (address that can be found using the searching motors). Before buying the product the potential future buyer has more free and cheap access to the offers of the producers or trading companies.

9.10.4 Disadvantages :

Disadvantages to Trader :

1. The Fraud

As in any other activity field, the technology of internet created new fraudulent possibilities. In the lack of a direct contact a client may cheat the trader regarding his identity or his real payment possibilities. Most of the occidental virtual shops hesitate to send commodities to East Europe because of the many successful embezzlement trials initiated by East Europeans with false credit cards.

2. The Security

Another important problem is that regarding the security of the data. A company that has not access to internet does not have too many worry reasons as regards the integrity of her administration informatics systems. The connection to a public network that can be accessed by anyone more or less authorized and the access to the confidential data of the local network is raising serious problems. Therefore new risks occur these being not present before the apparition of such type of commerce.

3. Launch and integration costs

Although the launch costs of a virtual shop are much lower in comparison with those of a real one they may be incorrectly estimated. A company that has not implemented yet an administration informatics system or those where the employees do not have minim technical

knowledge may confront with an unexpected increase of the launch costs due to the necessity of the acquisition of training systems for the employees.

Disadvantages for buyers

1. Security :

The most important reason for which some persons hesitate to use internet for purchases-as resulted from most of the opinion polls – is that of being afraid to supply on line information regarding the credit card. But the same persons are giving daily the credit card number, at phone, to other persons they even do not know at all when they buy from catalogues or TVs.

2. Intimacy :

Another important problem is the attempt to the personal intimacy. The potential buyers are afraid that by internet the traders or a bad will person can collect thorough information and they will not realize this at all. Unfortunately these worries are the result of some exaggerations especially in Occident where The Theory of Conspiracies is fashionable.

3. Absence of human contact :

This is the obvious inconvenient generated by the electronic commerce. The low launching and maintenance costs of a virtual shop derives of the advantages of the automatics of the processes and there is no need to employ additional personal, on one hand. On the other hand the absence of the seller, the human presence to which the buyer may appeal to in case he has doubts, represents an obstacle in spreading this form of commerce. In this respect some companies created programs that are permitting the vocal contact or visual one between the customer and one employee of the company during his visit on the web site.

4. Access to technology :

Thoroughly the access to technology refers to both the internet penetration degree and the spread of the computers and specialized knowledge. As long as a site of electronic commerce will be accessible only to persons who at least know to launch the browser and type the web address most of the potential customers will prefer the next to corner shop.

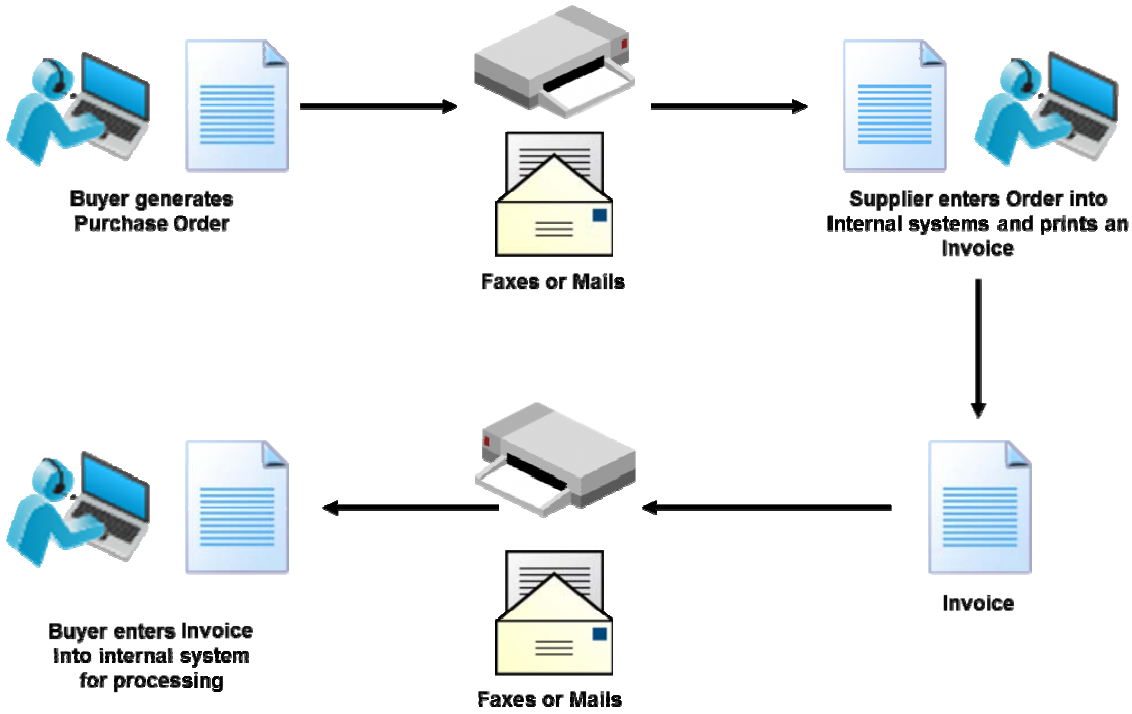
9.11 Electronic Data Interchange :

What is EDI?

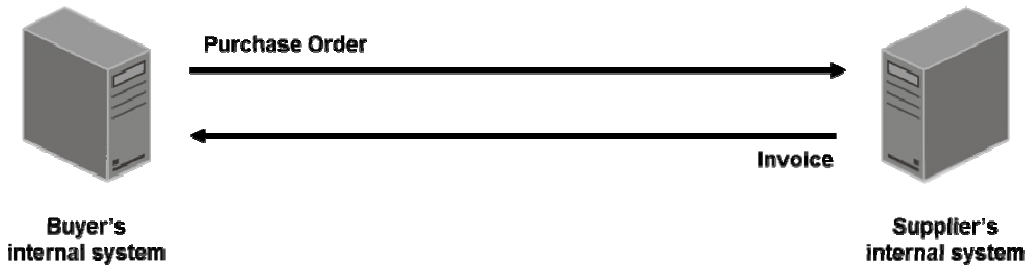
Electronic Data Interchange (EDI) is the computer-to-computer exchange of business documents in a standard electronic format between business partners. By moving from a paper-based exchange of business document to one that is electronic, businesses enjoy major benefits such as reduced cost, increased processing speed, reduced errors and improved relationships with business partners.

Each term in the definition is significant:

- **Computer-to-computer**– EDI replaces postal mail, fax and email. While email is also an electronic approach, the documents exchanged via email must still be handled by people rather than computers. Having people involved slows down the processing of the documents and also introduces errors. Instead, EDI documents can flow straight through to the appropriate application on the receiver's computer (e.g., the Order Management System) and processing can begin immediately. A typical manual process looks like this, with lots of paper and people involvement:



The EDI process looks like this — no paper, no people involved:



- **Business documents** – These are any of the documents that are typically exchanged between businesses. The most common documents exchanged via EDI are purchase orders, invoices and advance ship notices. But there are many, many others such as bill of lading, customs documents, inventory documents, shipping status documents and payment documents.
- **Standard format**– Because EDI documents must be processed by computers rather than humans, a standard format must be used so that the computer will be able to read and understand the documents. A standard format describes what each piece of information is and in what format (e.g., integer, decimal, mmddyy). Without a standard format, each company would send documents using its company-specific format and, much as an English-speaking person probably doesn't understand Japanese, the receiver's computer system doesn't understand the company-specific format of the sender's format.
  - There are several EDI standards in use today, including ANSI, EDIFACT, TRADACOMS and ebXML. And, for each standard there are many different versions, e.g., ANSI 5010 or EDIFACT version D12, Release A. When two businesses decide to exchange EDI documents, they must agree on the specific EDI standard and version.

  - Businesses typically use an EDI translator – either as in-house software or via an EDI service provider – to translate the EDI format so the data can be used by their internal applications and thus enable straight through processing of documents.
- **Business partners** – The exchange of EDI documents is typically between two different companies, referred to as business partners or trading partners. For example, Company A may buy goods from Company B. Company A sends orders to Company B. Company A and Company B are business partners.

Companies that use e-commerce often use Electronic Data Interchange (EDI). EDI involves using standardised document / file formats across the entire company. This means that employees use the same system to order materials, track customer orders, control stock levels, produce invoices and to carry out accounting.

Companies that use EDI, can transfer data from one branch to another and even across the world, with full confidence that the data can be accessed, edited and updated, without problems. A very good example of a standardised document format is PDF. This type of document can be emailed and opened on most computer systems, including smart phones.

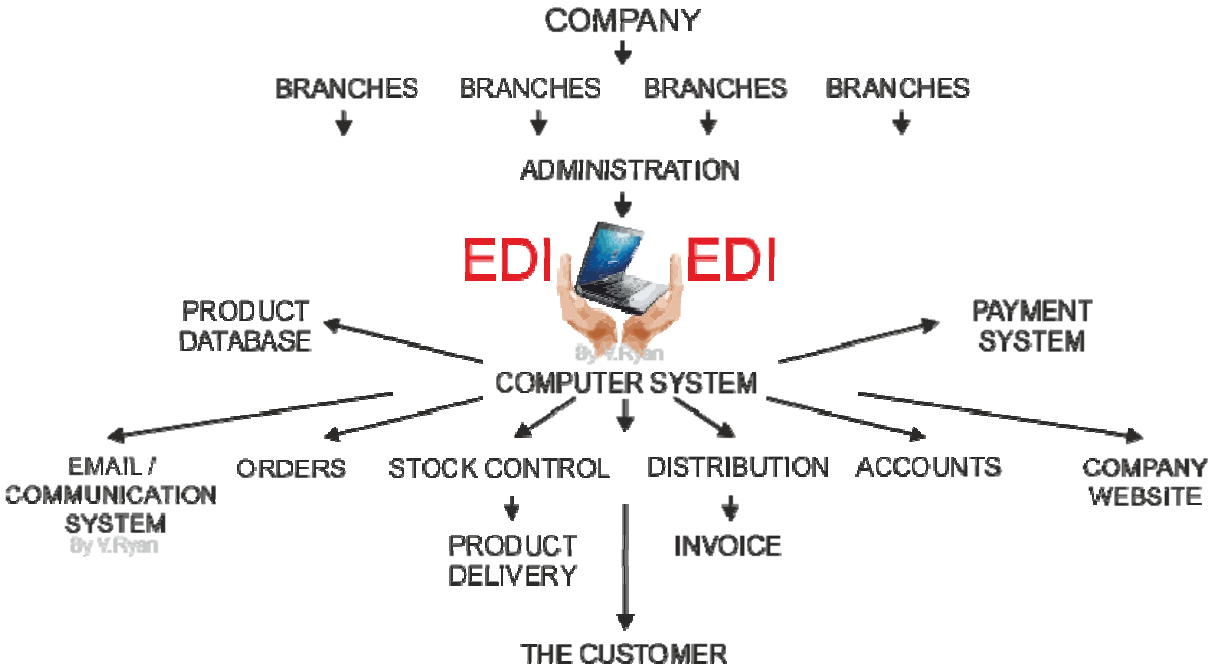
ADVANTAGES:

1. Reduces the overall costs of running a business, as the computer system carries out difficult and complicated tasks automatically.
2. The computer system monitors and controls most aspects of the business. Stock levels, order levels, accounts and invoices are known immediately, without the need for labourious manual intervention and accounting.
3. EDI eliminates the need for most paperwork, helping the environment. Efficiency levels are very high, as human error is minimised. The effective flow of business is assured.
4. EDI systems enhance security for the customer and company. Improved communication between employees and branches, due to the use of standardised document and data formats.

DISADVANTAGES:

1. Systems need continual electronic protection, from viruses, hacking and potential fraud. EDI systems need regular software updates.
2. In case of a systems failure, manual systems must also be in place to ensure that business continues.
3. Staff must recieve training, every time the EDI system is updated. This is a continuous investment.
4. Companies relying on EDI must invest in backup systems, in case the primary system fails. Human input error is still potentially a problem, although the software being used should highlight most errors.
5. Data Protection Laws, protecting customers and employees, must be applied and adhered to by employees and the company.

How EDI works -



Advantages :

1. Save Money

The cost of paper and paper processing is incredibly high compared to a properly implemented EDI program. RJR Nabisco estimates that processing a paper purchase order costs the company $70. Processing an EDI purchase order reduces the cost to a mere 93 cents.

2. End Repetition

If your trading partner wants a copy of a document, instead of calling you they simply check their mailbox. This results in a great time savings from not having to copy and fax/mail copies of business documents.

3. Save Time

EDI also saves time over paper processing since the transfer of information from computer to computer is automatic. There is no need to rekey information with EDI. And the chance for error drops to near zero, with no data entry.

4. Improve Customer Service

The quick transfer of business documents and marked decrease in errors allow you to do business faster and more efficient. KMart is an example of a retailer that implements a Vendor Stock Replenishment (VSR) program. With VSR, the KMart warehouse sends stock as their EDI system reports it and automatically bills the client. It can cut weeks from the order fulfillment cycle and ensures that product is always on the shelf.

5. Expand Your Customer Base

Thus with improved customer service, you can ultimately expand your customer base. Many large manufacturers and retailers are ordering their suppliers to institute an EDI program. So, when evaluating a new product to carry or a new supplier to use, the ability to do EDI is a big plus.

EDI benefits :

EDI continues to prove its major business value by lowering costs, improving speed, accuracy and business efficiency. The greatest EDI benefits often come at the *strategic* business level.

According to a recent research study from Forrester, EDI continues to prove its worth as an electronic message data format. This research states that “the annual volume of global EDI

transactions exceeds 20 billion per year and is still growing."[1] For buyers that handle numerous transactions, using EDI can result in millions of dollars of annual savings due to early payment discounts. From a financial perspective alone, there are impressive benefits from implementing EDI. Exchanging documents electronically improves transaction speed and visibility while decreasing the amount of money you spend on manual processes. But cost savings is far from the only benefit of using EDI.

But let's start with *cost savings* anyway:

- Expenses associated with paper, printing, reproduction, storage, filing, postage and document retrieval are all reduced or eliminated when you switch to EDI transactions, lowering your transaction costs by at least 35%
- A major electronics manufacturer calculates the cost of processing an order manually at $38 compared to just $1.35 for an order processed using EDI
- Errors due to illegible faxes, lost orders or incorrectly taken phone orders are eliminated, saving your staff valuable time from handling data disputes

The major benefits of EDI are often stated as *speed and accuracy*:

- EDI can speed up your business cycles by 61%. Exchange transactions in minutes instead of the days or weeks of wait time from the postal service
- Improves data quality, delivering at least a 30—40% reduction in transactions with errors—eliminating errors from illegible handwriting, lost faxes/mail and keying and re-keying errors.
- Using EDI can reduce the order-to-cash cycle time by more than 20%, improving business partner transactions and relationships.

However, the increase in business *efficiency* is also a major factor:

- Automating paper-based tasks allows your staff to concentrate on higher-value tasks and provides them with the tools to be more productive.
- Quick processing of accurate business documents leads to less re-working of orders, fewer stock outs and fewer cancelled orders.
- Automating the exchange of data between applications across a supply chain can ensure that business-critical data is sent on time and can be tracked in real time. Sellers benefit from improved cash flow and reduced order-to-cash cycles.
- Shortening the order processing and delivery times means that organizations can reduce their inventory levels.

In many cases, the greatest EDI benefits come at the *strategic* business level:

- Enables real-time visibility into transaction status. This in turn enables faster decision-making and improved responsiveness to changing customer and market demands, and allows businesses to adopt a demand-driven business model rather than a supply-driven one.
- Shortens the lead times for product enhancements and new product delivery
- Streamlines your ability to enter new territories and markets. EDI provides a common business language that facilitates business partner onboarding anywhere in the world.
- Promotes corporate social responsibility and sustainability by replacing paper-based processes with electronic alternatives. This will both save you money and reduce your CO_2 emissions

EDI : Limitations :

1. Expense

Business application systems were complex and expensive. Primarily serving the peripheral functions of a business, they were not regarded as being fully integrated into all business activities. So while there were substantial savings to be gained from the use of EDI, the cost

of re-designing and deploying software applications to integrate EDI into an existing portfolio of business applications was high enough to offset the anticipated advantages.

2. Network Complexity

The need for extensive telecommunications capability posed a second major barrier to widespread EDI implementation for small to mid-sized companies. Beyond the computer itself, a basic requirement of EDI is a means to transmit and receive information to and from a wide variety of customers or suppliers. This required a heavy investment in computer networks. Unlike the mail, to send electronic documents there must be a specific point-to-point electronic path for the document to take. So companies were either required to develop extensive and expensive networks, or rely on intermittent point-to-point modem communication.

3. Many Standards

There are too many standards bodies developing standard documents formats for EDI. For example your company may be following the X12 standard format, while your trading partner follows the EDIFACT standard format.

4. Changing Standards

Each year, most standards bodies publish revisions to the standards. This poses a problem to EDI users. You may be using one version of the standard while your trading partners are still using older versions.

5. EDI is Too Expensive

Some companies are only doing business with others who use EDI. If a company wants to do business with these organizations, they have to implement an EDI program. This expense may be very costly for small companies.

6. Limit Your Trading Partners

Some large companies tend to stop doing business with companies who don't comply with EDI. For example Wal Mart is only doing business with other companies that use EDI. The result of this is a limited group of people you can do business with.

