ITM SYLLABUS WISE NOTES

Introduction to Information Technology:

With the rapid spread of IT (Information Technology) and the increasing interconnection and connectivity in the contemporary world, having an IT strategy is no longer a luxury for organizations and indeed, it has become the very necessity for survival. This means that for organizations to harness the power of IT, leverage the synergies between their business processes, and capitalize on the efficiencies of the economies of scale, they need a robust, coherent, and proactive IT strategy. Further, with IT become ubiquitous, it is no longer the case that business strategy alone is enough and the alignment of the business strategy with that of the IT strategy has become paramount.

An IT strategy has been defined as the actualization of the plans, which consist of tactics, principles, and objectives concerning the use of IT within organizations. If we break down the elements of an IT strategy, the why, how, what, when, where aspects are the important components of an IT strategy. First, the organization needs to identify why it needs to use IT and then formalize a nuts and bolts plan on how it need to leverage IT. For instance, most business processes can be automated and those that cannot or need not be automated along with the practical implementation of the automation forms the what of the IT strategy. Next, the organization has to decide where it needs to deploy IT along with when the automation and the use of IT have to be rolled out.

After these elements are identified and codified in a written document that describes the operational details of an organizations IT strategy, care must be taken to ensure that this IT strategy is consonant with the overall objectives as well as based on scientific principles of technology. These objectives are related to what the organization wants from its IT strategy and dependent on the application of sound technology practices. Moreover, the organizations' IT strategy must complement and supplement its corporate and business strategies and these cannot exist in isolation but instead must work in tandem.

To take some examples, if a bank wants to actualize an IT strategy, it must first define the objectives behind such a strategy. This can take the form of automation of 1000 branches in a year, the rollout of a core banking solution, which would be the foundation for the integration of the corporate, retail, and investment banking functions and their automaton, and then must identify the returns that it expects from such an IT strategy. The ROI or the Return on Investment of an IT strategy is very important, as the bank needs to have a clear plan, articulate, and justify the spending on IT, which

would generate a return on its investment. In this case, the ROI can be expected to be a 10% rise in customer accounts, 20% rise in revenues because of handling higher volumes and processing more transactions, and a 15% cost savings because of lesser human effort as well as more rationalization of operations. All these figures should then translate into the percentage increase in profit that the bank expects from its IT strategy. Finally, it is also common for organizations to calculate ROI based on each dollar spent on IT and this can be the case with the example here of the bank which can actually note down all these figures and come up with a comprehensive IT strategy.

Business Values Of IT:

IT is becoming a partner with the business

Information Technology (IT) department in many firms is changing from a cost center to a trusted business partner within the enterprise. The change is needed to give the business the tools to be competitive in this global marketplace.

For too long, IT has been and acted like a cost center. IT has been focused on technology alone. The IT department has not been focused on how technology and processes can help the organization achieve its vision or to address Strengths, Weaknesses, Opportunities, and Threats (i.e. SWOT analysis) that impact the business.

As a cost center, IT is simply providing services such as email, data storage, business application access, desktop management, technical support and so forth. All of these services can and have been outsourced to vendor(s) based on cost and level of service. From a business perspective, if the IT department cannot provide the level of service needed at a reasonable cost, outsourcing is a reasonable approach.

IT has much more to give the business, however. As a trusted partner, IT can work with the business to provide the exact services the business needs at a price that the business wants to pay. The IT department has the advantage of working with the business to better understand and share in the business vision. With this understanding, the IT department should be better able to provide a list of services that the business would find critical in achieving the firm's objectives.

IT Processes and Procedures are Maturing

With concepts and policies such as Information Technology Infrastructure Library (ITIL), IT has recognized it must provide valuable services that help the organization accomplish its objectives. ITIL is a set of standards for how IT should work with the organization. This standard fits organizations ranging from small firms to large enterprises.

ITIL describes a comprehensive set of IT procedures, policies, and tasks for the organization. One goal of ITIL is to list the services and resources it can supply. In order to provide this list or menu, IT must work with the business to make sure this list fits the businesses goals.
The Service Desk is one example how ITIL is working toward providing an easy, streamlined process to help the organization. The Service Desk is basically a “one call for service”. The Service Desk provides solutions to agreed-upon services such as password resets. The Service Desk creates service tickets and routes the tickets to the correct resolvers for other issues.

Quality have become a concern for the IT Department

IT has recognized the need for quality. This is measured by metrics such as up time, service desk tickets, and other measurable objectives that are important for the organization.
The IT department is slowly adapting to the business needs. In the past, the IT department, vendors who provide IT equipment and/or services and even general vendors ranging from retail goods to automotive to industrial machinery have focused on features. Sometimes these features are not even based on customer need. It is easier to sell features than reliability.

Providing quality products can be a challenge because of the need to meet deadlines, lower development costs and integrate products into complex environments. However, this tendency to accept lower quality is coming to an end. Customers are starting to realize that lower quality results in lower productivity and/or more rework.
The business needs systems that are reliable. Each hour of down time could result in lost worker productivity and/or lost customer sales. Depending on the size of the organization, the lost sales and productivity could be large. In less tangible terms, the down time can result in lost employee moral and/or customer satisfaction. Perhaps the worst outcome would result in a customer becoming dissatisfied and taking all their future business to a competitor.

What can IT do?

IT can and must continue to become more business-centric.

1. Improve communications. IT must communicate with the business in terms that are clear. Rather than talking in terms of MegaBytes and Gigahertz, IT needs to talk in term of Return on Investment (ROI), competitive advantage and other metrics used by business. By communicating with the business, IT can better understand the needs of the business. It is not the job of the business leaders to know technical jargon. IT must communicate clearly with the business in order to be a trusted resource when the business is looking for solutions.
2. Focus on business needs. IT needs to work with the business to focus on upgrades and systems that support business needs, rather than

just reflexively provide those that are the newest technology. While a server upgrade may be valuable, there needs to be a demonstration of how it improves reliability, lowers costs or adds valuable services for the business to accept this cost.
The organization is not in business to add servers and workstations. To earn the organization's trust, IT must show value.

3. Provide a catalog of services for business. A catalog lets business know what the initial and ongoing costs are for a product or service as well as what the incremental costs would be for additional levels or features. This enables the business to decide what it wants rather than the IT department simply stating what the business will get at this price. One example would be to provide information on different levels of services for email. The business may decide that it wants regular email, that it does not want the extra cost and security risks of off-site web access but is willing to accept the costs and risks of mobile device (smart cell phone) email access.
   Another example may be offering different response times for problems. The business may decide that a 24-hour response to a problem is acceptable; that any shorter times would be too expensive given the number of problems and the typical severity level of cases. The business may also decide that it wants a shorter response time for critical applications such as the web-based order system and that the business is willing to pay the extra cost rather than risk lost customers.
4. Manage projects with proven methodologies. Using established tools and methods from professional organizations such as the Project Management Institute (PMI) vastly increases the probability of a project being completed on time, within budget and with the expected deliverables. For example, it is very easy for a project to expand in scope due to unforeseen needs or shrink in scope due to budget or unplanned problems. By using good project management, these risks can be reduced so the project delivers what was originally promised at the cost and time originally agreed upon.
5. Manage IT projects as a complete system. Often projects are delivered in a vacuum. Without considering all of the "moving parts" both internal and external to the project, there is a risk of problems and/or conflicts. Too often projects miss the impact they may have on systems that the project interacts with or even on totally unrelated systems. In one example, one software application upgrade resulted in the complete shutdown of an e-commerce application, despite the two systems appearing to be unrelated. It is critical to plan, develop and test the complete system.
6. Manage projects with input and buy-in from all stakeholders. Frequently, a simple requirement is missed or the stakeholders do not

realize all of the impacts of a design. By working with stakeholders to understand and document all details, the risk of system conflicts and problems for the project will be reduced. For example, in one case a project assumed that the system load would be basically even throughout the day.

7. Have a strong project sponsor. All projects need a strong sponsor at the leadership level who can help resolve roadblocks for the project and take responsibility for the project. Too often projects do not have a strong, committed sponsor who will ensure that there is the funding needed for the project, help to establish buy-in from all departments, obtain key resources and address other such problems.

Role Of Computer in Modern Business

In an age of booming technology, running a business without computers is like trying to breathe without lungs. Like it or not, technology has become an integral part of the way business is done. Even if you perform services or provide products which are not technology related in and of themselves -- such as dry cleaning and hairstyling -- you may find that without a computer, it's difficult to place orders with suppliers or pass information to your accountant.

Inventory Management

Retail and wholesale business have increasingly come to rely on computers' advanced ability to keep track of inventory and assist in ordering more when stocks get low. In fact, one of the central approaches to the success of retail giant WalMart was real time ordering in which WalMart's computer systems place orders for goods as they are needed. This allowed them not to carry too much or too little of any particular item as well as to save on the manpower required to manage much of the supply chain. However, businesses of all sizes use inventory management and point of sales systems to do smaller scale versions of the same thing.

Presentations And Documents

While it's still possible to find a typewriter at a garage sale, the days of typed papers and documents are dead and gone. Word processing is a must in today's business environment. Not only are computers the medium for document creation, but the ability to email and share documents electronically has become central to the editing, approval and delivery process. Similarly, presentations and reports are commonly delivered in

electronic slide show presentations or via webinars. Creators must use programs, such as PowerPoint, to create them as this is the standard for modern business.

Electronic Communications

A business not involved in electronic communications -- particularly email -- closes off one of the largest communication channels today. Customers, clients, vendors and business partners use email to make contact and transact business. Some companies go beyond email and actually encourage the use of in-house instant messaging as a method of communications between employees and departments.

Internet Access

Internet access is a business' communications lifeline. Internet-enabled computing allows you to receive orders from customers, place orders with suppliers, research businesses, explore business ideas, communicate with government agencies and even manage your business' banking. In addition, online presence with at least a website is critical to legitimizing a business. Many companies go further and participate in social networking sites for marketing and branding purposes.

Multi-site Networks

If your business has more than one site or branch, then multi-site networking provides tremendous benefits for accounting, standardizing and managing your multi-faceted operation. Many companies use point of sale systems to ensure standardized operations within a chain of stores or sites. Companies that sell similar products or services in multiple locations find that computer systems help them keep track of revenues, costs and their supply chain from a central office. This allows a centralized management team to get reports on any or all sites and get a macro-view of the business when needed.

Current Trends in IT

Information technology has served as a big change agent in different aspect of business and society. It has proven game changer in resolving economic and social issues.

Advancement and application of information technology are ever changing. Some of the trends in the information technology are as follows:

1. **Cloud Computing**

   One of the most talked about concept in information technology is the cloud computing. Clouding computing is defined as utilization of computing services, i.e. software as well as hardware as a service over a network. Typically, this network is the internet.