EDI Advantages and Disadvantages

Advantages	Disadvantages
Automating existing business procedures in inventory management, transport and distribution, also in administration, and cash management.	Managerial problems in the support, maintenance and implementation of EDI transactions.
Cost saving in - document preparation, postage, and handling of mainstream transactions- reduced errors and exceptions handling.	Each entity may have a different method of delivery, ranging from dial-up BBS systems mailing hard media such as a CD-ROM or tape backup.
Faster handling of transactions results in increased cash flow.	Lack of strict standards across implementations, transactions and methods. Improve customer services and Enhance the business process and operations One single computer application cannot handle all health care entities. Though this may not be necessary, it can lead to an obvious management headache as a company attempts to register itself with various EDI partners.

Improve customer services and Enhance the business process and operations	One single computer application cannot handle all health care entities. Though this may not be necessary, it can lead to an obvious management headache as a company attempts to register itself with various EDI partners.

1. Define e-commerce and describe how it differs from e-business.

• E-commerce involves digitally enabled commercial transactions between and among organizations and individuals. Digitally enabled transactions include all those mediated by digital technology, meaning, for the most part, transactions that occur over the Internet and the Web. Commercial transactions involve the exchange of value (e.g., money) across organizational or individual boundaries in return for products or services.

• E-business refers primarily to the digital enablement of transactions and processes within a firm, involving information systems under the control of the firm. For the most part, e-business does not involve commercial transactions across organizational boundaries where value is exchanged.

2. Identify the unique features of e-commerce technology and discuss their business significance.

There are seven features of e-commerce technology that are unique to this medium.

E-commerce technology:

• is ubiquitous—it is available just about everywhere, at all times, making it possible to shop from your desktop, at home, at work, or even from your car.

• has global reach, permitting commercial transactions to cross cultural and national boundaries far more conveniently and cost-effectively than is true in traditional commerce.

• operates according to universal standards shared by all nations around the world.

In contrast, most traditional commerce technologies differ from one nation to the next.

• provides information richness, which refers to the complexity and content of a message. It enables an online merchant to deliver marketing messages with text, video, and audio to an audience of millions, in a way not possible with traditional commerce technologies such as radio, television, or magazines.

• is interactive—it allows for two-way communication between merchant and consumer and enables the merchant to engage a consumer in ways similar to a face-to-face experience, but on a much more massive, global scale.

• increases information density (the total amount and quality of information available to all market participants). The Internet reduces information collection, storage, processing, and communication costs while increasing the currency, accuracy, and timeliness of information.

• permits personalization and customization. Merchants can target their marketing messages to specific individuals by adjusting the message to a person's name, interests, and past purchases. Because of the increase in information density, a great deal of information about the consumer's past purchases and behavior can be stored and used by online merchants. The result is a level of personalization and customization unthinkable with existing commerce technologies.

3. Describe the major types of e-commerce.

There are five major types of e-commerce:

• B2C involves businesses selling to consumers and is the type of e-commerce that most consumers are likely to encounter. In 2005, consumers spent about $142–$172 billion in B2C transactions.

• B2B e-commerce involves businesses selling to other businesses and is the largest form of e-commerce, with an estimated $1.5 trillion in transactions occurring in 2005.
• C2C is a means for consumers to sell to each other. In C2C e-commerce, the consumer prepares the product for market, places the product for auction or sale, and relies on the market maker to provide catalog, search engine, and transaction clearing capabilities so that products can be easily displayed, discovered, and paid for.
• P2P technology enables Internet users to share files and computer resources directly without having to go through a central Web server. Music and file-sharing services, such as Kazaa and Grokster, are prime examples of this type of e-commerce, because consumers can transfer files directly to other consumers without a central server involved.
• M-commerce involves the use of wireless digital devices to enable transactions on the Web.

4. Understand the visions and forces behind the early years of e-commerce ?

The early years of e-commerce were a period of explosive growth, beginning in 1995 with the first widespread use of the Web to advertise products and ending in 2000 with the collapse in stock market valuations for dot.com ventures. Among the visions for e-commerce expressed during the period were the following:
• For computer scientists, e-commerce was part of their vision of a universal communications and computing environment that everyone on earth could access with inexpensive computers.
• For economists, e-commerce raised the realistic prospect of a perfect Bertrand market—where price, cost, and quality information are equally distributed—and friction-free commerce.
• For entrepreneurs and their financial backers, e-commerce represented an extraordinary opportunity to earn far above normal returns on investment.
Overall, the early days of e-commerce were driven largely by visions of profiting from new technology, with the emphasis on quickly achieving very high market visibility. The source of financing was venture capital funds. The ideology of the period emphasized the ungoverned "Wild West" character of the Web and the feeling that governments and courts could not possibly limit or regulate the Internet; there was a general belief that traditional corporations were too slow and bureaucratic, too stuck in the old ways of doing business to "get it," that is, to be competitive in e-commerce.

5. Describe the major themes underlying the study of e-commerce.

E-commerce involves three broad interrelated themes:
• Technology: To understand e-commerce, you need a basic understanding of the information technologies upon which it is built, including the Internet and the World Wide Web, and a host of complementary technologies—personal computers, local area networks, client/server computing, packet-switched communications, protocols such as TCP/IP, Web servers, HTML, and relational databases, among others.
• Business: While technology provides the infrastructure, it is the business applications—the potential for extraordinary returns on investment—that create the interest and excitement in e-commerce. New technologies present businesses and entrepreneurs with new ways of organizing production and transacting business. Therefore, you also need to understand some key business concepts such as electronic markets, information goods, business models, firm and industry value chains, industry structure, and consumer behavior in electronic markets.
• Society: Understanding the pressures that global e-commerce places on contemporary society is critical to being successful in the e-commerce marketplace. The primary societal issues are intellectual property, individual privacy, and public policy.

6. List 5 advantages & disadvantages in E-Commerce ?

The Advantages

#1. Cost Effective :
The entire financial transactions will eventually become electronic, so sooner conversion is going to be lower on cost. It makes every transaction through e-commerce payment a lot cheaper.
#2. Higher Margin :
E-commerce also enables us to move better with higher margin for more business safety. Higher margin also means business with more control as well as flexibility. You can also save time from the e-commerce.
#3. Better Productivity :
Productivity here means productivity for both companies and customers. People like to find answers online because it is faster and cheaper, and it costs a lot cheaper expense as well for the company.
#4. Quick Comparison :
E-commerce also enables you to compare price among several providers. In the end, it leads you to smart shopping. People can save more money while they shop.
#5. Economy Benefit :
E-commerce allows us to make transaction without any needs on stores, infrastructure investment, and other common things we find. Companies only need well built website and customer service.

The Disadvantages :
#1. Security :
Customers need to be confident and trust the provider of payment method. Sometimes, we can be tricked. Examine on integrity and reputation of the web stores before you decide to buy.
#2. Scalability of System :
A company definitely needs a well developed website to support numbers of customers at a time. If your web destination is not well enough, you better forget it.
#3. Integrity on Data and System :
Customers need secure access all the time. In addition to it, protection to data is also essential. Unless the transaction can provide it, we should refuse for e-commerce.
#4. Products People :
People who prefer and focus on product will not buy online. They will want to feel, try, and sit on their new couch and bed.
#5. Customer Service and Relation Problem :
They sometimes forget how essential to build loyal relationship with customers. Without loyalty from customers, they will not survive the business.
The disadvantages are not impossible to avoid. If we have enough management on risks, we may really get a lot more advantages from e-commerce.

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9. 12. Assignment Questions :

1. Explain the different components of Information Systems and Information System Resources ?
2. Write a note on various Information System Activities
3. Explain how information Systems can be used for competitive Strategy
4. What are the strategic role of Information Systems ? Explain
5. Write a note on Strategic Use of Information Systems
6. List the factors contributing success & failure of MIS
7. Write a note on Information Concepts, its nature and functions.
8. Explain various methods of planning for information system ?
9. Write a note on MIS organizing issues and the MIS - control issues
10. Explain Simon model of Decision making ?
11. Explain the principle and working of Decision Support Systems
12. Define electronic Commerce -List various types ?
13. Explain advantages and disadvantages of Electronic commerce ?
14. What is Electronic data interchange ? Explain How EDI works
15. List the benefits and limitations of EDI

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Case Study 1 : Pepsi Cola Co. : Web Marketing Strategies

Would you shop for a soft drink online? Seems like a silly question. Of all the products for sales in the Universe, bottles and cans of sweet, carbonated liquid are probably the last things shoppers will want to buy on the Internet. Even frozen food has more potential. But soft drinks? They're cheap. They require no research to purchase. They are available on practically every street corner in the world. So why is Pepsi-Cola Co. trying so hard online? While many traditional advertisers have dabbled in the Net, Pepsi has a range of programs on the virtual air, from music sites to banner ads to Internet sweepstakes. Though only about 3 percent of its estimated $400 million soft drink ad budget goes online, that belies the emphasis the company places on the Web. "This medium is here to stay, and we buy that," says John Vail, director of digital media and marketing for Pepsi-Cola.

One reason: Despite the difficulties in measuring online ad performance, Pepsi has crafted deals that already show benefits. In a barter arrangement with Yahoo! Inc.) Pepsi plastered the portal's logo on 1.5 billion cans. In return, Yahoo took the cola company's already established loyalty program, Pepsi Stuff, to new heights. A co-branded web site, PepsiStuff.com let consumers collect points from bottle caps. The points were redeemable on the 'Web site for prizes-everything from electronic goods to concert tickets.

The results were considerable. Three million consumers logged on and registered at the PepsiStuff site, giving the cola company detailed consumer data that normally must be paid for in market research or gleaned from focus groups.

Information that once took months to obtain could now be had in days. What's more, Vail was able to tweak the program while it was in progress, maintaining the right inventory of the most popular prizes. "Instead of lagtime data, we had real-time and we could react to it," says Vail. Sales volume rose 5 percent during the online promotion and the cost was about one-fifth what it had been 'as a mail-in project.

Pepsi has no intention of slowing its Internet rush. The 'Web is the medium of choice for Pepsi's prime demographic audience, those under 25. "They are going to where their customer hangs out and flashing their name," says Tom Pirko, a beverage consultant for Santa Barbara-based Bevmark Ic. "This is aimed at flipping the next generation. For Pepsi, the Internet is serious. It's not a toy." For consumer Shane Erstad, 29, that's good news. Intrigued by the prizes and the ability to collect the points online, he became devoted to Mountain Dew and a fan of the Pepsi Stuff site. Even now that the game has ended, he hasn't cut back. "I hope they repeat the promotion," he says. He can count on it, and much more. For Pepsi knows that its E-commerce marketing strategies are a work in progress. Pepsi's online marketing road has been long and bumpy.

On February 29, 1996, the company launched Pepsi World, a Web site of sponsored content designed to attract the youthful consumer. Sports and music news was mixed with online games and animation. A seven figure publicity budget backed the debut. But it quickly became clear through focus groups and traffic numbers that Pepsi hadn't reached its target. Eyeballs were too fleeting, visitors too fickle. By the summer of 1997, Vail revamped the site to be less of a sports news digest and more of a vehicle to promote Pepsi-sponsored athletes, such as NASCAR driver Jeff Gordon.

Going forward, Pepsi plans to expand on its Web site-centric E-commerce marketing efforts. Although banner ads and other more traditional ad buys have had some success, it's the creation of engaging Pepsi Web sites that has given the brand the most traction online. For example, Vail would like to bring a virtual experience to many other Pepsi promotions, such as Choose Your Music, a current in-store create-your-own-CD promotion at participating music outlets.
"We're looking ahead to the next evolution," says Vail.

Case Study Questions
1. What are the major business benefits of Pepsi's online marketing efforts?
2. Do you approve of Pepsi's "Web-centric" E-commerce marketing strategy? Why or why not:
3. Visit www.pepsistuff.com or other Pepsi websites. What else could Pepsi do to improve its web-based marketing efforts? Explain.

Case Study 2 : General Electric Company –Evaluating E-business Strategy
General Electric (GE) is the world's largest diversified manufacturer. *Fortune* named GE "America's Most Admired Company" in 1998, 1999, and 2000. Jack Welch, GE's CEO and chairman since 1981, is often cited as the most admired CEO in the United States. Headquartered in Fairfield, Connecticut, the company consists of 20 units, including Appliances, Broadcasting (NBC), Capital, Medical Systems, and Transportation Systems. With the acquisition of Honeywell, announced in October 2000, GE became a company of $155 billion in revenue and 460,000 employees in 100 countries. Despite GE's size and old-economy businesses, *Internet Week* named GE its e-business company of 2000. Did GE transform itself into a digital firm?

At a January 1999 meeting of 500 top GE executives in Boca Raton, Florida, Welch announced a new initiative to turn GE into an Internet company. Earlier initiatives transformed GE and are partially responsible for its phenomenal rise in profit over the past two decades. Those initiatives were globalization of GE in the late 1980s, "products plus service" in 1995, which placed emphasis on customer service, and Six Sigma in 1996, a

quality program that mandated GE units to use feedback from customers as the center of the program.

Welch announced that the Internet "will forever change the way business is done. It will change every relationship, between our businesses, between our customers, between our suppliers." By Internet-enabling its business processes, GE could reduce overhead costs by half, saving as much as $10 billion in the first
two years. Gary Reiner, GE's corporate CIO, later explained "We are Web-enabling nearly all of the [purchasing] negotiations process, and we are targeting 100 percent of our transactions on the buy side being done electronically." On the sell side Reiner also wanted to automate as much as possible, including providing customer service and order taking.

GE had quietly been involved with the Internet years before the Boca Raton meeting, conducting more purchasing and selling on the Internet than any other non computer manufacturer. For example, within six months after beginning to use the Internet for purchasing in mid-1996, GE Lighting had reduced its purchasing cycle from 14 to 7 days. It also reduced its supply prices by 10 to 15 percent because of open bidding on the Internet. In 1997, seven other GE units began purchasing via the Net. The company even sold the concept to others, including Boeing and 3M.

Polymerland, GE Plastic's distribution arm, began distributing technical documentation over the Web in 1994. It put its product catalog on the Net in 1995 and in 1997 established a site for sales transactions. Its on-line system enables customers to search for product by name, number, or product characteristics, download product information, verify that the product meets their specifications, apply for credit, order, track the shipment, and even return merchandise. Polymerland's weekly on-line sales climbed from $10,000 in 1997 to $6 million in 2000.

Welch ordered all GE units to determine how dot.com companies could destroy their businesses, dubbing this project DYB (destroy your business). Welch explained that if these GE units didn't identify their weaknesses, others would. Once armed with these answers, managers were to change their units to prevent
it from happening. Each of GE's 20 units created small cross functional teams to execute the initiative. Welch also wanted them to move current operations to the Web and to uncover new Net-related business opportunities. The final product was to be an Internet-based business plan that a competitor could have used to take away their unit's customers, and a plan for changes to their unit to combat this threat. Reiner ordered GE units to "come back with alternative approaches that enhance value to the customer and reduce total costs."

The Internet initiative started by trying to change GE's culture at the very top. GE's internal newsletters and many of Welch's memos became available only on-line. To give blue-collar workers access to the Net, GE installed computer kiosks on factory floors. One thousand top managers and executives, including Welch (who also had to take typing lessons), were assigned young, skilled mentors to work with them three to four hours per week in order to make them comfortable with the Web. They had to be able to evaluate their competitors' Web sites and to use the Web in other beneficial ways. Every GE employee was given training. Welch announced in 2000, that GE would reduce administrative expenses by 30 to 50 percent (around $10 billion) within 18 months through use of the Internet.

Many projects came out of the initiative. For example GE Medical Systems, which manufactures diagnostic imaging systems, such as CAT scanners and mammography equipment, identified its DYB threat as aggregators, such as WebMD, which offered unbiased information on competing products as well as selling those products. GE products on these sites looked like just another commodity. The GE unit's major response was iCenter, a Web connection to customers' GE equipment to monitor the equipment operation at the customer site. iCenter collects data and feeds it back to each customer who can then ask questions about the operation of the equipment through the same site. GE compares a customer's operating data with the same equipment operating elsewhere to aid that customer in improving performance. In addition customers are now able to download and test upgraded software for 30 days prior to having
to purchase it. The unit also began offering its equipment training classes on-line, allowing clients to take them at any time. The aggregators were also auctioning off used equipment that was in demand in poorer countries. Medical Systems established its own site to auction its own used equipment, thus opening new markets (outside the United States). GE Aircraft adapted iCenter and now monitors its customers' engines while they are in flight.

GE Power Systems then developed its Turbine Optimizer, which uses the Web to monitor any GE turbine, comparing its performance (such as fuel burn rate) with other turbines of same model anywhere in the world. Their site advises operators how to improve their turbines' performance and how much money the improvements would be worth. The operator can even schedule a service call in order to make further performance improvements.

Late in 1999 GE Transportation went live with an Internet , auction system for purchasing supplies. Soon other units, including Power and Medical, adopted the system. GE later estimated) the system would handle $5 billion in GE purchasing in 2000, and the company would do at least 50 percent of its purchasing on-line in 2001. The system lowers prices for GE because approved suppliers bid against each other to obtain GE contracts. It also results in fewer specification errors and speeds up the purchasing process. GE estimates it saves between 10 and 15 percent of purchasing costs altogether.

GE Appliances realized that appliances are traditionally sold through large and small retailers and that the Internet might destroy that model, turning appliances into commodities sold on big retail and auction sites. GE wanted to maintain the current system, keeping consumer loyalty to their GE brand (versus May tag, Whirlpool, and Frigidaire). Appliances developed a point-of-sale system, which they placed in retail stores such as Home Depot, where customers enter their own orders. The retailer is paid a percentage of the sale. The product is shipped from GE directly to the customer. GE Appliances claims it can now take products from its factories and get them shipped anywhere in the United States virtually overnight on a cost-effective basis. In 2000 Appliances reported 45 percent of its sales, totaling $2.5 billion, took place on the Internet. It estimates 67 percent of its sales will be on the Internet in 2001.