   Cloud computing offers 3 types of broad services mainly Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS).

   Some of the benefit of cloud computing is as follows:

   - Cloud computing reduces IT infrastructure cost of the company.
   - Cloud computing promotes the concept of virtualization, which enables server and storage device to be utilized across organization.
   - Cloud computing makes maintenance of software and hardware easier as installation is not required on each end user's computer.

   Some issues concerning cloud computing are privacy, compliance, security, legal, abuse, IT governance, etc.

2. **Mobile Application**

   Another emerging trend within information technology is mobile applications (software application on Smart phone, tablet, etc.)

   Mobile application or mobile app has become a success since its introduction. They are designed to run on Smartphone, tablets and other mobile devices. They are available as a download from various mobile operating systems like Apple, Blackberry, Nokia, etc. Some of the mobile app are available free where as some involve download cost. The revenue collected is shared between app distributor and app developer.

3. **User Interfaces**

   User interface has undergone a revolution since introduction of touch screen. The touch screen capability has revolutionized way end users interact with application. Touch screen enables the user to directly interact with what is displayed and also removes any intermediate hand-held device like the mouse.

   Touch screen capability is utilized in smart phones, tablet, information kiosks and other information appliances.

4. **Analytics**

   The field of analytics has grown many folds in recent years. Analytics is a process which helps in discovering the informational patterns with data. The field of analytics is a combination of statistics, computer programming and operations research.

   The field of analytics has shown growth in the field of data analytics, predictive analytics and social analytics.

   Data analytics is tool used to support decision-making process. It converts raw data into meaningful information.

   Predictive analytics is tool used to predict future events based on current and historical information.

   Social media analytics is tool used by companies to understand and accommodate customer needs.

The every changing field of information technology has seen great advancement and changes in the last decade. And from the emerging trend, it can be concluded that its influence on business is ever growing, and it will help companies to serve customers better.

Business in Digital Economy

About the digital economy

The digital economy is a global network of different commercial and social activities, which are enabled by technology such as the internet and mobile devices.

From a business point of view, the digital economy is a dynamic environment where an increasing number of goods and services are provided

online. The digital economy can help you reach a targeted global audience and encourage them to interact with your business.

Broadband and the digital economy

In Australia, the national broadband network (nbn) will become the key infrastructure that supports growth of our digital economy. The nbn is predicted to change the way Queenslanders do business through:

- new technologies and industries
- new products and services
- new domestic and international markets
- new ways of communicating with customers and suppliers
- new work habits, especially an increase in telecommuting.

Queensland businesses are encouraged to make the most of the digital economy and the opportunities the nbn presents. Consider establishing or improving your online business to grow your customer base and access new markets.

Innovation is an important part of future growth. With the rollout of the nbn, Queensland businesses have greater opportunities to innovate and rapidly adapt to the innovations of their competitors and other businesses.

Unit 2:

Introduction to Information System: Information System, Classification and type of Information System

An information system is integrated and co-ordinate network of components, which combine together to convert data into information.

Components of information systems

An information system is essentially made up of five components hardware, software, database, network and people. These five components integrate to perform input, process, output, feedback and control.

Hardware consists of input/output device, processor, operating system and media devices. Software consists of various programs and procedures. Database consists of data organized in the required structure. Network consists of hubs, communication media and network devices. People consist of device operators, network administrators and system specialist.

Information processing consists of input; data process, data storage, output and control. During input stage data instructions are fed to the systems which during process stage are worked upon by software programs and other queries. During output stage, data is presented in structured format and reports.

Classification of Information System

In any given organization information system can be classified based on the usage of the information. Therefore, an information system in an organization can be divided into operations support system and management support system.

- **Operations support system**

  In an organization, data input is done by the end user which is processed to generate information products i.e. reports, which are utilized by internal and or external users. Such a system is called operation support system.

  The purpose of the operation support system is to facilitate business transaction, control production, support internal as well as external communication and update organization central database. The operation support system is further divided into a transaction-

processing system, processing control system and enterprise collaboration system.

- **Transaction Processing System (TPS)**

  In manufacturing organization, there are several types of transaction across department. Typical organizational departments are Sales, Account, Finance, Plant, Engineering, Human Resource and Marketing. Across which following transaction may occur sales order, sales return, cash receipts, credit sales; credit slips, material accounting, inventory management, depreciation accounting, etc.

  These transactions can be categorized into batch transaction processing, single transaction processing and real time transaction processing.

- **Process Control System**

  In a manufacturing organization, certain decisions are made by a computer system without any manual intervention. In this type of system, critical information is fed to the system on a real-time basis thereby enabling process control. This kind of systems is referred as process control systems.

- **Enterprise Collaboration System**

  In recent times, there is more stress on team effort or collaboration across different functional teams. A system which enables collaborative effort by improving communication and sharing of data is referred to as an enterprise collaboration system.

- **Management Support System**

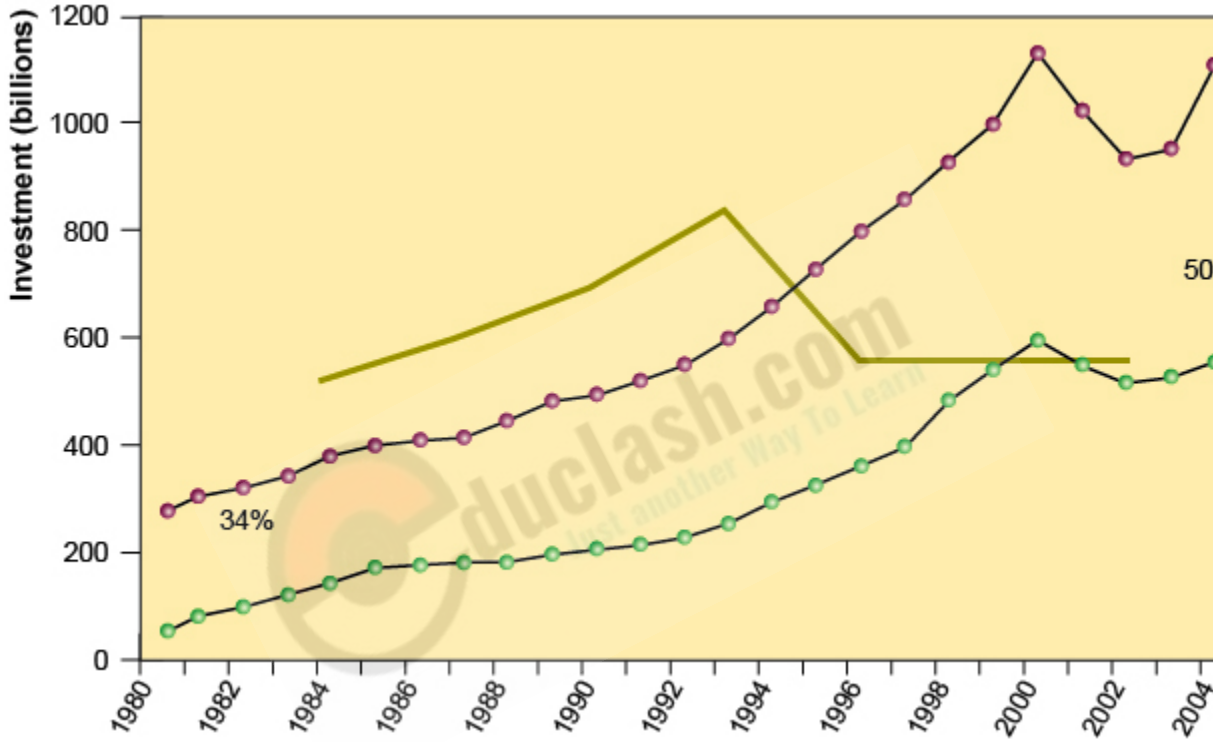
  Managers require precise information in a specific format to undertake an organizational decision. A system which facilitates an efficient decision making process for managers is called management support system.

  Management support systems are essentially categorized as management information system, decision support system, expert system and accounting information system.

Management information system provides information to manager facilitating the routine decision-making process. Decision support system provides information to manager facilitating specific issue related solution.

Role of Information Systems in Business Today

Information technology and systems have revolutionized firms and industries, becoming the largest component of capital investment in the U.S. and many industrialized societies. Investment in information technology accounts for approximately 50 percent of all capital invested in the United States.



INFORMATION TECHNOLOGY CAPITAL INVESTMENT
Information technology capital investment, defined as hardware, software, and communications equipment, grew from 34% to 50% between 1980 and 2004.
Source: Based on data in U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Product Accounts, 2006.

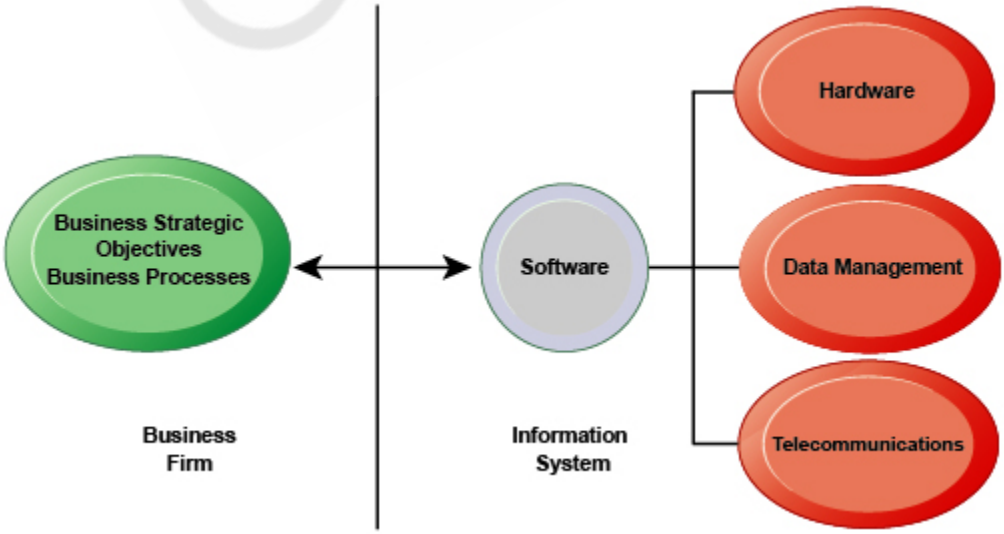
Information systems are transforming business and the visible results of this include the increased use of cell phones and wireless telecommunications devices, a massive shift toward online news and information, booming e-commerce and Internet advertising, and new federal security and accounting laws that address issues raised by the exponential growth of digital information. The Internet has also drastically reduced the costs of businesses

operating on a global scale.