The corporation and its units have issued a blizzard of press releases touting the successes of each of GE's Internet initiatives and the consequent positive effect on financial results. "In 1999, 30 percent of our orders came in via the Web," announced Marian Powell, the senior vice president for e-business at GE Capital Fleet Services. And in 2000 "we'll have over 60 percent. That's over a billion dollars in orders." CIO Reiner said, "We are not talking about incremental change. We're talking total transformation."

A January 2001 article by Mark Roberti of *The Industry Standard* was skeptical. Roberti commended GE for embracing the Internet so quickly. He also noted that "these endeavors are unlikely to make GE vastly more profitable. . . because the company isn't using the Internet to reach new markets or create major new sources of revenue." Roberti questioned the great savings through Internet-based cost cutting that GE claimed. To cut costs by moving business processes on-line, a firm "must eliminate-or redeploy-a significant number of employees" and "GE hasn't." For example, Roberti says, 60 percent of orders to GE Capital Fleet Services are now placed on-line, but it has not reduced its call center staff. GE reports that its selling, general, and administrative expenses as a percentage of sales fell for the first nine months of 2000 from 24.3 in 1999 to 23.6, a minor drop at best. Moreover, he notes caution coming from GE executives themselves. For example, although Reiner had projected a $10 billion saving over the next 18 months in 1999, in December 2000 he revised the 2001 savings to about $1.6 billion-not an insignificant sum, but far from the gigantic savings predicted. Reducing costs by having customers and employees serve themselves via the Web has proved elusive at other companies as well, such as IBM and UPS. Roberti claims that the Internet has not brought GE a significant number of new customers.

Overall, Roberti points out, "Through the third quarter of 2000, GE still hadn't demonstrated any significant improvement in its financial results that can be directly attributed to e-business." Although GE has achieved genuine progress and even leadership, the company could not be generating the savings management had been predicting. He speculates that the purpose of the continuous declarations of great savings may be to boost the price of GE's stock. Perhaps, most importantly, Roberti claims that although GE's Internet activities will give the company a boost, it will take its competitors only a few months to catch up, leaving GE without any competitive advantage.

CASE STUDY QUESTIONS

1. Summarize the business and technology conditions causing GE to launch its Internet initiative.
2. How is GE using Internet technology in its internal and external business processes?
3. What management, organization, and technology issues did GE have to address in its Internet initiative?
4. Evaluate GE's Internet initiative. Is it successful? Is the company transforming itself into a digital firm? Why or why not?

Case Study 3 : What Happened to Kmart?

On January 22, 2002, Kmart filed for bankruptcy protection. It was the largest retailer ever to do so and shocked many people. Kmart had made retail history when its founder, the Kresge "five and dime store" chain, invented the concept of the discount store. The first Kmart was established in Detroit in 1962, the same year Wal-Mart opened its first store in Rogers, Arkansas. By the end of 1963 Kmart had 63 stores converted from Kresge's. In the following years, however, Wal-Mart expanded quickly by following a strategy of everyday low prices. Wal-Mart used information technology (IT) to track sales in all its stores and to replenish its fastest selling products. Wal-Mart demonstrated its willingness to spend needed funds on IT by installing registers with bar-code scanners in each store during the late 1970s and early 1980s, which fed the sales data into the back-end store computers. The result was Wal-Mart sales data were always current and store managers knew what was selling well and what was not. In time many orders were routed straight from the Wal-Mart store to the appropriate supplier, and the delivery went from that supplier directly to the store. Wal-Mart recently developed an extranet to work closely with key suppliers on problems such as how to

increase sales on specific products. Many analysts believe Wal-Mart has the most sophisticated supply chain systems in the industry.

By 1983, with its cutting edge information systems, Wal-Mart was already spending only two cents per dollar getting goods to its stores while Kmart was spending five cents. From that differential alone, Wal-Mart could sell the same product at a price 3 percent lower than Kmart, an important saving to many shoppers. In 1990 Wal-Mart passed Kmart as the largest discount chain with annual sales of $32.6 billion for Kmart's $32.3 billion. Wal-Mart was well on its way to becoming the world's largest retailer. In December 2001, Target, Kmart's other major competitor, passed Kmart as the second largest discount chain. Target had prospered by emphasizing its merchandising, distinguishing itself as a low-cost source of quality and style. Kmart, in contrast, used a promotions-driven business model, drumming up business by advertising "blue-light" specials using circulars inserted into local newspapers. In an attempt to stay ahead ofWal-Mart, Kmart started investing $1 billion to modernize its information systems in 1987. According to David Carlson, then Kmart's CIa, the company developed capabilities to collect the necessary data, bUt it did not use them to forecast demand, relying instead on management's judgments.

Carlson notes that Kmart's suppliers promoted as many of their products as they could sell rather than helping Kmart to focus on the better selling items, as was Wal-Mart's approach. Beginning in 1984, Kmart began diversifying its businesses by acquiring Waldenbooks, rayless Drugstores, Sports Authority, and OfficeMax. It also opened its first Super Kmart Center, a much larger store that now included groceries. Kmart continued to lose ground to competitors while it gained the image of being old-fashioned, outdated, and frumpy. It had a reputation of being a run-down place to shop with an inferior selection of products. Many of its shelves were empty while its prices were too high. It was even considered to offer poor customer service and to not care about competition. By 1994, Kmart was on the verge of bankruptcy. It sold off its newer businesses to concentrate on its discount stores, and, in 1997, it inaugurated the very popular Martha Stewart product lines for the home. In 1999, Kmart began developing BlueLight.com, a Web site designed to sell a few items in order to draw customers to physical stores and to polish its image. In May 2000, watching its hemorrhaging continue, the company hired Charles Conaway, the former CVS drugstore chain president, as Kmart's chairman and CEO. Conaway pledged to turn the company around within two years, and said his goal was to make Kmart the primary destination for mothers looking for low-priced clothing, housewares, and packaged food for their families. He announced plans to restructure Kmart to increase the productivity of Kmart stores, inventories, and information systems. He closed 72 stores, reducing staff by 5,000. He even announced Kmart would spend about $1.4 billion for IT over two years versus only $263 million during the previous two years. However, in August 2001, Kmart announced a second quarter loss of $22 million, and Conaway blamed pricing pressure, particularly from Wal-Mart. Kmart reduced prices on 30,000 of its 70,000 items and cut down on advertising circulars. Consumer habits are hard to change and Kmart sales took a big hit.
Sales at Wal-Mart and Target grew in 2001, while those at Kmart continued to decline. Conaway said he had not found a formula to distinguish his company from his competitors. Since Conaway had taken over, Kmart had increased the percentage of items in stock to 86 percent, compared to 73 percent two to three years earlier. In a conference with Wall Street analysts, Conaway said Kmart was "doing a phenomenal job of reinventing" its supply chain, which would be visible to all in a year's time.

Despite Kmart's continuing falling sales and rising losses Conaway again mandated price cuts, this time on 50,000 products. When Fleming Companies, now Kmart's sole grocery supplier, suspended shipments to Kmart because of Kmart's failure to meet its weekly payment of $78 million, the company realized it could no longer meet all of its financial obligations. Kmart had to declare bankruptcy. Kmart had clearly exhibited many problems. For instance, former Kmart CIO Dave Carlson said he had tried to unify Kmart's two separate computers in its distribution system, but he was turned down because the project was considered to be too expensive. When Conaway was first hired, he wanted to find new ways to bring customers into the stores, and so he cut back on Kmart's primary method of Sunday circulars but offered no dear alternative strategy. In 2000, central planners were still allocating 60 percent of Kmart's goods to specific stores. Conaway tried to address this problem, but by December 2001, 40 percent of its goods were still being allocated by central planning rather than by local stores. Also, Kmart continued to expand the variety of its products rather than focusing on fast selling items, as did Wal-Mart. Shipping was such a problem that in December 2000, being limited to only 900 trucks per day, Kmart was forced to choose between shipping toothpaste or Christmas trees. Warehousing was also an obvious problem since 15,000 truck-trailers were parked behind its stores holding excess inventory because they had no more storage space. Conaway did successfully eliminate this problem within a few months, thereby also reducing the "shrink" (stolen product) rate. Many analysts and observers, including Conaway, believed supply chain management was Kmart's most serious problem, particularly when compared to Wal-Mart. Kmart's promotions driven business model created sharp spikes and drops in demand for products and has been much more difficult to support with supply chain management systems than everyday low pricing models such as Wal-Mart's. Indications of supply chain troubles were everywhere. Outdated technology at the distribution centers resulted in supplies often sitting on pallets for 24 or more hours until they were recorded in the central tracking system. The shelves displaying popular products were often empty, and to reorder them from regional distribution centers, store merchandisers first had to hand sift through previous purchasing receipts. Kmart's inventory turnover rate was very low.

In the year 2000, Kmart's was an anemic 3.6; while Wal-Mart's was 7.3, and Target's was 6.3. Gary Buzek, the president of IHL Consulting Group, estimated that Kmart could add $1.9 billion in profit just by matching its competitors' turnover rates. Conaway moved ahead quickly. In July, he selected i2 Technologies of Dallas, Texas, to work with Kmart in a project to rebuild its supply-chain systems. i2 had been a highly successful vendor of supply-chain software, although principally for manufacturers, while Kmart's new software had to be designed for its retail business. The project was to improve Kmart's management of sales forecasting, inventory sourcing, logistics, and reporting. i2 planned to use the Kmart project to create templates for sale to the retail industry in general and then customize them specifically for Kmart. The project would also connect these new systems to appropriate in-store technology such as bar-code scanners at cash registers. It would also include micro merchandising, which enables individual stores to select their own merchandise according to the needs and demands of their local community. i2 claimed its software would track the ability of key suppliers to supply their products. It would also analyze Kmart's needs, and execute the required orders, schedule shipments, and record the delivery of products. i2 claimed its software would reduce excess inventory in stores and distribution centers, thus lowering costs, and enabling Kmart to lower prices. Sales would then grow and profits increase. Conaway stated Kmart's supply chain would become the best in the retail business, although Lora Cecere, a Gartner analyst, did question the ability of the project to succeed in such a giant, complex project.

Katrina Roche, i2's chief marketing officer, stated that "i2 excels at sales but its execution isn't always flawless." Supply chain management software for manufacturing still accounted for 90 percent of i2's business, and it had only recent and limited experience in the retail sector. One major roadblock was that manufacturers use a relatively small number of stock-keeping units (SKUs) that must be handled by supply chain management software. Unfortunately, Kmart had over 70,000 SKUs in its 2,100 stores, meaning the system must deal with 147 million possible pairings, and this number is increased by inserting many distribution centers and time periods involved. The i2 software was simply not designed to handle such huge data sets. Yet advanced planning software is fundamental to supply chain management, and the problem could only be solved by Kmart purchasing more hardware; an expensive solution for a company facing Kmart's financial problems.

The i2 project was organized with a team of 500 working in an isolated location. It included over 100 personnel from Deloitte Consulting who were to customize i2's existing software, making it able to track the movement of goods to Kmart's more than 2,100 stores. Conaway announced that the first applications would go live in early 2001, followed by a "rapid, methodical rollout" of several dozen business releases with a total of93 distinct improvements, all by August 2002.

In February 2001, several suppliers, including Pharmavite Corp. of Northridge, California, and Bell Sports Corp. of Irving, Texas, said they were seeing improved inventory management in the last three months. Also, Kmart announced a $200 million program to purchase and install new point-of-sale terminal cash registers from IBM to improve customer service with faster checkout technologies.

In June 2001, Kmart began installing new warehouse management software called PkMS, from Manhattan Associates. Its goal was to move products-more quickly through Kmart's distribution centers to the stores, thereby cutting costs while getting the product on the shelves before it has been sold out. The software was installed at corporate headquarters and in all distribution centers. Using it, workers who pick, pack, and ship products to the stores use bar-code scanners to locate each item and to track the flow of the goods. A spokesperson said Kmart would save $15 million a year by increasing productivity and lowering labor costs. Management hoped it might also increase sales. The result was that Kmart could track 30 SKUs at the beginning of the third quarter (2001), 119,000 in late November, and 500,000 three months later. However, Buzek believed the information would be useless because management just didn't believe in the system. In September, the company announced a $148 million write-off of its previous warehouse management system because it was so extensively modified that it no longer could work well and cost too much to maintain. Observers and analysts claim the write-off included abandoning some of i2's software. Kmart also wrote off $65 million for two outdated distribution centers, replacing them with two newer ones purchased from Toys 'R" Us. In December 2001, word came out that the i2 project had fallen way behind. John West, i2's chief technology officer until late in 2001, said the software worked, but the project had stalled because of Kmart's "operational issues." One member of the i2 users group said, "If the data's not right, it's not that it doesn't work; it's just that you won't get the answer you want." Interestingly, when i2 had problems with Nike, it also blamed its customer and not itself. According to Karen Peterson, a Gartner analyst, Kmart originally did not understand the complex difficulties of the project. Another observer, Jim Dion, president of Chicago retail consulting firm Dionco Inc., said that with the project's difficulty in connecting its point-of-sale and inventory systems to its distribution systems,

Kmart was still sending many of its orders on paper. Also in December, Kmart indicated it was now trying to modernize 800 of its stores at a cost of around $1 billion, and that money was competing with funds needed to modernize its supply chain. During the Christmas 2001 selling period Kmart moved less product off its shelves than it had in 2000.

When Kmart was forced to declare bankruptcy, it did indicate some plans for survival. Conaway announced that the company would use Chapter 11 bankruptcy protection to break store leases in 284 stores in 40 states and then close them. In June 2002, Kmart c4anged the name of its Web site from Bluelight.com to Kmatt.com to attract a younger audience and help focus on Kmart stores and sales promotions. (Bluelight had never become a profitable Web business.) Kmart.com will also see an expanded variety of name brand products such as Pentax cameras and Disney apparel. Management believes Kmart.com also meshes better than Bluelight.com with the company's current "Stuff of Life" campaign, which is trying to position the chain as a family-friendly budget-minded store.

Emphasizing exclusive brands such as Martha, Stewart, Everyday, and Joe Boxer may help Kmart distinguish itself from its rivals. Conaway believes Kmart should be able to emerge from Chapter 11of Bankruptcy in 2003. The question is, will Kmart truly be able to bounce back? What will it take to keep going? The company still doesn't have a low enough cost structure to compete with Wal-Mart's low prices, nor does it have the trendy image of Target. What can Kmart do to become the shopping destination of choice?

Case Study 4 - E-Seva

e-Seva - an online community bill payment system, is Andhra Pradesh Government initiative to deliver government information and services online to the state's citizens. The service will provide real-time utility bill payments for water, electricity, telephone, municipal taxes, birth and death certificates, passport applications, permits and licenses, transport department services and other G2C (government-to-citizen) services (http://www.esevaonline.com)

e-Seva is a brain child of chief minister Mr. Chandra Babu Naidu and kicked off in 1999 at Hyderabad. In August 2001 19 centres were started in the cities of Hyderabad and Secunderabad. At present there are 35 e-Seva centres (with 280 service counters) The whole concept is based on real-time utility payment system, which is very common in western world. eSeva has tied-up with ICICI bank, HDFC bank, Global Trust bank and UTI bank for online payments.

The main data centre for e-Seva is at Khairatabad, which is used to store all information, facilitate transaction and update local department servers. The citizen service centre and governmental departments are linked to main WAN through a LAN.

e-Seva is based on three-tier network architecture. Transactions are conducted on a real-time basis. Departmental servers are connected to the data centre, which in turn is connected to the e-Seva centres. Leased lines, with back-up ISDN lines, connect the departmental servers to the e-Seva data centre. Transactions done at the e-Seva centres are recorded directly on the server of the department concerned.

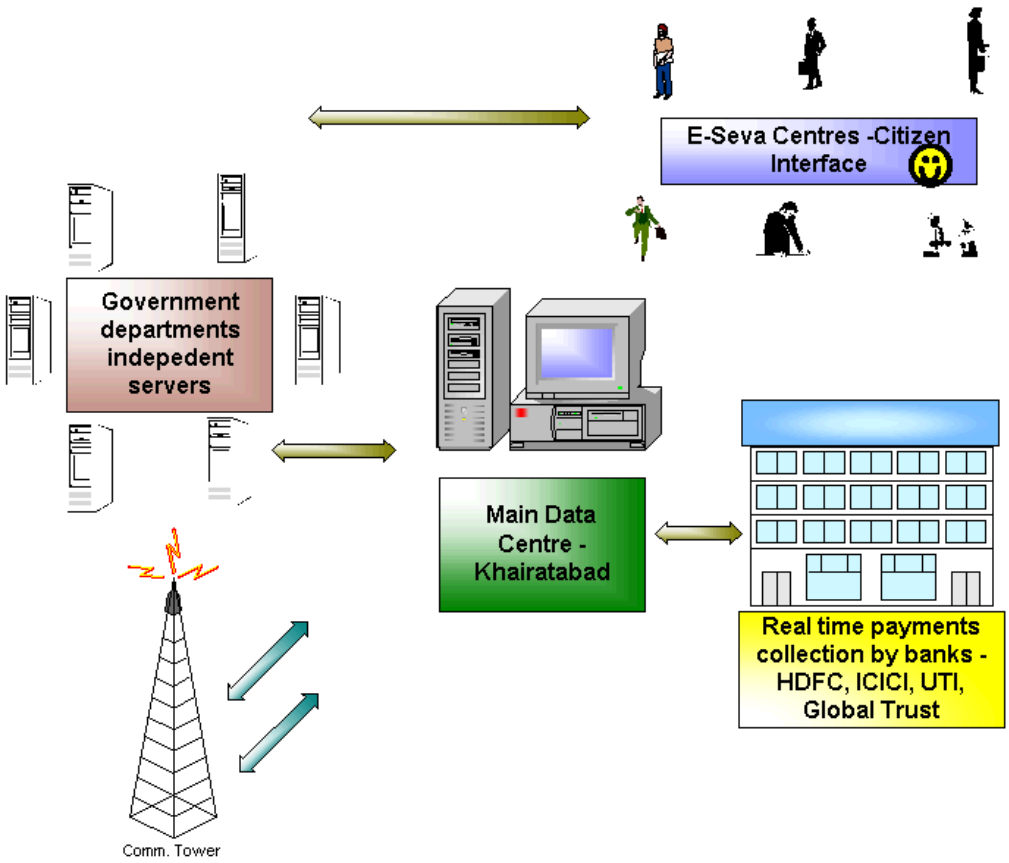

Fig. 1: E-Seva

Case Study 5 - Farmer Service Centre (FSC's)

India is an agricultural based economy. Agri industry in India contributes over 30% of the GDP (gross domestic product). Farmer Service Centre (FSC's) is a pioneering concept nourished by government of India. Farmers and rural residents are benefited from a common customer computer data base and smart card, which can be used for remote transactions. There are over 2 billion smart cards in use around the world. These enhancements to the information system will lead to rural customers being able to access their individual records, apply for loans and other transactional services using their smart card. FSC's is a major step to provide more convenience and quality service to rural consumers.