These changes have led to the emergence of the digital firm, a firm in which:

- Most of the firm's significant business relationships with customers, suppliers, and employees are digitally enabled and mediated.
- Core **business processes**, or logically related business tasks, are accomplished through digital networks.
- Key corporate assets (intellectual property, core competencies, and financial and human assets) are managed through digital means
- Business responses to changes in their environment are enhanced through digital communications, allowing for **time shifting** (business being conducted 24x7) and **space shifting** (business being conducted globally or beyond traditional geographic boundaries).

Information systems are essential for conducting day-to-day business in the U.S. and most other advanced countries, as well as achieving strategic business objectives. Some firms, such as Amazon and E*Trade, would be nonexistent without information systems. Some service industries, such as finance, insurance, and real estate industries, could not operate without information systems. The ability of a firm to use IT is becoming intertwined with the firm's ability to implement corporate strategy.



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.

Business firms invest heavily in information systems to achieve six strategic business objectives:

1. **Operational excellence:** Efficiency, productivity, and improved changes in business practices and management behavior

2. **New products, services, and business models:** A **business model** describes how a company produces, delivers, and sells a product or service to create wealth. Information systems and technologies create opportunities for products, services, and new ways to engage in business.

3. **Customer and supplier intimacy:** Improved communication with and service to customer's raises revenues, and improved communication with suppliers lowers costs.

4. **Improved decision making:** Without accurate and timely information, business managers must make decisions based on forecasts, best guesses, and luck, a process that results in over and under-production of goods, raising costs, and the loss of customers.

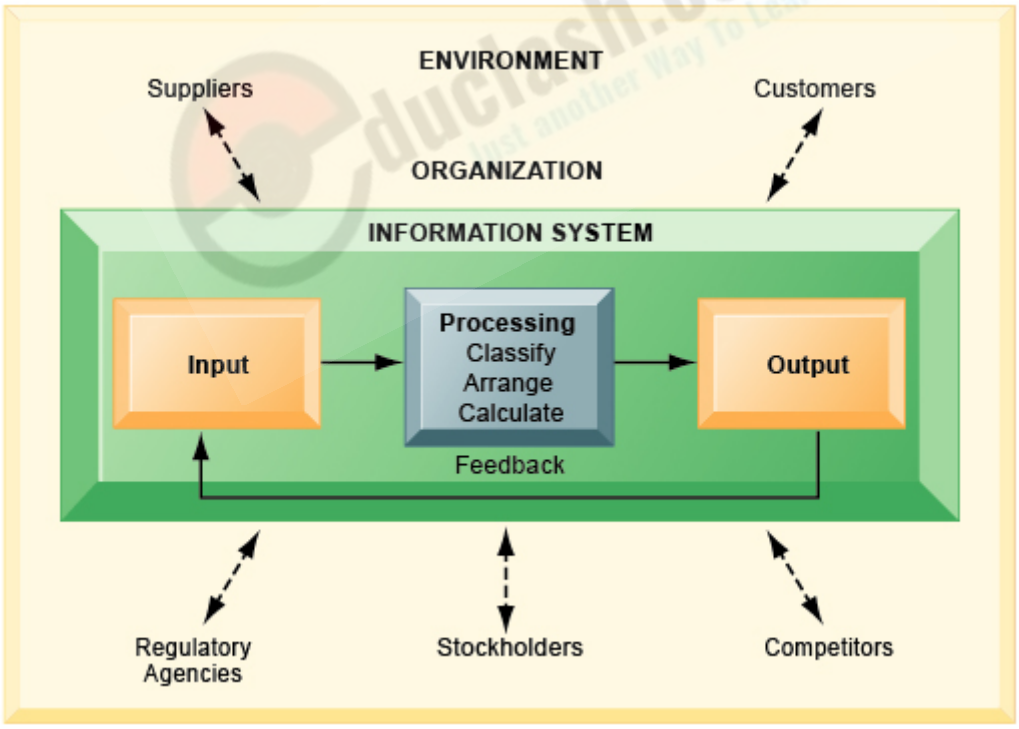
5. **Competitive advantage:** Implementing effective and efficient information systems can allow a company to charge less for superior products, adding up to higher sales and profits than their competitors.

6. **Survival:** Information systems can also be a necessity of doing business. A necessity may be driven by industry-level changes, as in the implementation of ATMs in the retail banking industry. A necessity may also be driven by governmental regulations, such as federal or state statutes requiring a business to retain data and report specific information.

Perspective on Information systems

An **information system** is a set of interrelated components that collect or retrieve, process, store, and distribute information to support decision making and control in an organization. Information systems can also be used to analyze problems, visualize complex subjects, and create new products.

Information is **data**, or raw facts, shaped into useful form for humans. **Input**, **processing**, and **output** are the three activities in an information system that produce the information an organization needs. 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.



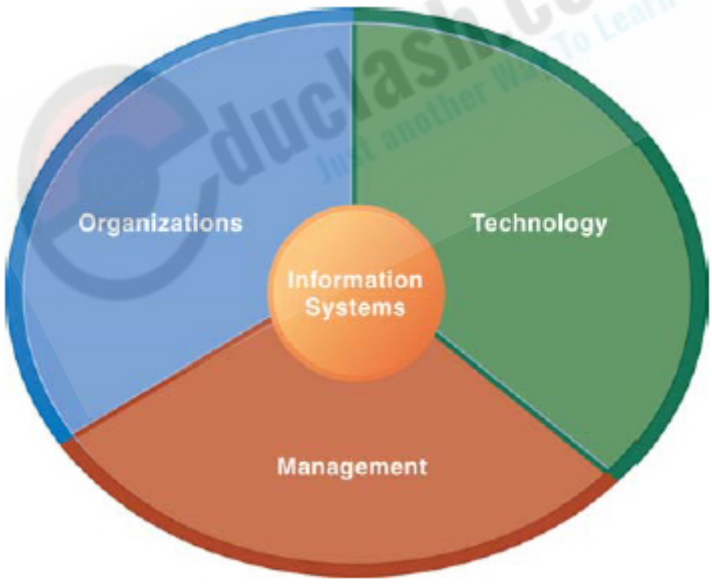
FUNCTIONS OF AN INFORMATION SYSTEM

An information system contains information about an organization and its surrounding environment. Three basic activities—input, processing, and output—produce the information organizations need. Feedback is output

returned to appropriate people or activities in the organization to evaluate and refine the input. Environmental actors, such as customers, suppliers, competitors, stockholders, and regulatory agencies, interact with the organization and its information systems.

It is important to distinguish information systems, which are designed to produce information and solve organizational problems, from the computer technology and software that is typically used to create and manage information systems.

Computer literacy focuses primarily on knowledge of information technology. **Information systems literacy**, the understanding of information systems, includes a behavioral and technical approach to understanding the broader organization, management, and information technology dimension of systems and their power to provide solutions. The field of **management information systems (MIS)** tries to achieve this broader information systems literacy.

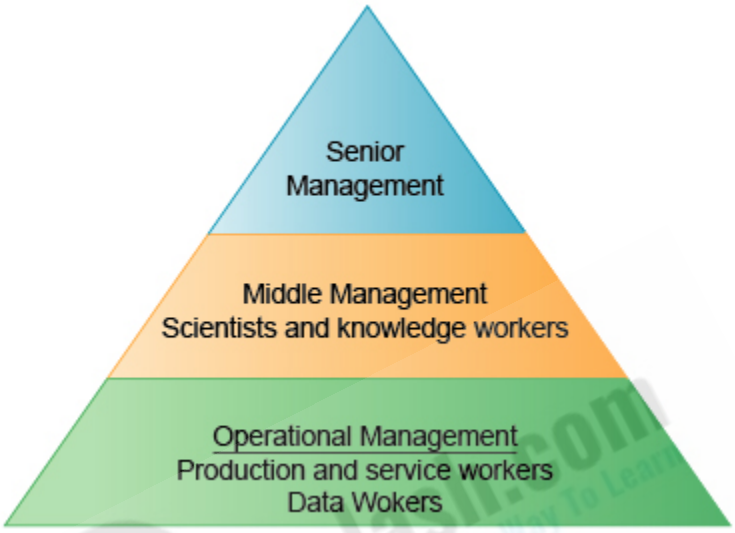


INFORMATION SYSTEMS ARE MORE THAN COMPUTERS

Using information systems effectively requires an understanding of the organization, management, and information technology shaping the systems. An information system creates value for the firm as an organizational and management solution to challenges posed by the environment.

The dimensions of information systems include organizations, management, and information technology.

The key elements of an organization are its people, structure, business processes, politics, and culture. An organization coordinates work through a structured hierarchy and formal standard operating procedures. Managerial, professional, and technical employees form the upper levels of the organization's hierarchy while lower levels consist of operational personnel.



LEVELS IN A FIRM

Business organizations are hierarchies consisting of three principal levels: senior management, middle management, and operational management. Information systems serve each of these levels. Scientists and knowledge workers often work with middle management.

Senior management makes long-range strategic decisions and ensures the firm's financial performance. **Middle management** carries out the plans of senior management and **operational management** monitors the firm's daily activities. **Knowledge workers** such as engineers and scientists design products and create and distribute new knowledge for the organization. **Data workers** such as secretaries process the organization's paperwork. **Production or service workers** produce the products or services.

Experts are employed for the major business functions: the specialized tasks performed by organizations, which consist of sales and marketing, manufacturing and production, finance and accounting, and human resources.

An organization coordinates work through its hierarchy and business processes. These processes may be documented and formal, or informal,

unwritten work processes, such as how to handle a telephone call.

Each organization has a unique **culture**, or fundamental set of assumptions, values, and ways of doing things, that are accepted by most of its members. Parts of an organization's culture can be found in its information systems. For example, UPS's organizational focus on customer service can be found in the package tracking system available to customers. Information systems may also reflect the organizational politics or conflicts that result from differing views and opinions in an organization.

Information systems are also a key component in the ability of management to make sense of the challenges facing a company and in management's ability to create new products and services, manage the company, and even re-create the organization from time to time.

Information technology is one of the many tools used by management to cope with change. A firm's **information technology (IT) infrastructure** is a technology platform or foundation on which a firm can build its information systems. IT infrastructure consists of:

- **Computer hardware**: The physical equipment and computing devices used for input, storage, processing, output, and telecommunications
- **Computer software**: The detailed, preprogrammed instructions that control and coordinate the computer hardware components
- **Data management software**: The software governing the organization of data on physical storage media
- **Networking and telecommunications technology**: Hardware and software used to link the various pieces of hardware and transfer data from one physical location to another; a computer **network** links two or more computers together to share data, such as files, images, sounds, video, or share resources, such as a printer.