FSC's is one-stop-shop for farmers to make purchases of raw materials, sell there goods and financial transactions. All the information related to farmer is stored on his unique smart card. Smart cards are safe to use. Through smart card farmers can access e-cash, it is a payment system which offers an alternative to paying cash for goods and services. Smart cards can be used for storing and dispensing cash electronically, making bills and coins lesser necessary and farmers can do money transaction in fast, secure way. It transfers funds over phone lines (which are in-turn connected to bank), making it easier to reload farmers smart cards. This acts as a electronic purse that allows person-to-person payments. The telephone or internet link makes payments possible anywhere. Mainly all the activity are controlled and monitered by FSC's, which provide assistance and guidance to farmers to use smart cards for their transactions.

All FSC's are connected to bank/financial institution through high speed, secured internet link. Farmers can top up there e-purse or make deposits to there banks accounts from FSC's. These FSC's also acts as the information centre for the government. Government can gather large amount of accurate rural data, also farmers can get the latest governmental policies like rates of crops, seeds, subsidies etc.

Other than banking transactions, these smart cards can be used in retail payments, vehicle registration, farmer unique ID (citizen ID), e-governance, driving license, health records and for maintaining previous crops records of farmers. These farmer service centres, can be used as central body in monitoring and implementing of welfare schemes such public distribution systems, health, education & training to villagers.

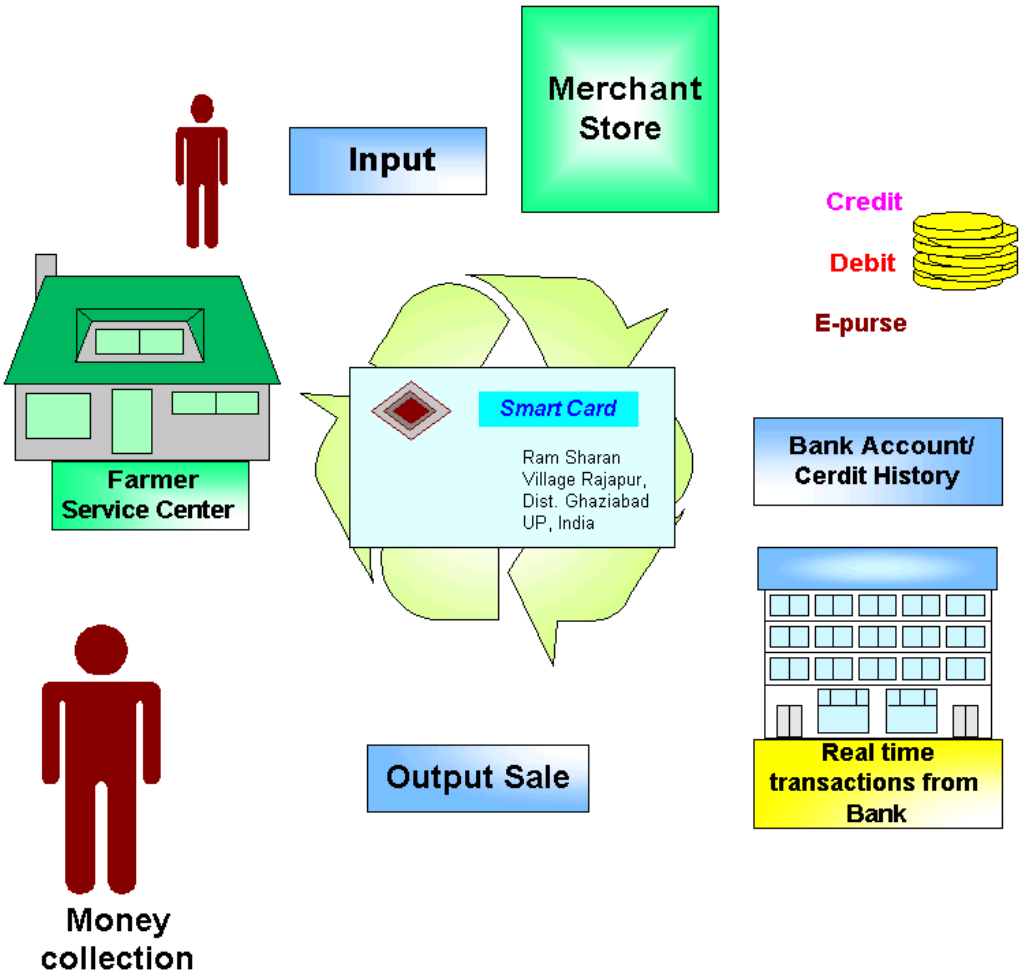

Fig. 2: Farmer Service Centre

Business Case 6 :

California Pizza controls costs with IS

California Pizza Kitchen (CPK) started out in 1985 as a venture by two former federal prosecutors who wanted to do something different. They decided to sell "designer pizza" in which the pizza dough is a "canvas" for exotic food toppings such as Thai chicken, shrimp pesto, Peking duck, or southwestern burritos. By offering stylish entrees costing less than

$10 in a sit-down setting, CPK mushroomed into a national chain of 70 restaurants in only nine years, with PepsiCo buying half-ownership in 1992.

Success did not come easily to this Los Angeles-headquartered chain. The restaurant business is a high-risk industry with many factors that are beyond their control-like :swelling competition, fickle customer tastes, and rising real estate costs. Thus, restaurants need to tightly control food and labor costs to remain profitable-without affecting the quality of their food or service.

CPK company is poised for another take-off. It hopes to expand to 700 restaurants by using information systems to control food costs and make employees more productive. Since diners are turned away by high prices, the only way to control costs is through inventory and portion control -keeping precise track of the amount of ingredients used in each menu item and stocking only as much of these ingredients as each restaurant actually needs.

All California Pizza Kitchen restaurants installed point-of-sale (POS) devices, which capture data about each item sold at the time the sale takes place. The sales data and inventory reports prepared by restaurant managers are transmitted from each restaurant to the company's central computer, where the information is consolidated and analyzed. An application called Inventory Express "remembers" ordering patterns, such as the amount of lettuce a restaurant needs each week, and also compares the amount of each item used to what each restaurant actually sold. If, for example, a restaurant sold 100 Thai shrimp pizzas in one week, it should have used a predetermined amount of shrimp, such as 40 pounds, based on portion measurements established by CPK management.

Using more shrimp would indicate a problem with over portioning or waste. Restaurants with out-of-line portions would be told to take corrective action. The POS-derived data is used for other purposes besides portion control. CPK's restaurant operations group uses the data to determine peak sales at each location so that they can schedule employee work shifts. The data tell food and beverage specialists how well each item sells. CPK found that it should get rid of its egg-salad pizza, for instance, when the item registered poor sales. California Pizza now has pilot projects to move to more state-of-the art information system technology. Waiters and waitresses are experimenting with hand-held point-of-sale devices, which management hopes will boost productivity by reducing the amount of time employees spend with customers.

The devices use radio frequencies to transmit orders to a computer in the back of the restaurant, eliminating the need for employees to run back and forth to a stationary POS device to place orders. CPK can also use its information systems to calculate the relative costs of different markets so it can determine if it has a lower profit margin on Hawaiian pizza in Maryland, than in Waikiki. (Pineapple should be less expensive in Hawaii than in the northeastern United States.) CPK's corporate accounting department can use the aggregated sales data to tally revenue and can manage the accounts payable and accounts receivable processes by combining that data with financial data residing on a central CPK computer.

Business Case 7 : Amazon.com

Amazon.com is one of the Web's most exciting and instructive stories. Started in a garage by Jeff Bezos in 1995, it has since grown to become the largest Internet retailer, with the highest

levels of customer satisfaction, the fastest revenue growth rates, and finally, after nine years, profitable. One of the Internet "Big Four" companies, along with Yahoo, eBay and Google, few would have thought it possible when Amazon first opened for business that an online bookstore would become one of the premiere general retailers in the world. But Amazon's ability to maintain operations at a sufficiently profitable level is a fact that continues to worry investors in 2005. Critics are of two minds: either Amazon will become the online Wal-Mart (and suffer from its huge size just as WalMart does) or it will fail to deliver superior growth and profits because it has spread itself too thin, taken on too many product lines, and given away too much revenue to customers by offering free shipping and superior service. Supporters, and Bezos himself, counter that Amazon has become the Web's largest retailer on a revenue basis by focusing on the customer, not short-term profits, and that it will ultimately become one of the most profitable by following the same strategy.

Amazon certainly has had a roller coaster ride in its ten brief years. In December 1999, Jeff Bezos graced the cover of Time magazine as its Person of the Year. In the same month, Amazon's stock reached a peak of $113 per share. In January 2001, Amazon reported a whopping $1.411 billion as its overall loss for the year. Its stock hit a low of $6 a share. Amazon laid off 1,300 employees, constituting about 15% of its workforce. Questions about its long-term viability abounded. Bezos promised he would make the company profitable in two years, but few believed this was possible. But, in 2003, Amazon reported soaring sales; it achieved its first annual profit ever (about $35 million), and its stock price more than doubled to $25 a share. The good news continued into 2004 when Amazon reported profits of $588 million on $6.92 billion in revenue.

How was Amazon able to turn around its business from a $1.4 billion annual loss to a $588 million profitable operation despite the dot.com stock market crash and the withdrawal of venture capital funding for e-commerce companies? The story of Amazon.com, the most well-known e-commerce company in the United States, in many ways mirrors the story of e-commerce itself. In 1994, Jeff Bezos, then a 29-year-old senior vice president at D.E. Shaw, a Wall Street investment bank, read that Internet usage was growing at 2,300% per year. To Bezos, that number represented an extraordinary opportunity. He quit his job and investigated what products he might be able to sell successfully online. He quickly hit upon books—with over 3 million in print at any one time, no physical bookstore could stock more than a small percentage. A "virtual bookstore" could offer a much greater selection. He also felt consumers would feel less need to actually "touch and feel" a book before buying it. The comparative dynamics of the book publishing, distributing, and retailing industry were also favorable. With over 2,500 publishers in the United States, and the two largest retailers, Barnes and Noble and Borders, accounting for only 12% of total sales, there were no "800-pound gorillas" in the market. The existence of two large distributors, Ingram Books and Baker and Taylor, meant that Amazon would have to stock only minimal inventory.

Bezos easily raised several million dollars from private investors and in July 1995, Amazon.com opened for business on the Web. Amazon offered consumers four compelling reasons to shop there: (1) selection (a database of 1.1 million titles), (2) convenience (shop anytime, anywhere, with ordering simplified by Amazon's patented "1-Click" express shopping technology), (3) price (high discounts on bestsellers), and (4) service (e-mail and telephone customer support, automated order confirmation, tracking and shipping information, and more).

In January 1996, Amazon moved from a small 400-square-foot office into a 17,000-square-foot warehouse. By the end of 1996, Amazon had almost 200,000 customers. Its revenues had climbed to $15.6 million, but the company posted an overall loss of $6.24 million. In May 1997, Amazon went public, raising $50 million. Its initial public offering documents identified several ways in which Amazon expected to have a lower cost structure than

traditional bookstores: it would not need to invest in expensive retail real estate, it would have reduced personnel requirements, and it would not have to carry extensive inventory, since it was relying in large part on book distributors. During 1997, Amazon continued to grow. It served its one-millionth unique customer, expanded its Seattle warehouse, and built a second 200,000-square-foot distribution center in Delaware. By the end of 1997, revenues had expanded to $148 million for the year, but at the same time, losses also grew, to $31 million.

In 1998, Amazon expanded its product line, first adding music CDs and then videos and DVDs. Amazon was no longer satisfied with merely selling books. Its business strategy was now "to become the best place to buy, find, and discover any product or services available online." It also opened Web sites in Great Britain and Germany.

Amazon, pundits noted, was planning to be the online Wal-Mart. Revenues for the year increased significantly, to $610 million, but the losses also continued to mount, quadrupling to $125 million.

The year 1999 was a watershed year for Amazon. Bezos's announced goal was for Amazon to become the "Earth's Biggest Store." In February, Amazon borrowed over $1 billion, using the funds to finance expansion and cover operating losses. During the year, it added electronics, toys, home improvement products, software, and video games to its product lines. It also introduced several marketplaces, including Amazon.com Auctions (similar to that offered by eBay), zShops (online storefronts for small retailers), and sothebys.amazon.com, a joint venture with the auction house Sotheby's. To service these new product lines, Amazon significantly expanded its warehouse and distribution capabilities, adding eight new distribution centers comprising approximately 4 million square feet. By the end of 1999, Amazon had more than doubled its 1998 revenues, recording sales of $1.6 billion. But at the same time, Amazon's losses showed no signs of abating, reaching $720 million for the year.

Although Bezos and Amazon were still riding high at the end of December 1999, in hindsight, it's possible to say that the handwriting was on the wall. Wall Street analysts, previously willing to overlook continuing and mounting losses as long as the company was expanding into new markets and attracting customers, began to wonder if Amazon would ever show a profit. They pointed out that as Amazon built more and more warehouses brimming with goods, and hired more and more employees (it had 9,000 by the end of 2000), it strayed farther and farther from its original vision of being a "virtual" retailer with lean inventories, low headcount, and significant cost savings over traditional bookstores.

The year 2000 ended on a much different note than 1999 for Amazon. No longer the darling of Wall Street, its stock price had fallen significantly from its December 1999 high. In January 2001, it struggled to put a positive spin on its financial results for 2000, noting that while it had recorded a staggering $1.4 billion loss on revenues of $2.7 billion, its fourth-quarter loss was slightly less than analysts' projections. For the first time, it also announced a target for profitability, promising a "pro forma operating profit" by the fourth quarter of 2001. Few analysts were impressed, pointing out that the method by which Amazon was suggesting its profit be calculated was not in accordance with generally accepted accounting principles. They also noted that growth had slowed in Amazon's core books, music, and video business, and profit margins were slim in the faster-growing categories, such as consumer electronics.

In 2001 and 2002, Bezos and fellow executives began to implement their strategy for profitability: cut prices, offer free shipping, and leverage Amazon's investment in infrastructure and consumer brands, while lowering costs of operation significantly. By evolving and leveraging the existing business model, Amazon hoped to do what analysts thought was impossible.

The "easy" part of the strategy was driving business revenues higher by offering customers the "lowest possible prices" for a broad range of goods, providing free shipping for orders greater than $25, and then multiplying sources of revenue. Amazon's Merchants@ and Amazon Marketplace allow other businesses to fully integrate their Web sites into Amazon's site to sell their branded goods, but use Amazon's fulfillment and payment infrastructure. Nordstrom, Toys "R" Us, Gap Inc., Target, and many other retailers use Amazon to sell their goods and then pay Amazon commissions and fees. Amazon also offers its expertise in Web site hosting through its Merchant.com program to national brands such as Target. In the Amazon Marketplace program, individuals are encouraged to sell their used or new goods on Amazon's Web site even when they compete directly with Amazon's sales of the same goods. Amazon reports that sales by third parties now represent 27% of revenues and that it makes as much profit on commissions from other vendors as it does from its own sales.

Lowering costs proved difficult, but not impossible. In early 2001, Amazon closed two of its eight warehouses and laid off 15% of its workforce. It hired 35-year-old engineer Jeffrey Wilke and a half-dozen mathematicians to figure out how to cut costs. The team found a way to redistribute book inventory among the warehouses to reduce shipping costs; used Six Sigma quality measures to reduce errors in fulfillment; consolidated orders from around the country prior to shipping (adding an extra day to fulfillment of "free shipping" orders); and further lowered shipping costs by using its own trucks to deliver orders to postal system centers. Wilke and his team reduced fulfillment costs from 15% of revenue in 2000 down to 10% by 2003. The effort contributed to Amazon's first ever annual profit in 2003: $35.3 million on revenues of $5.26 billion.

The results were even better in 2004: a $588.5 million profit on revenues of $6.92 billion. Looking back on the last ten years, it's clear that Wall Street and Main Street have differing views on Amazon. Amazon has been a tremendous Main Street e-commerce success story even if it took nine years to achieve profitable operations. It has changed its business model several times, focused on improving the efficiency of its operations, and maintained a steady commitment to keeping its 49 million customers satisfied. In 2005, Amazon was one of the leaders in a survey of customer satisfaction with retail Web sites, while traditional bricks-and-mortar retailers such as Target and Costco received low marks for their online offerings. Right now, Amazon must be counted as an online retailing success story. Few would have predicted this outcome in 1995, or even in 2000.

For the future, however, Amazon faces powerful competitors who keep innovating, such as eBay and Yahoo! Shopping. eBay has been profitable from its first day, while Yahoo achieved profitability in 2002. But despite Wall Street critics, Bezos has not changed his original vision: in 2005, for instance, he announced additional expenditures to increase customer convenience, such as a flat-fee shipping membership program (Amazon Prime). And although Amazon's revenues continue to grow, profits in 2005 were down compared to 2004. So the Amazon roller coaster ride continues, and what's around the next curve remains to be seen.

Business Case 8 :

A SHORT HISTORY OF DOT.COM IPOS

E-commerce was built on Internet technology, but what made it run was money—big money. Between 1998 and 2000, venture capitalists poured an estimated $120 billion into approximately 12,450 dot.com start-up ventures. Investment bankers then took 1,262 of these companies public in what is called an initial public offering (IPO) of stock. To prepare for an IPO, investment bankers analyze a company's finances and business plans and attempt to arrive at an estimate of how much the company is worth—how much the investing public might be willing to pay for the shares and how many shares might be purchased by the public

and other institutions. The bankers then underwrite the stock offering and sell the stock on a public stock exchange, making enormous fees for underwriting in the process.
In the early years of e-commerce, from 1998 to 2000, dot.com IPO shares often skyrocketed within minutes of hitting the trading floor. Some shares tripled and quadrupled in the first day, and a 50% "pump" (or increase in value) was considered just a reasonable showing. IPO shares for dot.com companies were often targeted to open at around $15 per share, and it was not uncommon for them to be trading at $45 a share or even much more later the same day. Therefore, getting in on the ground floor of an IPO—which meant arranging to purchase a fixed number of shares prior to actual trading on the first day—was a privilege reserved for other large institutions, friends of the investment bankers, or other investment bankers. In what was called "stock spinning," the underwriter would sell IPO shares to entrepreneurs it hoped to obtain business from in the future. The Securities and Exchange Commission made this practice illegal in 1999.
What has happened to the dot.com IPOs of this period? According to a financial services research firm, Thomson Financial, 12% of the companies that went public between 1998 and 2000 were trading at $1 or less a share in April 2001, a fairly shocking development when one considers that just a relatively short time previously, those companies' shares were trading at upwards of 10 to 100 times that price. Among the companies that fell below $1 in share price were Autoweb.com, iVillage.com, and Drugstore.com.
In mid-2005, Autoweb.com merged with Autobytel.com and the combined company sells for about $4 a share; iVillage still exists and sells for $8, and Drugstore.com sells in the $2–$4 range. Each of these companies is showing strong growth (10% a year or more).
In 2005, five years after the peak of the dot.com frenzy, at least 5,000 Internet companies have either been acquired or shut down. But well over $200 billion has poured into the dot.com sector during this period for the purchase of over 4,000 Web companies, initiating a second wave of dot.com investment. What are the investors buying this time? In 2005, hot properties have included Internet shopping sites (such as Shopping.com, purchased for $620 million by eBay and Shopzilla.com, purchased for $525 million by The E.W. Scripps Company),
Internet advertising firms (such as DoubleClick, purchased for $1.1 billion by buyout firm Hellman & Friedman), search engine properties (such as Ask Jeeves, purchased by IAC/InterActive Corp for $1.85 billion), and community sites (such as About.com, purchased by The New York Times for $410 million, and Intermix, owner of the social networking site MySpace.com, purchased by News Corp.'s Fox Interactive Media division for $580 million).
The IPO market is also sizzling hot again.
In 2004, there more IPOs than in all of 2002–2003 combined! These IPOs provided an average return to investors of 21% in the year. Almost 40% of the companies were not profitable when they went public, but this is a lot better than the 74% of companies that were not profitable prior to their IPO in 2000. The shakeout in dot.com industry is over, and the decks are cleared for a second wave of rapid but hopefully saner growth in Internet investments based on the positive earnings of successful mainstream dot.com companies.

Business Case 9 :
P2P Networks Continue to Rock, But For How Long?
In 2005, after several years of heated court battles, the case of Metro Goldwyn Mayer Studios v. Grokster, et al. finally reached the U.S. Supreme Court. In June 2005, the Court handed down its unanimous decision: Internet filesharing services such as Grokster, StreamCast, and Kazaa can be held liable for copyright infringement.
In 2005, an estimated 36 million Americans downloaded music files off the Web, about 6 million of them by using P2P services such as Grokster, StreamCast, Kazaa, BitTorrent,

eDonkey, and others. Music industry legal filings claim that as much as 90% of the songs downloaded from the file-sharing networks were done so illegally Grokster and the other P2P networks followed in the footsteps of Napster—the previous world champion of free music downloads. Founded in 1999, Napster had over 80 million users worldwide by 2001, but it was put out of business by a U.S. federal court decision in 2001 that required Napster to shut down its central servers, which indexed music titles stored on users' computers, while it arranged to either license the music titles from their owners or remove them from its central servers. In July 2002—despite initial efforts to turn Napster into a legal, commercially viable, fee-based music service—Napster declared bankruptcy and closed its doors. The Napster name and logo and remaining assets were acquired out of bankruptcy by Roxio, Inc., which later renamed itself Napster and launched a legal online music subscription service, which has not yet equaled the popularity of the former Napster. Does a similar fate now await Napster's followers?

The first Napster used an earlier P2P network technology that relied on a central index of members' available music. Kazaa uses a different P2P technology that does not require a central index of titles. Kazaa relies on a software program called Fast Track, which was invented in 1997 by two engineers: Niklas Zennstrom (Swedish) and Janus Friis (Dutch). Here's how it works. Users download the Fast Track software free from any of several sources on the Internet. The software helps users create a local shared directory where they can store music tracks they are willing to share and download tracks from others on the network. When users want to search the Web for new tracks, they launch Fast Track and the software searches first for Fast Track "super nodes" on the Internet—high-speed servers volunteered by other users—that contain pointers to other users who have the desired music tracks. From there, the requesting and sharing computers use their local client Fast Track software to establish a direct peer-to-peer link, and the file swap occurs. The super nodes speed up file transfer by identifying several sources of the same music track and establishing multiple download links. The software automatically identifies which computers on the network are capable of acting as super nodes without direction from outside.

Kazaa and other similar file-swapping services claim there is no central index, control, administration, or editing function performed by the company's servers. Critics claim otherwise. For instance, users of Morpheus—a U.S.-based service that relied on Fast Track—were kicked off the Kazaa network last year, indicating central controls do exist. Morpheus went out of business shortly thereafter. Moreover, software experts claim that when Kazaa software cannot find a super node, it "calls home" to a server under Kazaa's control.

Downloading Fast Track brings with it many other programs and occasional viruses. In order to make money, Kaaza loads Fast Track with so-called "spyware" and "adware" programs (discussed in the Insight on Society story in this chapter, and in later chapters), which in turn go out on the Internet and request pop-up advertisements and unsolicited e-mail from vendors who pay for this service. In that sense, Fast Track is an "advertising network" that makes its money not from selling music but from selling to advertisers access to its 65 million users. The music available on Kazaa functions as a draw to a huge Internet audience. Most other file-sharing services operate under the same principles, with few variations on the central theme of using copyrighted music to create an audience that downloads software, which in turn displays ads on users' computers.

File-swapping services pay no copyright fees to the owners of the copyrighted materials. Instead, they claim that they are not responsible for the way millions of people use their software. If copyright owners are damaged, they argue, the copyright owners should sue the individual violators who are abusing the Kazaa software and not the owners of the software. Any restrictions on the distribution of the software, would, in the eyes of supporters, inhibit the development of a socially desirable new technology. Moreover, Kazaa and Grokster argue

that the P2P software has many legitimate uses besides sharing copyrighted music. These services pose a direct threat to the intellectual property laws of the United States, Europe, and Japan, which require users to obtain permission (and usually pay a fee) for the use of copyrighted materials. The existing publishing, music, and book industries of the world are founded on a legal structure to protect intellectual property. For the copyright-holding industries in the United States—music label companies, Hollywood film producers, and television production firms—file-swapping services are a direct threat to their financial futures.

In October 2001, the world's largest media conglomerates filed a suit in federal court (Metro Goldwyn Mayer Studios v. Grokster, et al.), alleging copyright infringement against firms who were using Fast Track software or functionally similar software to swap copyrighted files of any sort. Morpheus, Kazaa, and several other P2P services were named in the suit. A trial began in October 2002. On April 25, 2003, the plain-tiffs experienced a severe setback when the United States District Court ruled that Grokster and the other defendants, including Kazaa, could not be held liable for copy-right infringement on the grounds that the defendants could not control how people used the software. The judge reasoned that the movie and record companies would have to pursue individual infringers. The District Court relied heavily on the Supreme Court's 1984 Sony decision (Sony Corp. of America v. Universal Studios, Inc. 464 U.S. 417) in which the court ruled that Sony could not be held liable for users who copied movies and shared them with others because Sony could not control or have knowledge about consumers illegally copying movies and sharing them, and because video-tape technology had substantial non-infringing uses. In August 2004, the 9th U.S. Circuit Court of Appeals in Los Angeles affirmed the District Court's decision. The music firms appealed this decision to the Supreme Court, which in June 2005 overturned the Circuit Court of Appeals and ruled that Grokster and other P2P networks could be held accountable for the illegal actions of their users if it could be shown that they intended their software to be used for illegal downloading and sharing, and had marketed the software for that purpose. In reaching this decision, the Court said that "one who distributes a device with the object of promoting its use to infringe copyright, as shown by clear expression or other affirmative steps taken to foster infringement, going beyond mere distribution with knowledge of third-party action, is liable for the resulting acts of infringement by third parties using the device, regardless of the device's lawful uses." The court felt that such actions could be distinguished from the facts in the Sony case, because Sony did not intend, encourage, or profit from illegal uses of its videotaping technology. The Court therefore ordered the case returned to the district court for a trial on the issue of whether Grokster and StreamCast in fact encouraged illegal use of their technology by its users.

The result of this decision is potentially a crippling blow to P2P illegal networks, not because the networks will fail, but because the advertising revenues that provide their revenue stream will dry up as no legitimate business firms will want to be using a patently illegal media to advertise their wares. If they do so, they may open themselves up to lawsuits. Kazaa, for instance, is already trying to recast its behavior in light of the decision, announcing in a press release on June 28, 2005 that "we welcome the remand back to the District Court, as we are confident the legal process will affirm that we have never sought to induce users of our file-sharing software, Kazaa Media Desktop, to illegally violate copyright law, and that we have taken numerous steps to discourage copyright infringement by our users." However, most commentators believe that if the cases go to trial, the record industry is likely to prevail.

In the meantime, the record industry itself has begun a remarkable game of catch-up by offering reasonably priced, legal, high quality downloading services, either on a per-song basis or a subscription basis. In the first six months of 2005, music downloads from legal sites tripled to 159 million songs. Recent surveys confirm a move away from illegal sites and

towards Apple's iTunes and other competitors such as the reborn Napster, RealNetwork's RealOne Music Store and Rhapsody service, Yahoo's Yahoo! Music Unlimited, MusicNet, and eMusic, as customers begin to appreciate the higher quality, trustworthy music tracks available. The music industry hopes that this trend means that illegal downloading will soon become a fad of the past.

Case Study Questions

1. How can P2P file-sharing networks make money if they do not sell music?
2. Into which category or categories of e-commerce do P2P file-sharing networks fall?
3. What social issues do P2P file-sharing networks such as Grokster and Kazaa raise? Is the record industry justified in attempting to shut them down? Why or why not?
4. Will the Supreme Court's decision inhibit the development of P2P technology or the Internet itself, as proponents of P2P services have claimed?
5. Will illegal downloading sites disappear altogether over time? Why or why not?

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Chapter 10

Use of MIS at Various Levels of Management : 06 Hr.

Syllabus : *Use of MIS at various levels of Management. A framework for information system for each level of Management and Operations. Types of Information systems – Operating Support Systems, Management support systems, Expert System.*

10.1 : A framework for information system for each level of Management and Operations.

Bottom Level :

* MIS helps operational management by providing operational data for planning, scheduling, controlling and also helps them further in decision making at the operational level to correct an out of control situation.
* Operational information pertains to the day-to-day activities of the organization and helps to assure that specific tasks are performed efficiently and effectively.
* It include the production of routine and necessary information, such as financial accounting, payrolls, personal rosters, equipment inventories, and logistics.
* Operation level require information for the purpose of conversion of inputs into outputs. Also it supplies routine and other information to tactical tier in summarized form.

Middle Level :

* MIS helps middle level management in short term planning, target setting and controlling the business functions.
* The tactical decisions are directed towards developing divisional plans, structuring workflow, establishing distribution channels, acquisition of resources such as men, materials and money.
* The tactical information helps managers to see that the resources are being used efficiently and effectively to meet the strategic objectives of the organization.

Such information include productivity measurement (output per man-hour or per machine-hour), budgetary control, or variance analysis reports, cash flow forecasts, manning levels and profit results within a particular department of the organization, labour turn-over statistics within a department, short-term purchasing requirements etc.
A large proportion of this information will be generated within the organization using feedback between different departments. Tactical information is usually prepared regularly – perhaps weekly, or monthly and is used for decision making referred to as management control.

Top Level :

MIS helps top management in goal setting, strategic planning and also evolving the business plans in addition to their implementation.
Strategic planning depends heavily upon information external to the organization.
When this is combined with internal data, management can make estimates of expected results. The specifics of this information are often unique and tailor made to particular strategic problems.
MIS in-fact plays the role of information generation, communication, problem identification and helps in the process of decision making.

10.2 : Types of Information systems

Business organizations today leverage available technologies to manage their business, collect data, process data to analyse it to make important decisions, interact with customers and partners, curtail costs, and generate revenues. For performing these operations, business organizations use different types of information systems, wherein an *information system* is a collection of hardware, software, data, people, and procedures that are designed to generate information to support routine activities. There are different types of Information systems.

Earlier, when computers were new to the world of business, each time an information system was needed, it was *tailor-made* or customized for the specific purpose. Computer experts soon realized, however, that most of the information systems were designed to solve a similar set of problems. Therefore, attempts were made to build a single system that would solve a whole range of similar problems. While designing information systems for similar problems, it was important to define how, where, why, and by whom the information system would be used: These questions gave rise to different information systems that were designed for different types of users working in the organization.

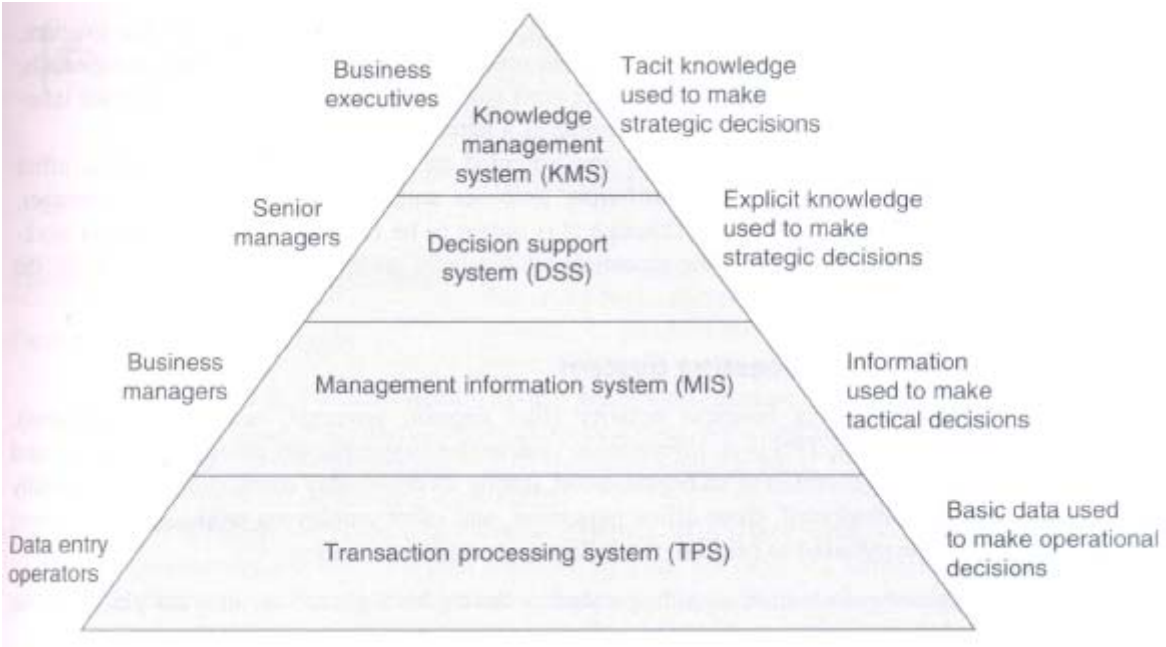
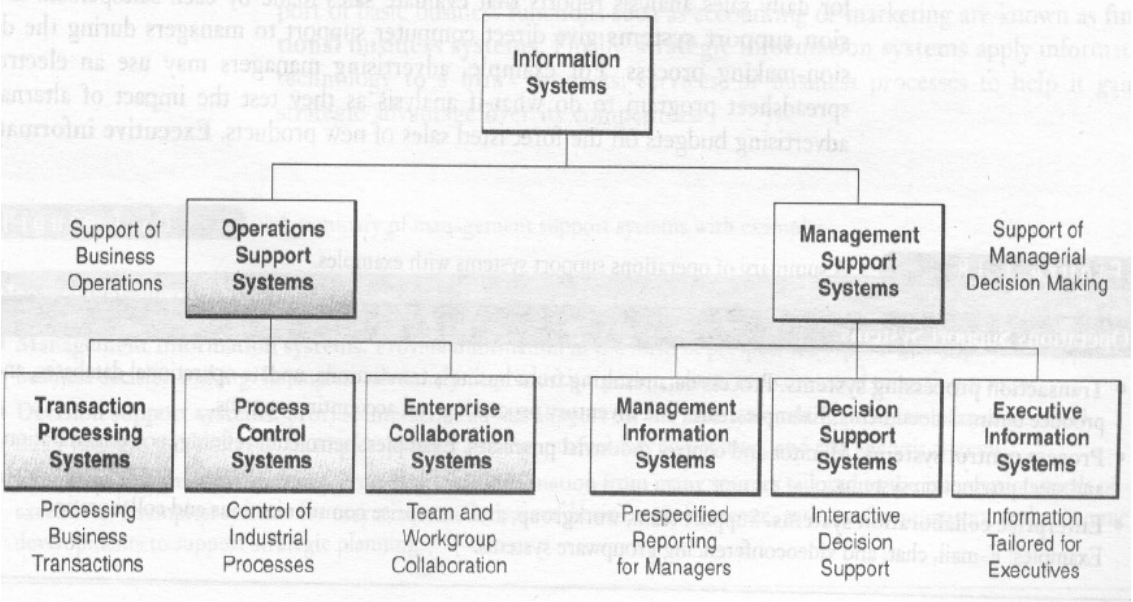


Fig. 10.1 : Pyramid model of Information Systems

To identify different types of information systems, classification is done to identify a set of activities that can be categorized together, so that they can be treated as a single unit. Although there is no well-defined rule to classify an information system, it is necessary to classify them in order to ease the design of applications they would render. Figure 10.1 shows the pyramid model used to classify information systems: As most organizations work in a hierarchy, the information systems are also categorized to follow the hierarchy. Figure 10.1 gives a generalized pyramid model for classifying different types of information systems in an organization. ft does not mean, however, that every business organization must strictly adhere to it. While some small businesses can have just three levels, that is, transaction processing system (TPS), management information system (MIS), and decision support system (DSS), large organizations can have two additional information systems, namely office automation/information system (GAS/GIS) and executive information system (EIS). In this section, we will read about all of them.