The **Internet** is the world's largest and most widely used network. The Internet is a global network that uses universal technology standards to connect many private and public networks. The universal standards and technologies used in the Internet are also used in systems and networks within the firm. **Intranets** are internal corporate networks based on Internet technology, and **extranets** are corporate networks extended to authorized users outside of the firm.

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. The Web can serve as the foundation for new kinds of information systems such as UPS's Web-based package tracking system

From a business perspective, an information system is an important instrument for creating value for the firm. Information systems enable the firm to increase its revenue or decrease its costs by providing information that helps managers make better decisions or that improves the execution of business processes.

Every business has an information value chain in which raw data is systematically acquired and then transformed through various stages that add value to that information. The value of an information system to a business, as well as the decision to invest in any new information system, is, in large part, determined by the extent to which the system will lead to better management decisions, more efficient business processes, and higher firm profitability.

Software and hardware platform to Improve Business Performance

Nowadays, most of the greatest organizations are using the computer technology and had implemented their own IT (Information Technology) department(s). They cannot neglect the powerful and productive of its IT department(s) which brings their business towards success. Examples of organizations are Apple Inc., FedEx, Wal-Mart, McDonald's, and etc. Hence, IT is now critical to an organization's success, so it is important that an organization should uses the computer technology in its daily business routine and the computer hardware and software meets the needs of the organization. The managers and/or IT employees must have the understanding of the role of computer hardware and software in the decisions that promote organizational performance and productivity.

The computer components, either hardware devices or software, are now updating and improving its technology frequently and speedy, and hence affected its price are rising. The computer hardware and software costs a lot of money in an organization. Therefore, it is very important that the IT department of an organization should choose and buy the most appropriate and cost-effective computer hardware and software.

While selecting the most appropriate and cost-effective computer hardware and software, it also needs to be sufficiently powerful to meet the demands of the current users and future unpredictable increasing of users demand. Therefore, expandability and scalability of the computer hardware and software needs to be carefully planned and considered.

Selection and use of computer hardware and software technology can have a deep impact on business performance. Computer hardware and software represent important organizational assets that must be managed appropriately. The most important issues in managing computer hardware and software technology assets are understanding the new technology requirements for electronic commerce and digital firm, determining the total cost of technology assets, and determining whether to own and maintain technology assets or use external technology service providers for an organization.

Managers and IT specialists need to pay attention to the computer hardware capacity planning and scalability. Capacity planning is the process of predicting when a computer hardware system becomes saturated. Capacity planning ensures that the organization has enough computing power for its current and future needs. Business managers need to determine acceptable levels of computer response time and availability for the organization's mission-critical systems to maintain the level of business performance they expect. New applications, mergers and acquisitions, and changes in business volume all impact computer workload and must be considered when planning hardware capacity. Scalability refers the ability of a computer, product, or system to expand to serve a large number of users without breaking down. Organizations must make sure they have sufficient computer processing, storage, and network resources to handle their business databases and to make it available online constantly. Hence, not affect their daily business routine or the availability for users demand.

The purchase and maintenance of computer hardware and software is but one of a series of cost components that managers must consider when selecting and managing computer hardware and software technology assets. The total cost of ownership (TCO) model can be used to analyze these direct and indirect costs to help organizations determine the actual cost of specific technology implementations. TCO designates the total cost of owning technology resources, including initial purchase costs, the cost of hardware and software upgrades, maintenance, technical support, and training. It is possible to reduce some of these administration costs through better management. Organizations can reduce their TCO through greater centralization and standardization of their computer hardware and software resources. They also can reduce the size of the information systems staff required to support their infrastructure if the organization minimized the

number of different computer models and pieces of software that employees are allowed to use. When TCO can be reduced, computers might run up to several times worth the original purchase price of the equipment.

Another important management decision when selecting computer hardware and software was to determine whether to own and maintain technology assets or use external technology service providers for an organization. Nowadays, many organizations are obtaining their computer hardware and software technology from external service vendors. That is because it significantly cheaper and can saved lots of costs in maintaining and administrating.

One of the popular external service vendor is online Storage Service Provider (SSP) is a third-party provider that rents out storage space to subscribers over the Web, allowing customers to store and access their data without having to purchase and maintain their own storage technology.

Application service provider (ASP) is a company providing software that can be rented by other companies over the Web or a private network. ASP not just helps an organization to save cost of software purchases and updates, there may be benefits allows the organization to focus on core business issues instead of technology challenges.

Utility computing model of computing in which organizations pay only for the IT resources they actually use during a specified time period. It also on-demand computing or usage-based pricing. Again, utility computing model helps to save cost of computer hardware and software of an organization.

Moreover, when selecting computer hardware, it is very important that an organization should consider management, organization, and technology issues. In management issues, selecting computer hardware technology for the organization is a key business decision and it should not be left to technical specialists alone. General Managers should understand the capabilities of various computer processing, input, and storage, options, as well as price versus performance relationships. They should be involved in hardware-capacity planning technology asset management, decisions to distribute computing, downsize, or use network computers.

In organization issues, computer hardware technology can either enhance or impede organizational performance. Computer hardware selection should consider how well the technology meshes with the organization`s culture and structure as well as its information processing requirements.

In technology issues, IT today is not limited to computers but must be viewed as an array of digital devices networked together. Organizations have many computer processing options to choose from, including mainframes,

workstations, PCs, and network computers, and many different ways of configuring hardware components to create systems.

Management opportunities challenges and Solutions

Organizations still need different types of information systems serving various organizational levels, functions, and business processes, and they increasingly need systems providing enterprise-wide integration. These needs create both opportunities and challenges.

Opportunities:
Businesses face extraordinary opportunities to apply information systems throughout the firm to achieve higher levels of productivity, earnings, and ultimately advance share prices. Today information systems support virtually all levels and functions in the firm. In addition they enhance decision making of both managers and employees, providing information where and when it is needed in a format that is easily integrated into everyday business life.

Management Challenges:
There are challenges to achieving these objectives.
INTEGRATION AND THE WHOLE FIRM VIEW
In the past, information systems were built to serve the narrow interests of different business functions (such as marketing, finance, or operations) or to serve a specific group of decision makers (such as middle managers). The problem with this approach is that it results in the building of thousands of systems that cannot share information with one another and, worse, makes it difficult for managers to obtain the information they need to operate the whole firm. Building systems that both serve specific interests in the firm, but also can be integrated to provide firm wide information is a challenge.
MANAGEMENT AND EMPLOYEE TRAINING
With so many systems in a large business firm, and with fairly high employee turnover typical of the last few years, training people how to use the existing systems, and learn new systems, turns out to be a major challenge. Obviously, without training or when training is limited, employees and managers cannot use information systems to maximum advantage, and the result can be a low return on investment in systems.

ACCOUNTING FOR THE COST OF SYSTEMS AND MANAGING DEMAND FOR SYSTEMS
As the cost of information falls because of the power of information technology, demands for information and technology services proliferate

throughout the firm. Unfortunately, if employees and managers believe information services are free, their demands will be infinite. One of the challenges facing business managers is understanding which systems are truly necessary, truly productive with high returns on investment, and which are merely conveniences that cost a great deal but deliver little.

Solution Guidelines:

A number of solutions exist to the challenges we have just described.

INVENTORYING THE FIRM'S INFORMATION SYSTEMS FOR A 360-DEGREE VIEW OF INFORMATION

You should develop a list of firm wide information requirements to get a 360-degree view of the most important information needs for your company as a whole. Once you have this list developed, examine how your existing systems—most built to service specific groups and levels in the firm—provide this information to corporate-wide systems. You'll need to inventory your firm's existing information systems and those under construction. (Many firms have no idea of all the systems in their firm, or what information they contain.) Identify each system and understand which group or level in the firm benefits from the system.

EMPLOYEE AND MANAGEMENT EDUCATION

Systems are usually not obvious or self-taught for most people. You will need to ensure that you understand how much training is required to support new systems, and budget accordingly. Once you have an inventory of just the major systems in a firm that are used every day by thousands of employees, try to identify how they learn how to use the system, how effective their training is, and how well they use the systems. Do they exploit all the potential value built into the systems?

ACCOUNTING FOR THE COSTS AND BENEFITS OF INFORMATION SYSTEMS

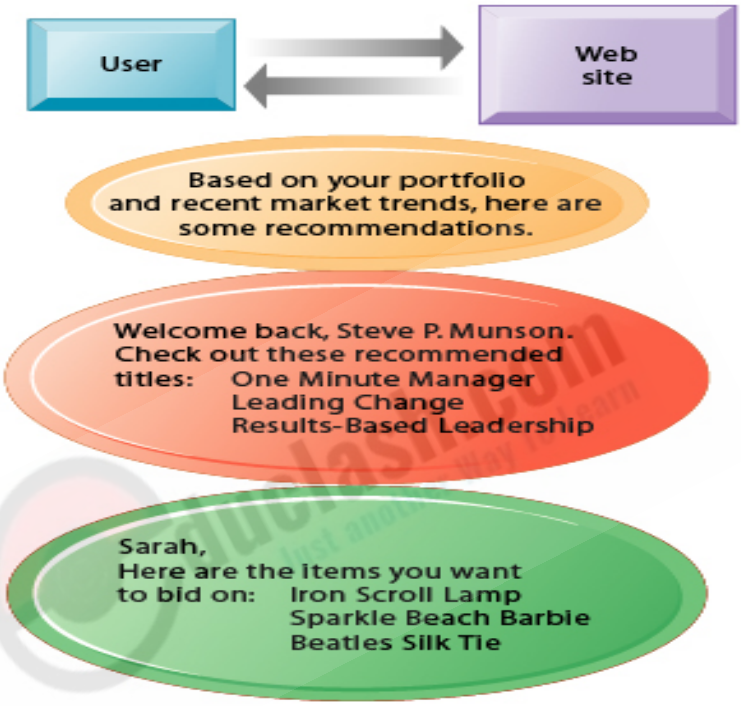
To manage the demand for information services, you'll need an accounting system for information services. It is worthwhile to examine the methods used in your industry and by industry competitors to account for their information systems budgets. Your system should use some method for charging the budgets of various divisions, departments, and groups that directly benefit from a system. And there are other services that should not be charged to any group because they are a part of the firm's general information technology (IT) infrastructure and serve everyone. For instance, you would not want to charge various groups for Internet or intranet services because they are services provided to everyone in the firm, but you would want to charge the manufacturing division for a production control system because it benefits that division exclusively. Equally important, management should establish priorities on which systems most deserve funding and corporate attention.

Business applications: Roles of IT in E-commerce, M-commerce.

Role of IT in E-Commerce:

- **The 3 major types of EC are:**
    1. Business-to-consumer (B2C): Retailing products & services to individual shoppers
    2. Business-to-business (B2B): Sales of goods & services among businesses
    3. Consumer-to-consumer (C2C): Consumers selling directly to other consumers.
- Another way of classifying EC transactions is in terms of the participants' physical connection to the Web. Conventional EC transactions, which take place over wired networks, can be distinguished from mobile commerce(M-Commerce), the purchase of goods & services using handheld wireless devices.
- Marketers can use the interactive features of Web pages to hold consumers' attention or to capture information about their tastes & interests. This information may be obtained by asking visitors to "register" online & provide information about themselves or by using special software such as clickstream tracking to track the activities of Web site visitors. Companies can then analyze this information to develop more precise profiles of their customers.
- EC Web sites have tools to track a shopper's every step through an online store. Close examination of customer behavior at a Web site selling women's clothing shows what the store might learn at each step & what actions it could take to increase sales.
- Communications & product offerings can also be tailored precisely to individual customers. By using Web personalization technology to modify Web pages presented to each customer, marketers can achieve the benefits of using individual salespeople at dramatically lower costs. Personalization can help firms form lasting relationships with customers by providing individualized content, information & services.

- **Collaborative filtering** compares a customer's behavior with data about similar customers to predict what the customer would like to see next & makes recommendations to users.
- Firms can create unique personalized Web pages that display content or ads for products or services of special interest to individual users, improving the customer experience & creating additional value



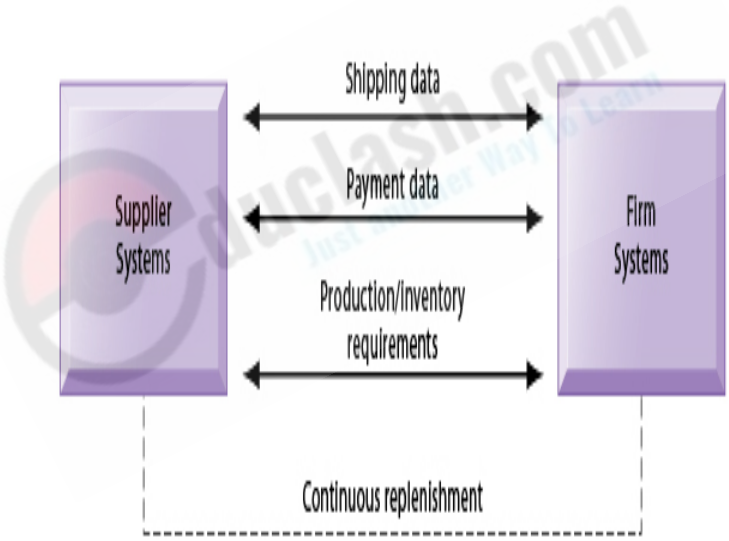
Blogs or Weblogs, informal web sites where individuals or corporate representatives & groups can publish views & options have emerged as a promising Web marketing tool. New third-party services monitor customer discussions in online communities or research online behavior of large numbers of customers at many different web sites.

- Learning what customers feel about one's products or services through electronic visits to Web sites is much less costly than using focus groups. The Web shifts more marketing & selling activities to the customer, as customers fill out their own on-line order forms. M-Commerce will provide businesses with additional channels for reaching customers & new opportunities for personalization.
- The Web & other network technologies are inspiring new approaches to customer service & support. Companies can reduce costs & improve customer service by using Web sites to provide helpful information as

well as customer support via e-mail. Companies are realizing substantial cost savings from Web-based customer self-service applications. New products are even integrating the Web with customer **call centers**.

Much of B2B EC is still based on proprietary systems for **Electronic Data Interchange**(EDI) which enables automated computer-to-computer exchange between 2 organizations of standard transactions such as invoices, bills of lading, shipment schedules or purchase orders.

Companies use EDI to automate transactions for B2B e-commerce & continuous inventory replenishment. Suppliers can automatically send data about shipments to purchasing firms. The purchasing firms can use EDI to provide production & inventory requirements & payment data to suppliers.



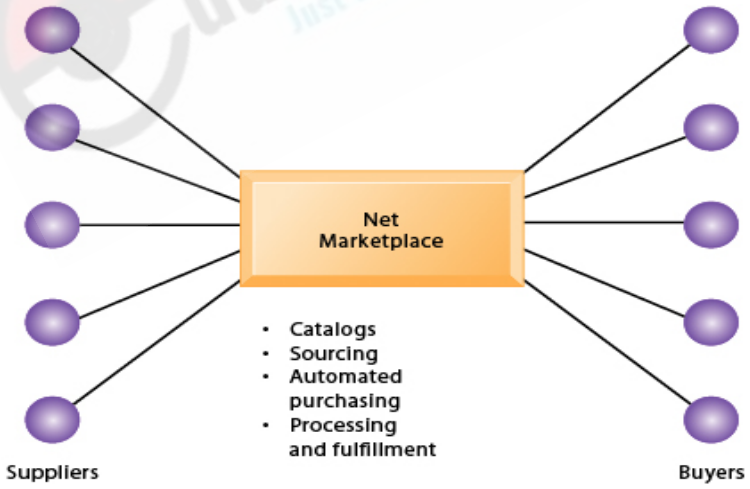
- Today companies are increasingly turning to the Internet for this purpose because it provides a much more flexible & low-cost platform for linking to other firms. For procurement (purchasing source goods & negotiation with suppliers), businesses can use the Internet to locate low-cost goods, place orders, make payments, etc. Businesses can create Web storefronts to sell goods & Internet technology to create extranets or link to other businesses for transactions.
- B2B EC environments include:

  Private industrial networks or **private exchanges**: Typically consisting of a large firm using an extranet to link to its suppliers,

distributors & other key business partners for efficient SCM & other collaborative commerce activities.

Net marketplaces or **e-hubs**: Internet-based marketplaces or online marketplaces where multiple buyers can purchase from multiple sellers. Net marketplaces are industry owned or operate as independent intermediaries between buyers & sellers, generating revenue from transaction fees or services to clients. Net marketplaces may sell direct goods (used in a production process) & some sell indirect goods. They may support contractual purchasing based on long-term relationships with designated suppliers & others support short-term spot purchasing, where goods are purchased based on immediate needs, often from many different suppliers. Some net marketplaces may serve vertical markets for specific industries or horizontal markets, with goods & services for many industries.

Exchanges: Independently owned third-party Net marketplaces that can connect thousands of suppliers & buyers for spot purchasing. Many exchanges provide vertical markets for a single industry. However, many exchanges have failed because they encourage competitive bidding that drove prices down without offering long-term relationships.



Role of IT in M-Commerce:

- M-commerce applications have taken off for services that are time-critical, that appeal to people on the move, or that accomplish a task more efficiently than other methods. Popular m-commerce applications include:

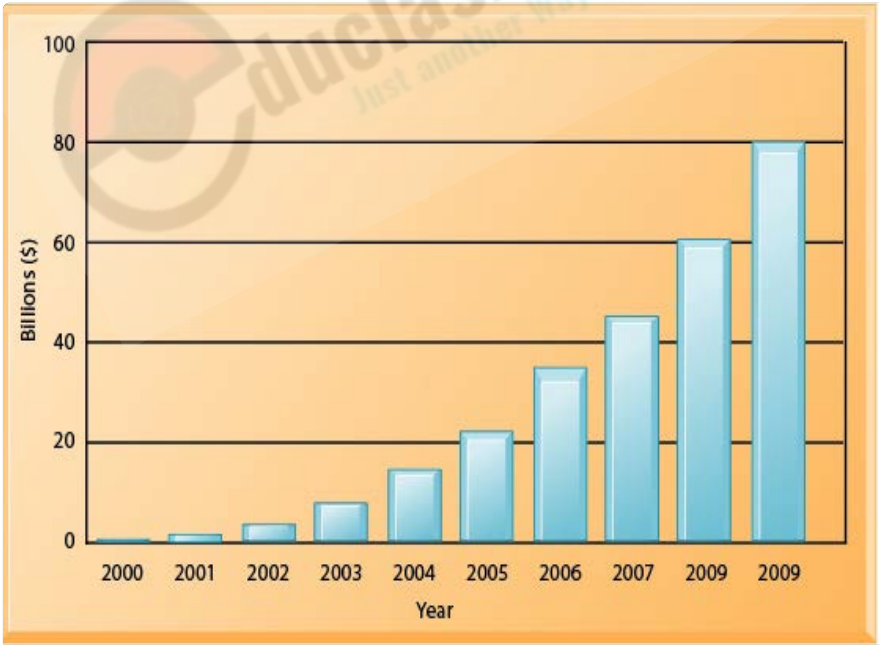
Content & location-based services: For checking travel information, schedules, news, movie times, weather forecasts, etc

Banking & financial services: For checking account balances, transferring funds, paying bills

Wireless advertising: Selling of advertising space in m-commerce applications, such as sponsored search results from the go2Directory search site

Games and entertainment: Downloadable digital games, movies, music & ringtones

- Because handheld mobile devices can only display small amounts of information at a time, m-commerce enabled Web sites are being designed as special **wireless portals** (mobile portals) with content optimized for smaller screens.
- Although m-commerce represents a small fraction of total e-commerce transactions, revenue has been steadily growing.



Unit 3:

Need to acquire technology:

- An organization's motive for wanting to acquire a technology will affect the kind of technology they are looking for, the partners from whom they decide to acquire it & the process they follow to make the acquisition.
- There are a wide variety of motivations which can be broadly classified into 4 categories:
    1. Developing new technological capabilities
    2. Increasing strategic options
    3. Gaining efficiency improvements
    4. Responding to the competitive environment
- One of the fundamental motivations for the acquisition of external technologies is the need to develop new technological capabilities & to fill gaps in the R&D knowledge base.
- The objective of these acquisitions is either to fill holes in an existing product line or to create & establish a brand new product.
- This need may arise because specialist technical expertise & capabilities are often difficult to obtain & firms may not have the ability to develop these valuable knowledge-based resources internally.
- This may be the case, for instance, when the technological knowledge of a firm is close to exhaustion & most of the possible technological combinations have already been tried.
- Acquisitions can enable a firm to improve its strategic flexibility.
- Increasing its internal technological capabilities, can give the company more strategic options, allowing it to select the best available technology. For eg:
    1. Acquisitions can encourage innovation, countering inertia & rigidity & increasing R&D productivity. Relying on incremental improvements to existing technologies may limit a firm's potential. Experimenting with novel & emerging technologies can provide opportunities for more radical innovation.

2. Acquisition can open new markets, allowing the knowledge of new customers, channels, inputs, processes & markets to be exploited.
3. Acquisitions may help to deal with uncertainty & risk. Companies operating in high-tech industries are often dependent on uncertain future outcomes or developments. In such cases, managers are more likely to avoid risky internal investments in R&D with long-term payback periods, investing instead in external technologies as a way of keeping their options open until the risks & uncertainty diminish.