Operations and management classifications of information systems :



(a) Operations Support Systems :

Operations Support Systems are used to process data generated by, and used in, business operations. The role of a business firm's operations support systems is to efficiently process business transactions, control industrial processes, support enterprise communications and collaboration, and update corporate databases.

1. Transaction Processing Systems

A transaction is a business activity (like deposit, payment, order, or reservation), Correspondingly, TPS is an information system that is specifically designed to capture and process data generated in an organization, during its day-to-day transactions. It is basically used by clerical staff, front-office personnel, and other employees working at the lowest level of the pyramid to perform the following transactions online.

- ☛ Record information regarding a student during his registration, an order placed by the customer, payment details of a client, and the like.
- ☛ Confirm an action or send a response to inquiries, issue receipts of payments, send a thank-you mail to customers, and so on.
- ☛ Collect customers' feedback.
- ☛ Generate employees' paycheck.
- ☛ Add, update, and delete existing data.

Transaction processing system was one of the first computerized systems developed to process business data (also known as *data processing).* The first TPS was based on batch processing, in which data is collected over a period of time, and all transactions are processed later as a group. But with drastic improvements in computing technology, batch processing systems were upgraded to online transaction processing systems (OLTPs), in which the computer processes transactions as they are entered.

These days, the OLTPs have widely replaced the earlier and now obsolete batch processing systems, and you have already seen OLTPs when registering yourself in college, shopping in a showroom that generates electronic invoices, paying bills in a restaurant that generates a printed receipt, and so on. Other places in which TPS is used includes payroll systems, order processing systems. reservation systems, stock control systems, and systems for payments and funds transfers.

Advantages : Here are some of the advantages of TPS:
(1) Enhanced efficiency and accuracy of business activities
(2) Faster processing
(3) Reduced clerical costs
(4) Improved customer service

They record and process data resulting from business transactions. They process transactions in two basic ways.
In *batch processing,* transactions data are accumulated over a period of time, and processed periodically.
In *real-time* (or online) processing, data are processed immediately after a transaction occurs.

For example, point-of-sale (POS) systems at many retail stores use electronic cash register terminals to electronically capture and transmit sales data over telecommunications links to regional computer centers for immediate (real-time) or nightly (batch) processing.

2. Process control systems :
Process control systems monitor and control physical processes. For example, a petroleum refinery uses electronic sensors linked to computers to continually monitor chemical processes and make instant (real-time) adjustments that control the refinery process.

3. Enterprise Collaboration Systems :
Enterprise collaboration systems enhance team and workgroup communications and productivity, and are sometimes called *office automation systems.* For example, knowledge workers in a project team may use electronic mail to send and receive electronic messages, and videoconferencing to hold electronic meetings to coordinate their activities.

4. Office Automation Systems :
Office information system (OIS) or office automation system (OAS) uses hardware, software, and networks to enhance work flow and facilitate communication among employees. While hardware includes computers equipped with modems, video cameras, speakers, microphones, scanners, and fax machines, software comprises word processing, spreadsheets, databases, presentation graphics, email, web browsers, web page authoring, personal information management, and groupware to support the aforementioned activities. Besides hardware and software, an OAS also uses technology for communication, such as voice mail, fax, videoconferencing, and electronic data interchange (EDI) for the electronic exchange of documents, which include text, graphics, audio, and video (refer Figure 10.3). In such a system, employees perform their tasks electronically rather than manually. For example, in an OAS in your college, the time table, academic calendar, subjects in the semester, along with their guidelines, notification of events in the university, fee structure, and the like, are all published online, either on the website or as notifications, using emails.

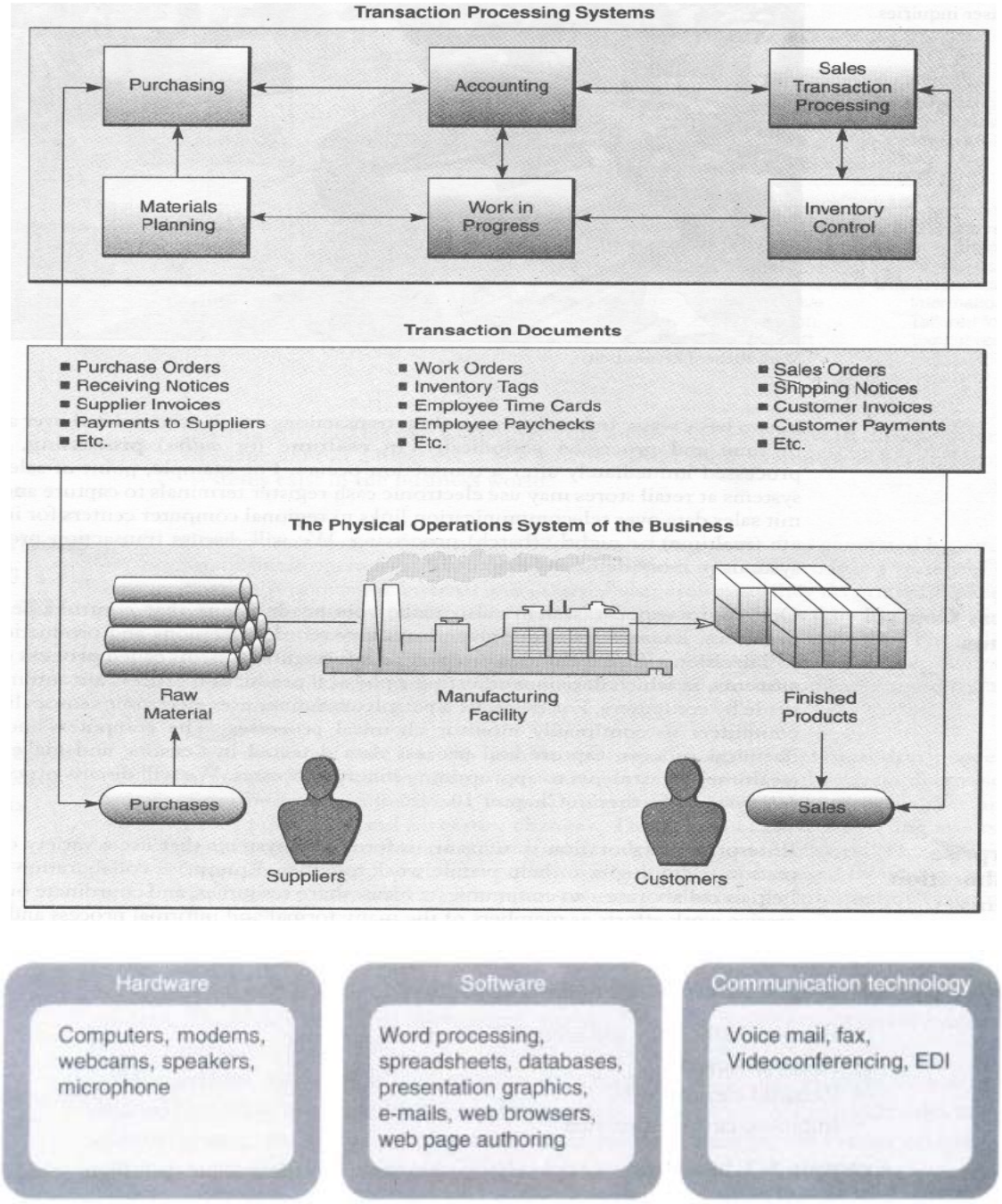


Fig. 10.3 : Components of OAS.

Had it been a manual system, the office staff would have to take a photocopy of the information and send it to each student's home as a letter or as registered post. Office automation systems are implemented to support a range of business office activities like creating and distributing graphics and/or documents, sending messages, scheduling, and accounting. Although it is meant to be used by clerks and officers working at the lower level of the pyramid, all levels of users avail some benefit from the OAS.

(b) Management Support Systems

When information system applications focus on providing information and support for effective decision making by managers, they are called management support systems.

Conceptually, several major types of information systems support a variety of decision-making responsibilities:

(1) Management information systems,
(2) Decision support systems, and
(3) Executive information systems.

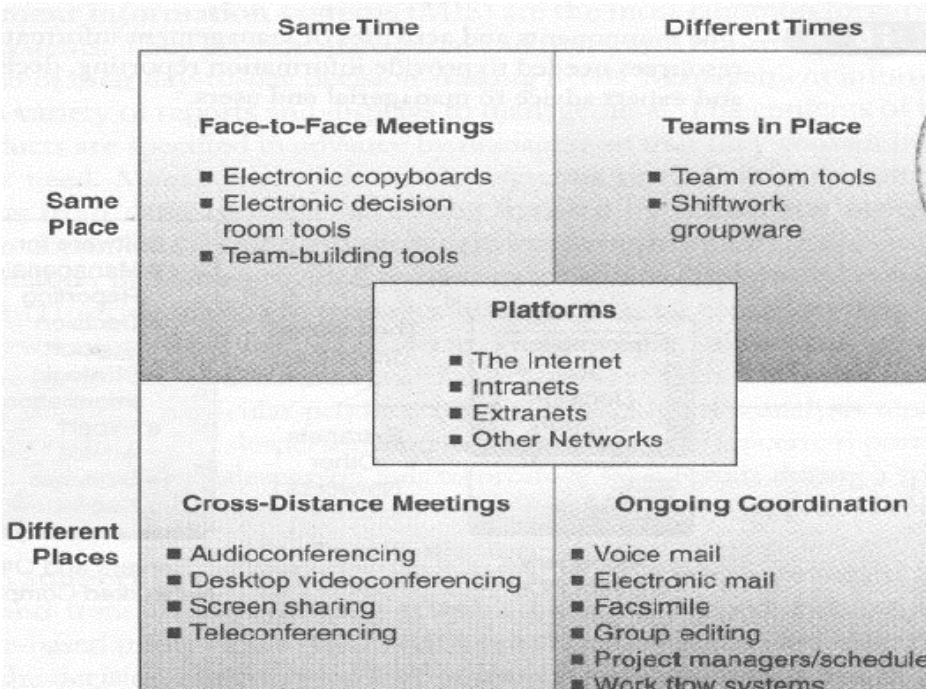


Fig. 10.4 : Enterprise collaboration systems

1. Management Information Systems

MIS provide information in the form of reports and displays to managers and many business professionals. For example, sales managers ,may use their networked computers and Web browsers to get instantaneous displays about the sales results of their products and to access their corporate intranet for daily sales analysis reports that evaluate sales made by each salesperson.

While TPS is best suited for routine transaction processing, business managers felt the need for an information system that could perform rapid calculations and data comparisons, in order to produce meaningful information for management.

This need led to a new type of information system called MIS. It is an information system generating accurate, timely, and organized information that helps business managers make decisions, solve problems, supervise activities, and track progress by generating useful reports on a regular basis. Therefore, it is also known as a *management reporting system (MRS).*

For better integration with business activities, MIS is integrated with TPS, so that MIS can generate reports using the data collected by TPS. For example, while TPS records the daily sales, updates the customer's account balance, and makes a deduction from inventory, MIS can use this information to produce reports that recap daily sales activities, list customers with past due account balances, identify slow or fast-selling products, and highlight inventory items that need reordering. It generates three types of reports, as shown in Figure 1.10. These are explained as follows.

Detailed report : This lists transaction processing activities. For example, a detailed order report enlists all transactions that involve ordering of items.

Summary report : This aggregates data so that managers can get a quick overview of the

business activity. It synopsizes large amounts of information that contains totals, tables, or graphs. For example, an inventory summary report summarizes the items and the number of units available.

Exception report : This filters data to identify information that is beyond a normal condition (also called *exception condition)* and notify business managers, so that corrective measures can be instantly taken. For example, an inventory exception report notifies the purchasing department of items whose stock is less than .the specified normal stock. These items must be reordered at the earliest. Exception reports enable managers to save their time, as they no longer have to go through the detailed report to identify exceptional conditions.

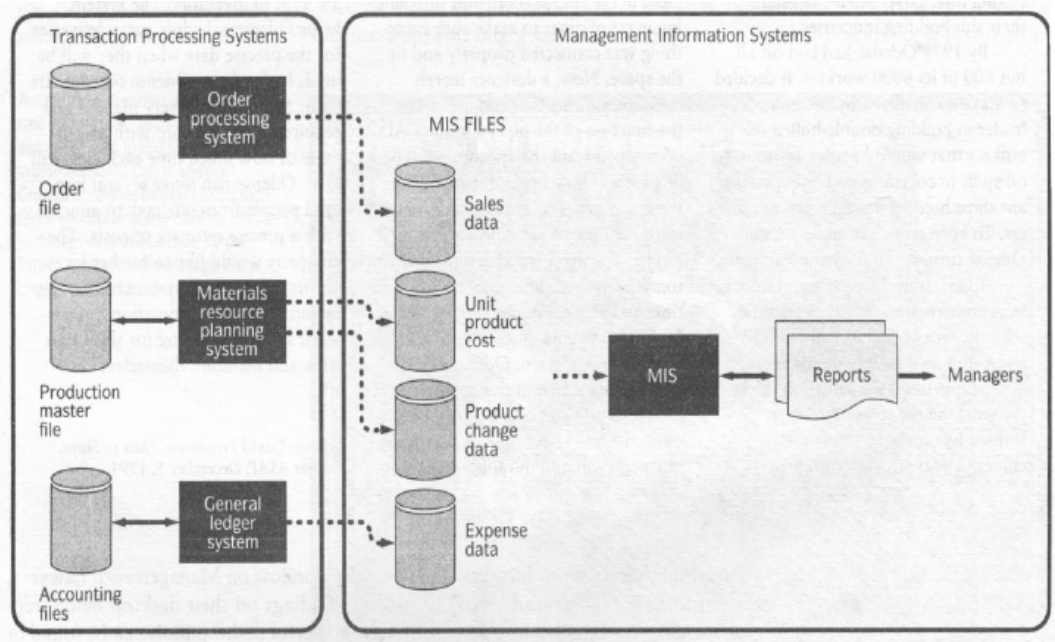
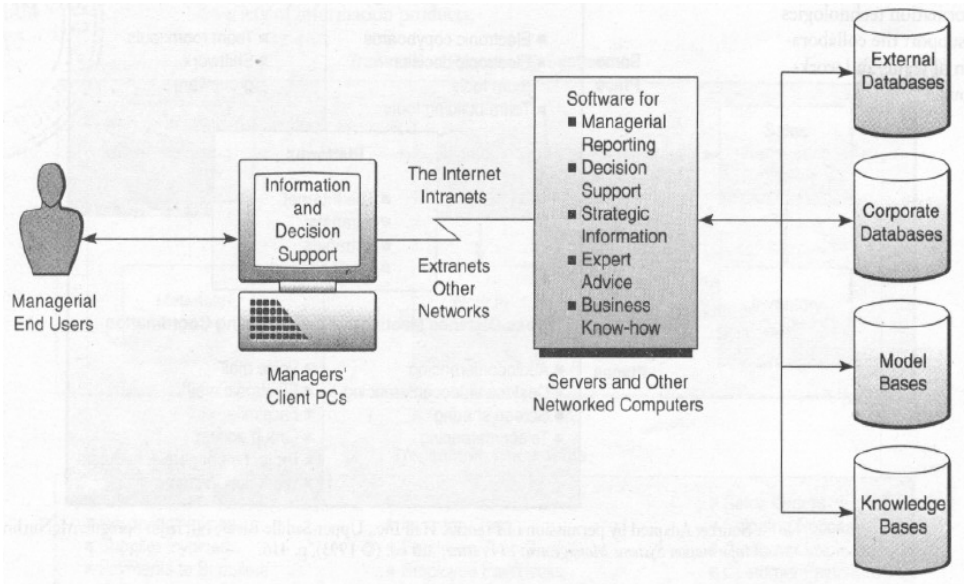


Fig. 10.5 : The Components and activities of management information systems.