GAINING EFFICIENCY IMPROVEMENTS

- The need to innovate more rapidly is another motivation for technological acquisition as it can reduce the time.
- The internal development of new capabilities may take too long or be too costly. Technology acquisition can create these more quickly so that the firm can be more responsive to market demands.
- There are often cost advantages to acquiring technologies externally. Firms substitute fixed investment costs with variable acquisition costs which can be recovered via profits from new businesses that follow a partnership-based strategy.

RESPONDING TO THE COMPETITIVE ENVIRONMENT

- Firms are more likely to consider technology acquisitions as environments become more hostile, when there is rapid technological change & fast-moving competition in their market area.
- Acquiring technologies helps the firm to feel less vulnerable & more competitive.
- In such an environment it is likely there will be a greater use of partnerships, collaborations & outsourcing as a substitute for in-house activities.

Developing new technologies in Information technology:

Information Technology is a developing technology that aims at obtaining the maximum information with minimum of resources, labour or time. According to the dictionary, Information Technology is "the study or use of electronic equipment especially computers, for storing, analysing and distribution of information of all kinds, including words, numbers and pictures."

Ever since the appearance of Man on the earth, information has been the major cause of his progress and development. But information alone is not enough. Information has to be processed, put to use by logic and reason before it becomes useful knowledge.

Information Technology includes and encompasses within itself the whole technological, social and cultural phenomena that promise an excellent future for mankind. The 21st century is a century of Information Technology. Just as steam engine emerged to be the technology of the 19th century and computer technology enhanced the capacity of human brain in the 20th century, Information Technology is the in-thing in the 21 century.

The technological progress during the past sixty years has brought about an explosion in knowledge. Today we have super computers imitating the human brain and even beating it in various fields like fast data processing, huge memory storage and quick retrieval capacity. These super computers can do as much as Terra (10) floating point operations per second (FLOPS) and have a 128 bit word length. The personal computer is today a part of many urban homes in the country. The computer is changing its capacity so fast that while in the 70s the IC chips were operated with 18MHz clock, today the clock rate is 850MHz. In the near future, we would have computers with a clock speed of 4000 MHz. Similarly, the first microprocessor chip (intel 4004) produced in early seventies had 2500 transistors. We hope to have not in very far distant future, 350 million of these transistors sitting on a tiny little chip. The semiconductor fabrication technology has made a possible for the latest memory devices to have a capacity of one Gigabyte (10 bytes) each, which is equivalent to the information stored in 8000 newspaper pages. A single CD can store in itself the entire works of Shakespeare. The most interesting part of the story of staggering progress is that while the number crunching capacity of the computer is going up in geometrical progression, the price or cost involved is falling down in an almost similar proportion.

This wonder machine called computer has revolutionised life in a big way. With its excellent memory, it has become a source of Internet Information Service. A fathomless ocean of information is available today on these computers on any subject, any phenomenon, anytime and anywhere in the world. You have only to switch on your computer, press a few buttons and a whole sea of information is available to you on your screen to select and download without spending a single penny on it. Just press a few buttons, you may be a student, a research worker in any field, an industrialist or an inquisitive information gatherer, the floodgates of information are opened on you in no time.

Think of the days when transfer of information was confined to oral transmission or written message only. Today, any amount of information can be conveyed from any corner of the world to any other farthest corner, in a matter of seconds only. We have satellite communication, optical fibre communication, terrestrial microwave communication, coaxial cable communication and several other advances systems that enable us to transport enormous amounts of data at the huge rate of several gigabytes per second to the farthest points in the world. The data communication capability is increasing every day with the help of various advancing technologies like the video data compression, digital video and audio, HDTV etc.

The global information Infrastructure has established thousands and thousands of servers and multitudes of personal computers in more than 150 countries. All these computers have been networked in the Internet System. The Internet, you will be surprised to learn, has taken five years to reach the first 50 million users. This number is increasing every day. The day is not far when every human individual will have an access to the brain of every other human individual in the world and the two would be able to exchange information on any and every topic under the sun.

The Information Technology today is rightly called the Technology of the Century as it has found its application and use in every walk society of the world. Distances no longer exist and the world appears to have shrunk into a Global Village. The wisdom of the wisest is today available to the stupidest of the person thus ushering in an era of real equality of opportunity to all. It is really a landmark achievement that more than six billion population of the world will soon be living in a virtual village, as compact as any small Indian village of a fun thousand population.

Information Technology, as expected, has brought about a sea change in the functioning of this world. It has proved to be a great boon to industrial productivity. Internet makes all the information available regarding product

design, product quality, latest technologies, market survey, financial conditions and the like at any given point of time on a continuous basis at any place in the world. Systems like Supply Chain Management (SCM) and Enterprises Resources Planning (ERP) and coming up fast to provide mutual help and information to producers, buyers, distributors, and consumers all over the world. Documents transfer has now become a very fast and quick affair. The results are eye-opening. The global market for IT enabled services, starting from 200 billion US dollars in 1998 is growing at the rate of 23 per cent per annum. It is expected to touch the 100 trillion US$ mark by the year 2008. In India alone, the software export industry is expected to touch the 100 billion US dollars mark in the next eight years. Commercial activity through internet not only serves businessmen, consumers, financial institutions and their mutual activities, but also provides advertising facilities on the World Wide Web (WWW) servers and Home Pages. Product specifications, company profiles, catalogues, pricing information etc. are all available on these pages 24 hours a day and seven days per week all over the world. Orders can be placed through E-mail and payments can be made through telebanking facilities and E- currency.

There is a similar revolution in the field of education. No student, anywhere in the world, will now be deprived of the best information available on any subject in any part of the world. The best course material, the best teachers and the best teaching aids and tools will be available to one and all. Education, in fact, is the biggest beneficiary of the Information Technology. Several projects like Wired Class-rooms of the USA, National Grid of the U.K., Operation Knowledge of India, are already under way, to bring internet to the actual class-rooms of every village in every country.

In the field of the social and cultural development also, the Information Technology is fast showing its wonderful impact. Home shopping, Telebanking, Video conferencing, E-mail, Videophones etc. are bringing the peoples of the world closer together and ushering in an era of mutual goodwill, understanding and harmonious relationships. Similarly, E-governance is bringing in well-informed, quick decisions and transparency in administration. No missing files, no red tape, no delay, better records, quick service and no dishonesty or fooling —- this will soon become the order of the day.

Sources for acquiring technology:

- Technology can be acquired from a number of different kinds of sources including private companies, universities & government agencies.
- May be acquired from a single organization, or more than one can be involved, sometimes in the form of a Consortium.
- It is important to understand the characteristics of your potential partner(s) as these will determine their expectations & behavior during collaborations.
- Examples of the different perspectives & characteristics of some of the organizations that may be involved are:
  - ✓ Universities
  - ✓ Start-up companies
  - ✓ Consortia

UNIVERSITIES

- Universities are increasingly interested in the commercialization of research but are generally inexperienced.
- Regulations regarding ownership of academic research outputs vary from country to country. An element of tension exists between academics who wish to publish results & industry which prioritizes the filling of patents. An additional issue is that high turnover of people in academia might lead to information leaks.

START-UP COMPANIES

- Start-ups can be an important source of ideas for larger companies.
- However, they are typically lacking in resources & business knowledge & are often subject to the influence of their investors (eg: Venture Capitalists).
- May be more flexible but also more volatile than established firms.
- May own only one technology & the fear of losing control over it might lead to over protective attitudes.

- Partnerships between start-ups & established firms can be mutually beneficial as there are ways to increase the chances of success.

CONSORTIA

- A firm gets together with other types of organizations(any mix of universities, industry & government bodies) typically to tackle complex technological issues which would be difficult to deal with in isolation.
- Are more common in industries with long technology life cycles such as pharmaceuticals. This industry requires access to a wider set of competences beyond the traditional areas of chemistry & pharmacology- such as molecular, biological, nanotechnology & computational science- to guarantee future innovation.

Responding to the competitive environment:

The application of information technology (IT) in organizations to maintain competitive advantage is discussed. IT can either be a product or service provided by the company, or a part of the organizational support for a product or service. Companies using IT as a product or service should pursue both differentiation and cost minimization strategies to remain competitive, while companies using IT as support services should focus on cost leadership strategies. Whichever way IT is used, a number of companies attest to the effectiveness of an efficient IT system. IT is effective in preventing competition in oligopolistic markets such as the SABRE on-line reservations system of American Airlines. IT is also capable of sustaining the foundations of monopolies by improving the relationship between organizations, customers and suppliers.

Unit 4:

Impact of Information Technology on organization: Modern Organizations, Creating New Types of Organizations

Information technology systems are used by organizations to perform various tasks. Some use IT to provide for the basic processing of transactions, while others enable customers, distributors and suppliers to interact with the organization through various communication technology systems such as the internet.
The term ‘’information technology systems in an organization ‘’ is composed of four distinct parts which include: an organization, information in an organization, and information technology and information technology systems in an organization. **Below I have listed some of the impacts of information technology in an organization.**

- **Flow of Information**: Information is a key resource for all organizations. What information describes might be internal, external, objective or subjective. **External** information describes the environment surrounding the organization. **Objective** information describes something that is known. **Subjective** information describes something that is currently unknown. With information technology the flow of all these three types of information is made simple buy use of centralized data centers where all this data can be retrieved. Information in an organization can flow in four direction and these include upward flow of information, downward flow of information, outward flow of information and horizontal flow of information.

- **Transaction processing**: Information technology simplifies the transaction process of an organization. A transaction process system (**TPS**) is a system that processes transactions that occur within an organization. At the heart of every organization are IT systems whose main role is to capture transaction information, create new information based on the transaction information. **TPS** will update any transaction process and store that information in a database, so any concerned party in the organization can access that information via a centralized information storage network of internet.

- **Decision support**: A decision support system (**DSS**) is a highly flexible and interactive IT system that is designed to support decision making when the problem is not structured. A DSS works

together with an artificial intelligence system to help the worker create information through (**OLAP**) online analytical process to facilitate decision making tasks that require significant effort and analysis.

- **Workgroup support:** Since information technology facilitates in the creating an information sharing environment, workers can easily consult each other across different department without any interruption. They can use emails, text chatting services to inquire some thing related to a given task at work. With work group support systems, group decision making becomes easier.

- **Executive support**: An executive information system (EIS) is an interactive management information system (MIS) combined with decision support systems and artificial intelligence for helping managers identify and address problems and opportunities.
  An **EIS** allows **managers** to view information from different angles. Yet it also provides managers with the flexibility to easily create more views to better understand the problem or opportunity at hand.