Management information system is used by business managers working at the middle level of the pyramid in order to ensure smooth running of the organization in the short- to medium-term. The highly structured information, produced by MIS, enables managers to evaluate

their organization's performance, by comparing current output with the previous one.
Management information system supports structured decisions. Besides action and detailed reports, MIS also generates summary reports. Examples of MIS include sales management system, inventory control system, human resource management system, budgeting systems, and the like. The downside of these systems, however, is that they have little analytical capability. It also helps compare past values with the present, but does not facilitate prediction of the future.

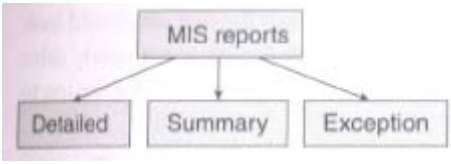


Figure 10.6 **:** Types of reports

2. Decision Support Systems

Decision support systems give direct computer support to managers during the decision-making process. For example, advertising managers may use an electronic spreadsheet program to do what-if analysis as they test the impact of alternative advertising budgets on the forecasted sales of new products.

Transaction processing system and MIS are very well suited for providing information to appropriate users on a regular basis. But senior managers need some other type of information to make some longer term decisions. For short-term decisions, MIS is enough, but for decisions regarding a longer period of time, say a year, an MIS is not the one we should look for. For example, a sales manager needs information to find out how high to set yearly sales quotas, based on increased sales and lowered product costs. A DSS provides information to support such decisions.
In order to make vital decisions, DSS not only uses data from its internal information systems, but also makes use of data from external sources, like business magazines, surveys of competitors available on the Internet, interest rates, population trends, customer demographics, spending behavior of a group of customers, and so on.
Decision support system makes full use of query language, statistical analysis tools, spreadsheets, and graphics to analyse data, evaluate results, and identify and document factors affecting a decision. This could not only help the sales manager to estimate the expected sales volume at each price level with greater accuracy, but also enable him to ask what-if questions, by changing one or more of the factors (that could affect the sales) and view the projected results.

3. Executive Information Systems

Executive information system is a special type of DSS, which is specifically designed for the information needs of business executives. It makes use of charts and tables to represent information that could help executives view trends, ratios, and other statistics, predict future sales patterns, summarize current costs, and forecast sales revenues.
Executive information system is basically used to make strategic decisions, and therefore, relies heavily on external sources of data like the Dow Jones news and the Internet, to retrieve information on interest rates, commodity prices, and other leading economic indicators. To store all the external as well as internal data, current as well as historical data, DSS and EIS use extremely large databases, called data warehouses. Data warehouses, along with EIS, help executives analyse data according to the entire business or at the individual department, region, or a particular store. For example, the executive of McDonald's can view

the daily sales, either in all the stores worldwide, or in a particular county, or in a particular city, or at a specific outlet.

EIS provide critical information from a wide variety of internal and external sources in easy-to-use displays to executives and managers. For example, top executives may use touch-screen terminals to instantly view text and graphics displays that highlight key areas of organizational and competitive performance.

Example : Financial institutions like banks use EIS to develop credit risk models to analyse the number and extent of lending or credit that is given to various sectors. For this, various techniques and formulae are used to determine the probability of loan defaults.

10.3 : Other Classifications of Information Systems

Type of Information System	Focus
Knowledge mangement systems	Knowledge—from knowledge workers.
Expert systems	Knowledge—from experts
Decision support systems	Decisions—interactive support
Executive information systems	Information—for executives and others
Management information systems	Information—for managerial end users
Transactions processing systems	Data—from business operations

1. Expert systems can provide expert advice for operational chores like equipment diagnostics, or managerial decisions such as loan portfolio management.

2. Knowledge management systems are knowledge based information systems that support the creation, organization, and dissemination of business knowledge to employees and managers throughout a company. Information systems that focus on operational and managerial applications in support of basic business functions such as accounting or marketing are known as ***Functional business systems***.

Knowledge is personalized information, a state of knowing and understanding that is stored and manipulated, to influence actions. Knowledge is obtained through the organization's data warehouse, DSS tools, internal expertise, and networks of knowledge workers. All the discussed systems fall under KMS. We can also say that KMS extends the already existing systems by assimilating more information. Basically, KMS refers to a system that manages knowledge in an organization (in the form of documents, policies, procedures. expertise, and experience) to support identification, creation, capture, evaluation, storage retrieval, sharing, and dissemination of information, as shown in Figure 10.7. It helps employees have ready access to the organization's documented base of facts, sources of information, and solutions, as shown in Figure 10.7. It also provides network maps of the organization, depicting the flow of communication between entities and individuals.

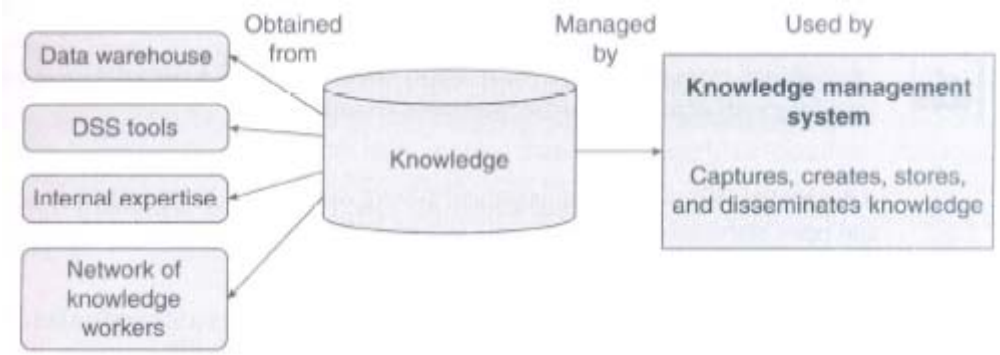


Fig. 10.7 : Knowledge Management System

Example : The most effective strategy to promote a product in rural areas can be shared organization-wide, to help the sales and marketing team throughout the country to use the same strategy. It also opens up a new platform to discuss new and improved strategies.

Features KMS :

• Stores knowledge that is developed collectively.
• Comprises a range of practices to create and enable adoption of knowledge, embodied in an individual or in organizational processes.
• Knowledge exists in the form of documents, policies, procedures, expertise, and experience.
• Distribution of knowledge through KMS results in continuous change, reconstruction, and application of knowledge in different contexts.
• Required information is effectively and efficiently retrieved, whenever required.

Types of knowledge managed An effective KMS provides a variety of information, which includes the following.

(1) Experiences : It collects information retrieved from people, who have already tackled a problem and found a solution. Therefore, KMS stores information about successful strategies, and also the best practices to solve a particular problem.

(2) Expertise location : It stores a network map that informs the users about where to locate for an expert or expert information.

(3) Communities of practice : It enables groups of individuals to discuss their problems, opportunities, lessons learned, and other information gained from users.

(4) Feedback : An organization can collect feedback from customers and employees and share it with their research and development (R&D) departments, so that an integrated approach can be taken to understand the shared information and produce better products and services. For example, a company developing a new product may conduct research on their competitors and ask the R&D team to identify the ingredient needed in their product. The R&D team can find out from the KMS team the assets and processes the company has in place, which can be used to meet the sales potential, meet customer needs, and fill gaps within the marketplace.

(5) Share project files : An employee team can work collaboratively on a project. They can share their files and information to allow everyone in the team to upload and comment on the work performed by others.

Advantages :

Knowledge management system can be associated with open source software, and open standards, open protocols and open knowledge licenses, and initiatives and policies.

Its advantages include the following:

• Improved performance
• Competitive advantage

• Innovation, which gives a cutting edge to perform better than one's competitors
• Integrating and sharing of knowledge
• Solving problems faster
• Developing professional skills
• Orientation and training of new employees
• Support of better sales, by helping business users make critical decisions in a better and informed manner
• Creation of knowledge directories
• Avoidance ofre-inventing the wheel, thereby reducing redundant work
• Retention of intellectual property, even after the employee leaves the organization
• Service as central repository, to retain information in a standard format
• Ensuring of consistent and speedy responses to user queries

Many large organizations are reaping the benefits of KMS. These days, even small businesses are implementing it.

3. Strategic information systems

Strategic information systems apply information technology to a firm's products, services, or business processes to help it gain a strategic advantage over its competitors.

Strategic MIS is the set of systems which are considered critical to the current or future business competitiveness, and hence the survival of an organization. Strategic MIS also supplies an organization with business intelligence. In other words, if an information system is used in creative ways to achieve goals and fulfill set organizational missions, it can be considered to be a strategic MIS.

Strategic MIS can be external or internal systems. External strategic MIS are used mainly by external quantities in the business environment, such as customers, suppliers, distributors etc and have a value added component that gives developers some time to reap the benefits of the system innovation. Internal strategic MIS are used by employees within the organization and do not have value added component. The employees focus on issues such as improving the quality of products, services and also enhancing the decision making capabilities of managers. Such systems are used at all levels in the organization and they have long term implications for the firm and also for the business processes within the firm.

In general, Strategic MIS can be divided into 3 categories :
(a) systems that focus on innovation fro competitive edge
(b) systems that use information as a weapon
(c) systems that increase productivity and lower the costs of goods and services

3.1 Characteristics

There are three common characteristics in all Strategic MIS. They are :
(a) telecommunications as a central part of SMIS
(b) reliance on a number of vendors fro providing information technologies
(c) cooperation among a number of organizations

Telecommunications is a vital part of SMIS. Successful organizations transcended traditional organizational boundaries and eliminated the barriers of time and space through the use of telecommunications. However, developing and implementing information systems that rely heavily on telecommunications is a challenging task and often becomes one of the bottlenecks for the development of SMIS.

For integration of complex technologies to develop an SMIS, a number of vendors are needed in many cases. Therefore, one of the ingredients of an SMIS of an SMIS is the ability to

identify, coordinate and manage transactions with a number of vendors and effectively bring together diverse technologies to achieve a goal.

Inter organizational systems are those systems which are shared by more than two organizations, in terms of cooperation and collaboration rather than competition. Such ventures often result in powerful systems enhancing productivity, reduction in operating costs, increased market share, creating new partnerships, especially for organizations that conduct business transactions in the global market.

3. 2 Barriers of SIMS :

Researchers, Chris Kemerer and Glen Sosa, both from the Sloan school of management, identified 12 barriers to successful development of SMIS. These barriers fall into 3 categories

(a) Problem definition
(b) Implementation
(c) Maintenance

Problem definition barriers

- Generating workable idea require leadership and team work
- Many innovative ideas are technically infeasible
- Many innovative ideas are prohibitively expansive
- Many ideas die because they lack a sufficient market

Implementation barriers

- Telecommunications increases the complexity of implementing SMIS
- Multiple systems are difficult to integrate
- SMIS systems often require inter organizational cooperation
- State of the art technologies are difficult to implement

Maintenance barriers

- Competitors can copy SMIS
- Unanticipated demand can overwhelm the usefulness of an SMIS
- Applications can be expensive to maintain or enhance
- High exit barriers can cause devastating losses

Organizations with limited financial resources technological sophistication and organizational flexibility are likely to face one or more of the above mentioned barriers.

4. Success and Failure of MIS :

Most organizations use MIS more successfully than other organizations. Through hardware, software and technology available are the latest and the best, its use is more for the collection and storage of data and its elementary processing. There are some factors, which make MIS, a success while there are some factors, which make it a failure.

Factors contributing to success of MIS : If MIS is to be a success, then it should have all the features listed below :

- MIS is integrated into the management function. It sets clear objectives to ensure that MIS focuses on the major issues of the business. Also adequate development resources are provided and human & organizational barriers to progress are removed.
- An appropriate information processing technology required to meet the data processing and analysis needs of the users of MIS is selected.
- MIS is oriented, defined and designed in terms of the users requirements and its operational viability is ensured.

- MIS is kept under continuous surveillance, so that its open system is modified according to the changing information needs.
- MIS focuses on results and goals, and highlights the factors and reasons for non achievements.
- MIS is not allowed to end up into an information generation mill avoiding the noise in the information and the communication system.
- MIS recognizes that a manager is a human being and therefore, the systems must consider all the human behavioral aspects in the process of management.
- MIS recognizes that the different information needs for different objectives must be met with. The globalization of information in isolation from the different objectives leads to too much information and its non use.
- MIS is easy to operate and therefore, the design of MIS has such good features which make up a user friendly design.
- MIS recognizes that the information needs become obsolete and new needs emerge. The MIS design, therefore, has a potential capability to quickly meet newer and newer needs of information.
- MIS concentrates on developing the information support to manage critical success factors. It concentrates on the mission critical applications serving the needs of the top management.

Factors contributing to failures : Many times, MIS is a failure. The common factors which are responsible for this are as follows :

- MIS is conceived as a data processing and not as an information system.
- MIS does not provide that information which is needed by managers but it tends to provide the information generally the function calls for. MIS then becomes an impersonal function.
- Underestimating the complexity in the business systems and not recognizing it in the MIS design leads to problems in the successful implementation.
- Adequate attention is not given to the quality control aspects of the inputs, the process and the outputs leading to insufficient checks and controls in MIS.
- MIS is developed without streamlining the transaction processing systems in the organizations.
- Lack of training and appreciation that the users of the information and the generators of the data are different, and they have to play an important role in the MIS.
- MIS does not meet certain critical and key factors of its users, such as a response to the query on the database, an inability to get the processing done in a particular manner, lack of user friendly system and the dependence on the system personnel.
- A belief that the computerized MIS can solve all the management problems of planning and control of the business.
- Lack of administrative discipline in following the standardized systems and procedures, wrong coding and deviating from the system specifications result in incomplete and incorrect information.
- MIS does not give perfect information to all the users in the organization. Any attempt towards such a goal will be unsuccessful because every user has a human ingenuity, bias and certain assumptions not known to the designer. MIS cannot make up these by providing perfect information.

10.4 : Expert System

Expert system (Figure 10. 8) is a branch of AI that designs intelligent machines, which solve real-world problems by using deductive logic. They are specifically designed to solve problems of a particular niche area. An expert system is built with total expertise in a specific domain of human thought and is programmed to use statistical analysis and data mining concepts. It is basically used to give expert advice to non-expert humans in situations in which either the human expert is not available or is too expensive to be consulted. There are three main components in an expert system.
(1) Knowledge base
(2) Inference engine
(3) User interface

Knowledge base consists of facts and rules collected from human experts, either through interviews or by observations. These rules are usually expressed using If-Then statements describing if a particular condition is true, then the following inference can be made or the following action can be taken. With the inference, a probability factor is also associated to tell the non-expert user that the inference is not a certainty but is valid with the specified probability. For example, a system for approving loan applications might infer that the person's loan plea may be rejected because there is a probability of 0.9 that the person will be unable to pay the debt.

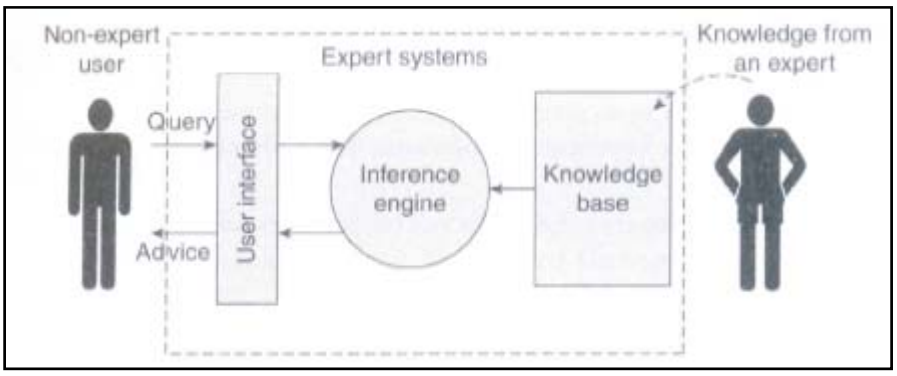


Figure 10.08 : Components of an Expert System

An *inference engine* acts as a search engine in the knowledge base. It searches for facts and rules in the knowledge base, depending on the user's query.
User interface is an easy and intuitive-to-use component that allows users to submit their queries and get experts' advice. A good user interface enables the users to express their query in their own language.
In response to the user's query, the expert system displays the corresponding or action along with its probability factor and a sequence of rules which were used to deduce the inference. This will enable the non-experts to cross check the validity of the inference made by the expert system. This will even help the students as they can use it as a learning tool.

Applications :
The applications of expert systems are as follows:
• Hearsay is used to analyse sensor data to infer situation descriptions.
• MYCIN is used to make observations and send alerts about system malfunctions.
• MYCIN is used to diagnose human illness and suggest a treatment.
• Preterm Birth Risk Assessment is used to predict the consequence of a given situation.

• Dendral is used to configure objects within specified constraints.
• REACTOR is used to monitor systems for any type of vulnerabilities.
• MACSYMS is used to provide incremental solutions for complex problems.
• SMH.PAL is used for diagnosing and assessing students with multiple disabilities.
• Expert system is used to plan the sequence of actions.
• It is used to make financial forecasts.
• It is used to schedule routes for delivery vehicles.
• It is used to analyse sonar data to detect submarines.
• It is used to analyse problems in the car engine.
• It is used to deduce locations where drilling for oil/water/gold can be done.

Limitations :
The limitations of expert systems are as follows:
• Difficulty to attain expert's knowledge.
• Difficulty in accessing large knowledge databases.
• Difficulty in integrating knowledge from different experts.