- **Data Management**: With the help of database software, an organization stores all its relevant data on a database. This infrastructure can be designed when it is internal or external. An internal centralized system can only be accessed within the organization while an external centralized system allows data to be accessed outside the organization using a remote **(IP)** internet protocol Address or a domain name. In this case, employees or managers can use a company website to access relevant company data by use of passwords. This data is not exposed to the public and search engines.

- **Communication**: Information technology accounts in the development of **communication technology**. Services like electronic mail make communication within and outside the organization easy and first. Now days email communication is a default communication technology used by every organization. Communication is a great tool in business develops, with advanced communication tools, employees and managers can easily make beneficial decisions in the organization.

Strategic Issues of Information Technology:

Information technology (IT) strategy over the next few years will increasingly reflect organizational responses to the compelling issue of IT outsourcing -- particularly in view of the increased desire to "focus on core competences" and to be the "best in class" providers of product or service quality. The MIT Study on IT Strategy sought to better understand the critical role of IT in modern organizations -- especially pertaining to the mode of acquiring IT-based competences. This report summarizes the key findings of the study for both business and IT managers by focusing on three dimensions:

Patterns of Change in IT Strategy

We find that the role of the CIO is attaining a steady state: the CIO is increasingly playing a critical role in the strategic management of the corporation; further, the CIO is expected to be an important partner to the CEO and COO in the strategic planning for IT. The information systems (IS) function is evolving rapidly from a support function to becoming more like a business -- with decreasing importance of technical criteria of performance assessment and increasing importance of business criteria. We also observe that the current interest in IT outsourcing as a component of IT strategy goes beyond the widely publicized megadeals. Our thesis is that more focused, selective relationships that are being adopted in both the "strategic" and the "operational" arenas of IT will become important in the future.

Perspectives on IT Sourcing

We contend that IT sourcing decisions should be made by balancing the benefits and risks within an overall portfolio of relationships. Our results show that the main benefit of outsourcing is the access to IT-based expertise or competence, while the major risk is irreversibility of the decision. In contrast to focusing on activities that could be outsourced, we develop a new approach to making sourcing choices based on the allocation of decision rights between the user organization and the vendor. This involves recognizing a continuum for locating the decision rights, and encompasses several alternative user vendor arrangements. Our research also implies that IT sourcing decisions have the potential for enhancing shareholder value; thus the stock market is an important referent in making effective sourcing strategies.

Prescriptions for IT Sourcing Strategy

We believe that every firm should be continually evaluating the best set of sources for obtaining the required IT competences. Our view of outsourcing calls for selecting the appropriate locus of IT governance involving both internal and external arrangements.

Outsourcing shifts the authority for IT decisions, but it never shifts the responsibility. We further call for a recognition that the benefits from

outsourcing extend beyond the traditional considerations of improved cost and service levels; it is far more important to focus on enhancement of value from IT investments - reflecting four components: cost center, service center, profit center, and investment center.
In conclusion, our thesis is that effective governance of the IS function is "more than outsourcing." It is not a one-shot decision (insourcing versus outsourcing) but a continuous set of decisions pertaining to a portfolio of relationships that are spread across internal and external providers with a view to maximize the value from IT investments.

Managing Information Technology

International Business Strategy:

International business strategy refers to plans that guide commercial transactions taking place between entities in different countries. Typically, international business strategy refers to the plans and actions of private companies rather than governments; as such, the goal is increased profit.

Most companies of any appreciable size deal with at least one international partner at some point in their supply chain, and in most well-established fields competition is international. Because methods of doing business vary appreciably in different countries, an understanding of cultural and linguistic barriers, political and legal systems, and the many complexities of international trade is essential to commercial success.

As historically developing countries become increasingly prominent, new markets open up and new sources of goods become available, making it increasingly important even for long-established firms to have a viable international business strategy. This is often facilitated with the use of international management consulting firms such as Oliver Wyman, Roland Berger, Amritt, or the Everest Group.

The three most prevalent philosophies of international business strategy are:

- **industry-based** which argues that conditions within a particular industry determine strategy;
- **resource-based** which argues that firm-specific differences determine strategy;

- **institution-based** which argues that the industry- and resource-based views need to be supplemented by accounting for relevant societal differences of the types mentioned above.

I. Multinational business strategy:

Unlike local businesses, multinational companies have a slew of additional considerations that warrant a separate business strategy. Almost every sector of business is affected by engaging in business overseas including marketing, economics, finance and accounting. Nonetheless, multinational companies can preempt the difficulties of doing business abroad by developing a well-designed business strategy.

Product Implementation

- A product that sells well in the company's host country may not churn a profit overseas. The California Raisin Advisory Board experienced setbacks when it attempted to pitch raisins to the Japanese market overseas. Michael White, author of "A Short Course in International Marketing Blunders," states the Board failed to translate the commercials or explain the product. The result was that many Japanese people mistook raisins for potatoes or chocolate candies. Thus, multinational firms must include a strong marketing campaign as part of their overall strategy.

- Additionally, firms should test the product overseas to ensure the flavor profile is in line with the unique tastes and preferences of the foreign country's people. If not, the company must redesign the product's flavors, packaging and branding in ways that appeal to the locals. One way to accomplish these objectives is working with a consultant based in the foreign country. These consultants will know the foreign audience well enough to know where to test the product and how to get the product on the shelves.

Strategic Outsourcing

- Multinational firms may choose not to offer the product directly to a foreign audience, but using foreign vendors to reduce costs is becoming increasingly common. Several U.S. companies such as Walmart and Nike offer products assembled from abroad. An integral part of the business strategy is selecting the appropriate

country and the best vendor there as well. Firms should settle on the country with the greatest competitive advantage as determined by the nation's factor endowments. K. Aswathappa, author of the textbook, "International Business," explains that factor endowments are resources the country naturally possesses such as an abundance of natural resources or inexpensive labor. For example, a clothing company based in the United States should choose a foreign country with a strong, reliable textile industry such as Thailand or China. Or, a coffee company may want to consider importing its coffee directly from countries with high-quality beans such as Costa Rica or Brazil.

- However, temper the foreign vendor's strengths with any apparent weaknesses. For example, a steel production company in Argentina may offer the lowest prices, but the political and economic unrest in the nation could be a threat to the supply chain. Multinational companies should evaluate the tax laws, political and economic environment and any trade barriers imposed by the country as part of the business strategy.

Financial Investment

- Doing business in another country mandates a financial strategy. Every multinational company engaging in financial transactions overseas incurs a "transaction exposure," or the appreciation or depreciation of foreign currency. These currency rate fluctuations can have a significant impact on a company's bottom line. Therefore, part of a multinational business strategy should include financial risk management.

- One way companies minimize currency exchange risk is by negotiating a forward exchange contract for all business transactions. Richard Schaffer, author of "International Business Law and the Environment," states companies use these contracts to deliver currency at the agreed-upon negotiated exchange rate. Some companies use hedge contracts to cover a lengthy period of time such as five or 10 years. Schaffer also elaborates that some businesses opt to barter goods instead of undergo a currency exchange.

II. Global Buiness Strategies:

Global Business Strategy can be defined as the business strategies engaged by the businesses, companies or firms operating in a global business environment and serving consumers throughout the world. Global business strategies are closely related to the business developing strategies adopted by businesses to meet their short and long term objectives. The short term goals of the business would be related to improving the day-to-day operations of the company while the long term objectives are generally targeted towards increment of the profits, sales and earnings of the company in the long run ensuring growth and stability of the business and dominance over the national or regional market.

This is essentially the point where a global business strategy differs from a national business development strategy as different other factors such as product standardization and adaptation come in. The factors of product differentiation and diversification are relevant in the case of both national and global business strategy in the wake of rising competition in both the national and international market. Global business strategies have emerged as a result of globalization and internationalization of established domestic companies which is purported to increase the value of the company in question. Increasing pressure of globalization and the rising global competition have prompted managers and academicians to rethink the formulation of global business strategy. As previously mentioned, global business strategies rests on two pillars of standardization and adaptation which have been in severe conflict in the recent years. This debate have been backed by claims of theorists from both sides who have exchanged salvos regarding which of the two is more profitable for the global businesses functioning in a unique set of circumstances.

Standardization of production by firms who engage in global business entails producing the same product for the national as well as the international markets with only minor changes in attributes. This is mainly explained by the fact that basic human needs are the same in all countries across the world. This strategy to expand the global business has been supported by personalities such as Levitt, Buzzell, Yip, Loewe and Yoshino. The concept of standardization first emerged in the 1960's and then again resurfaced in the 1980's and it has been adopted very effectively by many Japanese and European firms which have experienced higher levels of product and process innovations which in turn have acted as source of comparative advantage for these companies in the international market. The arguments in favor of the global business strategy of standardization are as follows: -

- It benefits in the economies of scale accruing to the company with it being able to produce in large quantities using more or less the same techniques of production

- It preserves the image of the home country which houses the global corporation since it helps in minimizing the costs of alteration, design or modification, handling and stocking the product, speeding up delivery systems. It also helps in saving the managerial time and effort to take decisions regarding the manufacture of different products.
- It helps in faster accumulation of the learning experience as fallout of the learning-by-doing approach.

III. Translation business Strategy:

A transnational business conducts operations in several countries with varying degrees of coordination and integration of strategy and operations, according to Newcastle Business School professor George Stonehouse and his colleagues. A transnational strategy combines global reach, coordination of operations and leveraging unique advantages of local markets to drive sales, market share and profit growth.

Basics

Transnational strategy involves operating in different world markets, designing responsive organizational structures and establishing value-added activities that exploit national similarities and differences. Stonehouse defines transnational strategic management as iterations of organizational learning and performance improvements. The foundation of a transnational strategy is a global vision, but with customized implementations for local markets and regions.

Country Environment

The country environment is an important aspect of transnational strategy. In a March 2007 interview with Harvard Business School Working Knowledge writer Sean Silverthorne, Harvard professor Richard H.K. Vietor suggests that countries with a sound fiscal and monetary environment, secure property rights and anti-corruption policies attract transnational companies. A small-business owner should select a country based on its current business environment and a reasonable estimate on what the business and political environment might be in three to five years. In an October 1999 interview with

Harvard Business School Working Knowledge writer James Aisner, Harvard professor Michael E. Porter discussed the importance of clusters in country selection. Clusters are geographic concentrations of competing and cooperating suppliers and service providers. Emerging nations should encourage transnational companies to build linkages with the local economy and become consumers of local goods and services. The development of skills training and support infrastructure are also important characteristics of countries that are appealing for transnational companies.