10.5 : Enterprise Resource Planning (ERP), Definition, Modules, Vendors

Enterprise Resource Planning (Enterprise Wide Information System) **:**
Originally, ERP packages are targeted at the manufacturing industry and consisted mainly function for planning and managing core businesses such as sales management, production management, accounting and financial affairs, etc. However, in recent years, adaptation not only to the manufacturing industry, but also to diverse types of Industry has become possible and the expansion of implementation and use has been progressing on a global level. ERP software has been designed to model and automate many of the basic process of a company, from finance to the shop floor with the goal of integrating information across the company and eliminating complex, expensive links between computer system that were never meant to talk to each other.

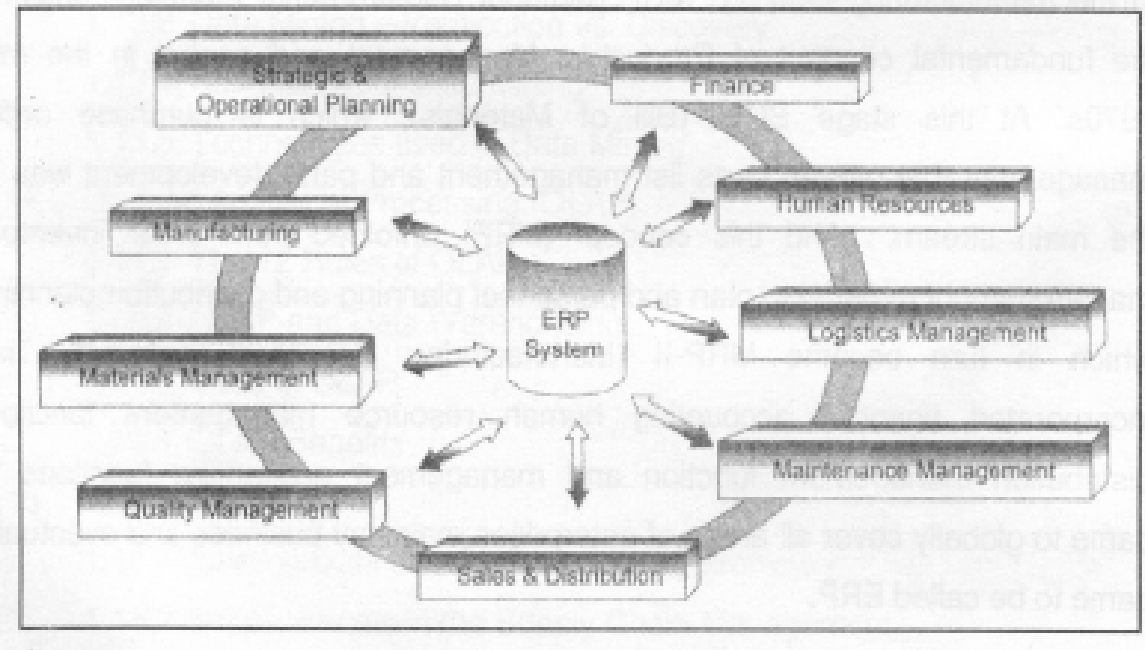


Figure 10.09 : Information Integration through ERP Systems

ERP System's set to generic processes produce the dramatic improvements that they are capable of only when use to connects parts of an organization an integrate its various processes seamlessly. When a warehouse in Noida enters a customer order, for example, the data flows automatically to others in the company who need to see it - to the finance department and the company head quarters in Mumbai and manufacturing plant in Chennai.

Advantages of ERP :

Installing an ERP system has many advantages - both direct and indirect. The direct advantages include improved efficiency, information integration for better decision making, faster response time to customer queries, etc. The indirect benefits include better corporate image, improved customer goodwill, customer satisfaction, and so on.

The following are some of the direct benefits of an ERP system:

. Business integration
. Flexibility
. Better analysis and planning capabilities
. Use of latest technology

ERP and Related Technologies :

ERP is an abbreviation for Enterprise Resource Planning and means, the techniques and concepts for the integrated management of businesses as a whole, from the viewpoint of the effective use of management resources, to improve the efficiency of an enterprise.

ERP systems serve an important function by integrating separate business functions - materials management, product planning, sales, distribution, finance and accounting and others - into a single application. However, ERP systems have three significant limitations:

1. Managers cannot generate custom reports or queries without help from a programmer and this inhibits them from obtaining information quickly, which is essential for maintaining a competitive advantage.
2. ERP systems provide current status only, such as open orders. Managers often need to look past the current status to find trends and patterns that aid better decision making.
3. The data in the ERP application is not integrated with other enterprise or division systems and does not include external intelligence.

There are many technologies that help to overcome these limitations. These technologies, when used in conjunction with the ERP package, will help in overcoming the limitations of a standalone ERP system and thus, help the employees to make better decisions. Some of these technologies are BPR, Data Warehousing, Data Mining, Online Analytical Processing (OLAP), Supply Chain Management and so on.

With the competition in the ERP market getting hotter and hotter, and ERP vendors searching for ways to penetrate new market segments and expand the existing ones, tomorrows ERP systems will have most of these technologies integrated into them. In this chapter, we will see how each of these technologies are related to ERP systems.

1. Business Process Reengineering (BPR) :

BPR has been around for quite some time and a lot has been written about it in both, the practitioner trade press and the academic research journals. However, the controversy still remains about whether there is any accurate description of BPR or BPR is just a fad - an appealing label to tag on to whatever your company is doing, to suggest that your latest and greatest work is 'in vogue'. But if reengineering is to continue in the long run, then it must do more than advertise its considerable successes to date. It must become more proactive and inclusive with regard to human, organizational and motivational change issues.

Dr. Michael Hammer defines BPR as "... the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance such as cost, quality, service and speed." One of the main tools for making this change is the Information Technology (IT), any BPR effort that fails to understand the importance of IT, and goes through the pre-BPR analysis and planning phases without considering the various IT options available and the effect of the proposed IT solutions on the employees and the organization, is bound to crash during takeoff.
We have seen that the ERP systems help in integrating the various business Processes of the organization with the help of modern developments in IT. With a good ERP package, the organization will have the capability of achieving dramatic improvements in critical areas such as cost, quality, speed and so on. So many BPR initiatives end up in the ERP implementation.

2. Data Warehousing :
If operational data is kept in the databases of the ERP system, it can create a lot of problems. As time passes, the amount of data will increase and this will affect the performance of the ERP system. So it is better to archive the operational data once its use is over. When I say 'the use is over', it does not mean that the archived data is useless. On the contrary, it is one of the most valuable resources of the organization. However, once the operational use of the data is over, it should be removed from the operational databases. For example, one the financial year is over, the daily transactional data can be archived. Figure 10.10 shows what happens if the data is not archived.

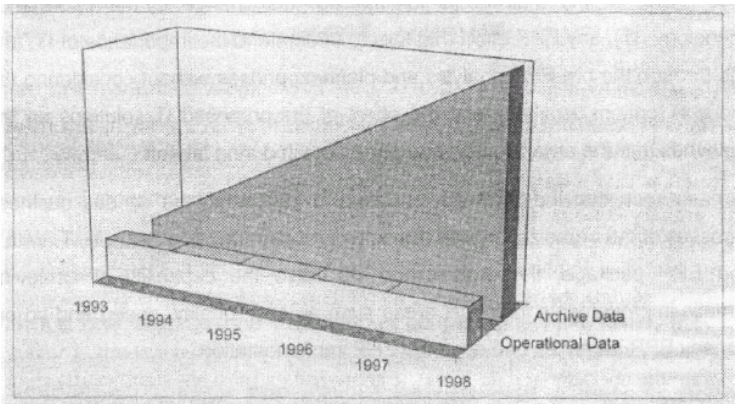


Figure 10.10 : Operational Data vs. Archive Data

It is evident from the Figure 10.10 that even though the operational data volume is nearly the same each year, since the data is not archived, the total amount of data that is stored in the operational database will go on increasing. Figure 10.10 shows the effect of keeping this huge amount of data in the operational database.
It is clear from the graph (Figure 10.11) that as the volume of the data in the database increases, the performance of the database and the related applications decreases.
It is evident that we should separate the operational data from the non-operational data. Here the term archive data is not used because if the non-operational data is archived, there is little or no use for it. But this data is a very valuable resource and is too precious to be kept in some archive. It is in this situation that a data warehouse comes in handy.

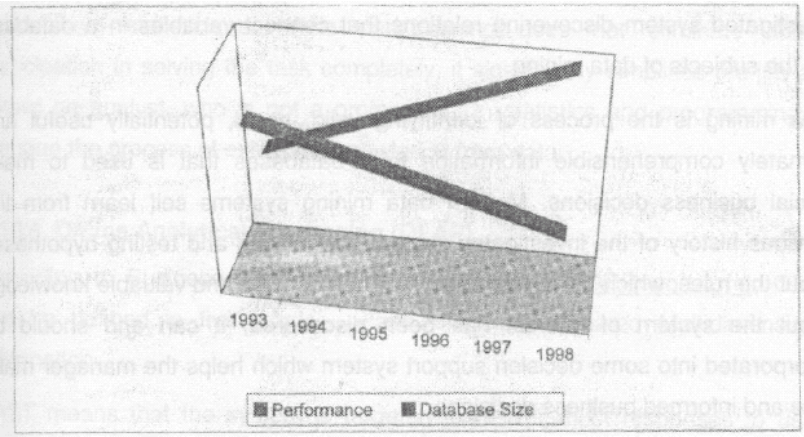


Figure 10.11. Data Volume Vs. Performance

Separating it from the data in operational systems can access the primary concept of data warehousing is that the data stored for business analysis most effectively. The most important reason for separating data for business analysis, from the operational data, has always been the potential performance since analysis processes much more complex and sophisticated. In addition to producing standard reports, today's data warehousing systems support very sophisticated online analysis, including multi-dimensional analysis.

3. Data Mining :

We are living in the information age. The importance of collecting data that reflects one business or of activities that achieve competitive advantage, are widely recognized now. Powerful systems for collecting data and managing it in large databases are available in most organizations. However, the major bottleneck of converting this data into effective information is the difficulty faced in extracting knowledge about the system from the collected data. Modeling the investigated system discovering relations that connect variables in a database are the subjects of data mining.

Data mining is the process of identifying valid, novel, potentially useful and ultimately comprehensible information from databases that is used to make crucial business decisions. Modern data mining systems self learn from the previous history of the investigated system, formulating and testing hypotheses about the rules, which the system obeys. When concise and valuable knowledge about the system of interest has been discovered, it can and should be incorporated into some decision support system which helps the manager make wise and informed business decisions.

The main reason for needing automated computer systems for intelligent data analysis is the enormous volume of existing and newly appearing data that require processing. The amount of data accumulated each day by various' businesses, scientific and governmental organizations around the world is daunting. Research organizations, academic institutions and commercial organizations create and store huge amounts of data each day. It becomes impossible for human analysts to cope with such overwhelming amounts of data. The other problems that surface when human analysts process data are:

☛ The inadequacy of the human brain when searching for complex factorial dependencies in the data

☛ The lack of objectiveness in analyzing the data

A human expert is always a hostage of the previous experience of investigating other systems. Sometimes this helps, sometimes this hurts, but it is almost impossible to get rid of this fact.
One additional benefit of using automated data mining systems is that this process has a much lower cost than hiring an army of highly trained (and paid) professional statisticians. While data mining does not eliminate human participation in solving the task completely, it significantly simplifies the job and allows an analyst, who is not a professional in statistics and programming, to manage the process of extracting knowledge from data.

4. Online Analytical Processing (OLAP) :
According to Business Intelligence Ltd., (httP://www.OlAPReport.com), OLlAP can be defined in five words - Fast Analysis of Shared Multidimensional Information. FAST means that the system is targeted to deliver most responses to users within about five seconds, with the simplest analysis taking no more than one second and very few taking more than 20 seconds. ANALYSIS means that the system can cope with any business logic and statistical analysis that is relevant for the application and the user, and keep it easy enough the target user.
SHARED means that the system implements all the security requirements for confidentiality (possibly down to cell level) and, if multiple write access is needed, concurrent update locking at an appropriate level. MULTIDIMENSIONAL means that the system must provide a multidimensional conceptual view of the data, including full support for hierarchies and multiple hierarchies. INFORMATION is refined data that is accurate, timely and relevant to the user.
Simply put, OLAP describes a class of technologies that are designed for live adhoc data access and analysis. While transaction processing (OLTP) generally relies solely on relational databases, OLAP has become synonymous with multidimensional views of business data. These multidimensional views are supported by multidimensional database technology and provide the technical basis for calculations and analysis required by Business Intelligence applications.

OLAP technology is being used in an increasingly wide range of applications. The most common are sales and marketing analysis; financial reporting and consolidation; and budgeting and planning. Increasingly however, OLAP is being used for applications such as product profitability and pricing analysis; activity based costing; manpower planning; and quality analysis; or for that matter any management system that requires a flexible, top down view of an organization.

5. Supply Chain Management :
A supply chain is a network of facilities and distribution options that performs the function of procurement of materials, transformation of these materials into intermediate and finished products, and the distribution of these finished products to customers. Supply chains exist in both service and manufacturing organizations, although the complexity of the chain may vary greatly from industry to industry and firm to firm.
Traditionally, marketing, distribution, planning, manufacturing, and the purchasing organizations along the supply chain operated independently. These organizations have their own objectives, which are often conflicting. Marketing's objective of high customer service and maximum sales revenue conflict with manufacturing and distribution goals. Many manufacturing operations are designed to maximize throughput and lower costs with little consideration for the impact on inventory levels and distribution' capabilities. Purchasing contracts are often negotiated with very little information beyond historical buying patterns.

The result of these factors is that there is not a single, integrated plan for the organization - there are as many plans as businesses. Clearly, there is a need for a mechanism through which these different functions can be integrated together. Supply chain management is a strategy through which such integration can be achieved.

10.7 : Student Presentation :

SAP,
People Soft,
Oracle

10.8 ; Student Presentation :

MIS Career Opportunities for MBA students

Case Study 1 : American Management System

The Business Benefits of Knowledge Management

Like most employees new to a company, when Andrew Jewell needed to answer an important question about a department project, he wasn't quite sure where to turn. So Jewell, a configuration management manager in the industrial and utilities consulting group at American Management Systems, Inc., logged on to *AMS's* "Knowledge Center." The center is *AMS's* knowledge management system, an online intranet compendium of the consulting firm's best practices.

On the intranet, Jewell reviewed the center's white papers on business process reengineering tools but still didn't find the information he needed. He then clicked on a directory listing *AMS's* resident reengineering experts. One of them turned out to be a-vice president down the hall who was happy to share his expertise.

"The Knowledge Center gave me a single point of contact to check all the resources of the firm," Jewell says. "Without it, I'd probably have wound up reinventing the wheel". That notion of putting the combined knowledge of the firm at an employee's fingertips is the essence of knowledge management systems. The basic goal to take key pieces of data from various sources such as groupware, databases, applications, and people's minds, and make them readily available to users in an organized, logical form that represents knowledge.

The ability to put together facts and personal experience into knowledge others can then share has eluded many businesses. Of 400 executives surveyed last year by Ernst & Young's Center for Business Innovation, most said theirs was a knowledge-intensive business, but 87 percent said their firms were only average or worst at transferring knowledge. "It's hard to know what we know collectively," says Susan Hanley, director of the Knowledge Center and senior principal at AMS.

For example, while AMS has several consulting specialties, it decided all consultants could benefit from access to best practices data. Realizing that most of these practices were locked in the minds of thousands of employees scattered across globe, AMS created a Knowledge Center Associates program designed to encourage consultants to commit to work on at least one best practices project a year. Associates may work singly or in virtual groups

to create white papers distilling these practices. Senior consultants review the papers to ensure they don't conflict with other best practices. Next, they're indexed by the Knowledge Center's staffers, who enter them into a Lotus Notes database for retrieval. Consultants in the company access the center via a Notes interface.

Outside the company, they can search Web-enabled Notes databases through a Lotus Domino Web server. AMS began its knowledge programs with one "core competency" in 1993 and expanded it to five others in 1995. In 1996, about 250 associates completed research projects; that number grew to 450 in 1997, Hanley says. With thousands of consultants in 50 offices worldwide and new knowledge being the process of capturing it will be a continual one she says.

Do knowledge management systems payoff? Sharing the best practices definitely does, says Susan Hanley. For example AMS signed up one new client only after consultants pulled up 15 real world examples from the Knowledge Centre that convinced the client that AMS had the expertise, Hanley says.

Case Study Questions :

1. What are the system components of the Knowledge Center knowledge management system at AMS?
2. What business benefits does AMS derived from their knowledge management system.
3. How could other types of companies use an intranet for knowledge management like AMS *does?*

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Assignment 10

1. What are the different types of Information Systems ? Explain each of them ?
2. Write a note on Use of MIS at various levels of Management.
3. What is expert system ? Explain in detail ?
4. Write a note on ERP and related technologies which supports automation of business management ?
5. Give a framework for information system for each level of Management and Operations.

Additional Questions :

1. Explain the different components of Information Systems and Information System Resources ? 12 M
2. Write a note on various Information System Activities 12 M
3. Explain how information Systems can be used for competitive Strategy 12 M
4. What are the strategic role of Information Systems ? Explain 12 M
5. Write a note on Strategic Use of Information Systems 12 M
6. List the factors contributing success & failure of MIS 12 M
7. What are the different levels of management in an organization ? What types of information required in each level for effective decision making ? 15 M
8. Define Management Information System ? Explain various characteristics of MIS
9. Write a note on impact of information system on an organizational effectiveness.
10. What are the different types of Information Systems ? Explain each of them ?
11. What is decision making ? What are the types of decisions ?

12. What do you mean by decision support system ? What are their characteristics, types, components and functions ?

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