Branding

Transnational businesses may use global brands or create specialized local brands. In an October 2007 Harvard Business School Working Knowledge article, Harvard professor John A. Quelch cites the cases of American and Japanese automakers to suggest that developing a marketing strategy around one set of brands is more efficient than having several different brands for different regions of the world. Global brands share certain characteristics, such as a focus on a single product category and consistent market positioning.

Contingency Planning

Transnational strategy also includes contingency planning. Natural disasters, such as the March 2011 earthquake in Japan, can cause severe disruptions in the supply chain. In a May 2011 interview with Harvard Business School Working Knowledge writer Dennis Fisher, Harvard professor Willy C. Shih suggests that manufacturers and suppliers often lack contingency plans and find themselves scrambling for alternatives when disaster strikes. Diversification of supply sources and having alternative distributors are some of the contingency planning options. However, management should consider whether customers would be willing to pay for the cost of establishing and maintaining these backup supply and distribution arrangements.

Considerations

Although people use the terms interchangeably, global, multinational, international and transnational businesses have subtle differences.

International is a generic term that applies to all businesses with foreign operations. A multinational business operates in several foreign countries, but it delegates strategic decision-making responsibility to its overseas subsidiaries, which operate as autonomous businesses. A global business conducts activities in many countries but with an integrated worldwide strategy.

Key issue in international Environment:

Some of the issues while carrying on international business are as follows:

i. Social issues.
ii. Ethical issues.
iii. Labour issues.
iv. Environmental issues.

Social issues in international business

The common social issues while carrying out international trade are:

i. The country with which we do international might be ruled by a corrupt leader or a party.

ii. Military rulers pose a serious threat for international business.

iii. If the home country and the trading country are at war. If two countries are at war then there wont be any international trade between them.

iv. The attitude of the host country towards foreign investment is negative. Host countries may impose special rules for MNC's

v. If the country where we do our international trade social infrastructure. Inadequate facilities may require a company carrying on international business to build housing,

vi. Establishing schools and providing transportation facilities for the employees.

vii. Government interference is yet another issue. If the government of a host country inists on becoming a partial owner of the foreign business.

Ethical issues in international business

The common ethical issues are:

i. Employment practices.
ii. Human rights.
iii. Work Environment.
iv. Bribery & Corruption.
v. Moral obligation of multinational firms.
vi. Product safety.
vii. Fair price.
viii. Following local news.
ix. Impact on local social Institutions.
x. Fair return on investment.

Labour issues in international business

The Basic Labour issues are:

i. Child labour.
ii. Forced labour.
iii. Health & safety.
iv. Working Hours.
v. Low Wages.

Labour Issue in international business

One of the important social issues in the developed countries in respect of business with the developing countries pertains to ill treatment of labour & children.

Child labour used in the manufacture of exports from the developing countries is widely criticized by people in the developed countries. For eg, it is alleged that child labour is used by the carpet industry in india and some other countries & social activist in the developed nations

demand ban on the import of goods embodying child labour. Consumers are called ipon to boycott such goods.

Similar issue in the sweat labour. The argument here is that goods are manufactured by labour working in human/ unhealthy working conditions not getting fair wages should be banned or boycotted. Creating important developing country, like garments, are alleged to be suffering from such problem.

Environmental issues in International Business

Some countries prohibit the import of goods which cause ecological damage. For example, the US has banned the import of shrimp harvested without turtle excluder devise because of its concern for the endangered sea turtles. Countries like india are affected by it.

Developing countries are affected by the relocation of polluting industries from the developed it the developing ones.

Governance concept:

IT Governance:

Over the past few years one of the most common topics with customers seeking to improve their overall performance of the IT groups was “governance”. It often showed up in the following statements:

- “The key to our success is governance”
- “What we are really missing is good, solid governance”
- “We would be doing better if we only had good governance”

After a while, this got me to thinking. What does ‘governance’ mean? Apparently, it is important to have it. However, when I started talking with people I started to get widely different answers as to what ‘governance’ was, what it consisted of, and why it was so important. What follows below is the outcome of these discussions and ideas. In this post, I will help the reader to better understand the components of governance and why it is important to a high-performing IT organization.

I found the best place to start with this topic is with the definition. If one goes to the dictionary governance would be defined as ‘establishing chains of responsibility, authority, and communication to empower people’. A closer look at the key words reveals these additional details. Governance includes responsibility (being held accountable for a specific

duty, task, or decision); authority (the power to influence behavior); communication (exchanging information); and empowering (giving official authority to act). To more easily remember these items; just use the mnemonic 'RACE' (Responsibility, Accountability, Communication, and Empowerment). Governance also involves establishing measurement and control mechanisms to enable people to carry out their roles and responsibilities. Using this definition as a guideline, the goal of governance is to ensure the results of an organization's business processes meet the strategic requirements of the organization.

How is IT Governance any different? Based on the above concepts, IT governance can be described as having two distinct components. There is a structural component that pertains to the organization's information technology activities, the way those activities support the goals of the business, and the people who help manage those activities. There is also a process component that defines the decision-making rights associated with IT as well as the mechanisms and policies used to measure and control the way IT decisions are made and carried out within the organization.

Does the business drive IT through governance? Most people would answer this question with a resounding 'YES'. There might even be a cynical 'Duh!' added at the end of the answer. However, in many cases, this is not necessarily the case. In order for effective governance to be in place, the goals of the IT organization and the goals of the business must be clearly tied together. Too often, a very casual relationship exists between the two or none exists at all. When this occurs, IT initiatives crop up that have no bearing on the strategic business goals. When this happens, both the business and IT resource begin to wonder why a specific project is even being deployed. The question – what is this expected to accomplish? – is often asked. Worse yet, no one can really provide a clear answer.

I attended a conference a few years back that depicted the alignment between business and technology. The illustration they used is shown below. This is one of the best pictures I have seen that demonstrates how business goals and IT projects become aligned with one another. At the top the goals of the business are clearly stated. These goals should be easily understood by all people from the top to the bottom of the organization. Once the business goals have been established, the business strategies are developed. When successfully executed, these business strategies will accomplish the business goals. Business Process Capabilities – the next layer – are areas in which the business must improve in order to accomplish the business strategies (which, in turn,

will achieve the business goals). Finally, the bottom layer depicts the various business process improvement projects and IT projects that are being deployed. As an organization considers IT projects, it is critical to align them with the business strategies and business goals. Doing this creates a very clear picture as to what is expected to be accomplished and how these expectations fit within what the business wants to accomplish. At its core, this is what IT governance accomplishes.

I. Internet governance:

The term Internet governance has evolved over time, and various groups have attempted to develop working definitions. As the Internet first opened to commerce and the wider public in the mid-1990s, the term referred to a limited set of policy issues associated with the global synchronization and management of domain names (e.g., samplesite.com) and IP addresses (e.g., 7.42.21.42).
But as the Internet became a unified medium for all types of information, the definition broadened considerably. In 2005, the UN-sponsored World Summit on the Information Society defined Internet governance as "the development and application by governments, the private sector and civil society, in their respective roles, of shared principles, norms, rules, decision-making procedures, and programs that shape the evolution and use of the Internet."
As contentious public policy issues have emerged, the concept of Internet governance has conflated management of the technical resources necessary for its stability and continued expansion with discussion of behaviors emerging from the *use* of the Internet at what is known as the content layer.

How is the Internet governed?

Many information policy experts emphasize that "Internet governance" is not the product of an institutional hierarchy, but rather, it emerges from the decentralized, bottom-up coordination of tens of thousands of mostly private-sector entities across the globe. Often referred to as Internet "stakeholders," these include network and server operators, domain name registrars (e.g., GoDaddy) and registries (e.g., Verisign), IP address and standards organizations, Internet service providers (e.g., Verizon), and individual users. Civil society organizations and governments participate alongside these stakeholders in contributing to the development of technical policies.

What role do national governments play?
States control Internet-related policies within their own borders, such as passing laws prohibiting online gambling, protecting intellectual property, or blocking/filtering access to certain content. Some authoritarian governments censor political and social content much as they do in traditional media.

II. E-governance:

E- Governance means the use of information and communication technology as an instrument for achieving goal of better governance. **E-Governance** means the use of information and communication technology as an instrument for achieving goal of better governance.

Governance in E- governance means a **collective approach towards problem solving**. Paradigm has changed from state considered as all almighty ie God on earth to greater role play by market. This paradigm has changed even further with information and communication technology making possible the participation of the citizenry in the overall governance of society. It is not confined to citizens only, but participation of all stakeholders in decision-making process of society.

Notion and extent of using ICT for collective problem-solving, facilitating administration of society and smooth decision making is subject to personal perspectives of individuals and agencies.

E-Governance as a concept can be visualised in **narrow sense** as well as in broad sense. Narrow sense can be visualised as confined to using ICT for better service delivery by state. Aadhar card scheme of india can be seen as a good example.

In **broader sense** E-governance covers all stakeholders ie government, business, citizens and nongovernment. As governance is a collective approach, it has to involve dialogic process rather than one sided argument. various dimensions of this collective approach can be in the fields of administration, services, e- government, democracy etc.

Application of such ICT can be found in various interactions of stakeholders.such as
G2B (government to business) e.g. E- taxation.
G2C (government to citizen) e.g. E- services such as e- citizen, e-transport, e-education, e-registration, e-medicine etc.
C2G (Citizen to Government) e.g. e-democracy.
G2N (government to nongovernment) e.g. e-society

G2G (government to government) e.g. e-secretariate , e-court, e-police, SWAN etc

It can be seen as e-governance has two sides ie administrative side that deals ICT enabled administration and democratic side, i.e. ICT used to enrich society in its democratic values. **administration** and democratic side, i.e. ICT used to enrich society in its democratic values. **democratic** side, i.e. ICT used to enrich society in its democratic values.

E- governance makes governance cheaper, efficient, quicker and innovative. But to reap its benefits two elements of e- governance have to be kept in mind. one is ICT infrastructure, other is will to implement it. i.e. **information system** and its **environment.**

UNIT 6:

MANAGEMENT IN A TECHNOLOGICAL ENVIRONMENT

No matter what their functional area, managers today and in the future will face a highly technological environment. The costs of processing logic and communications networks are so low, and the potential of this technology so high, that the proliferation of technologies will continue to accelerate. How will we manage under this increased level of technology? What are the management challenges?

What Do CEOs Think?

CEOs, according to surveys, want their IS departments to produce fast and flexible systems that impress customers and increase markets. The majority of CEOs report using a PC and almost 50 percent of companies do some outsourcing for IT services, the major reason being cost savings. Unfortunately, about half of the
CEOs and CFOs surveyed said they are not getting an adequate return from their investments in IT. This level of dissatisfaction is a serious problem given the huge amounts of capital invested in technology. What can management do to improve the effectiveness of the technology effort?

A Political Model of Information Technology
a political model of information technology in the organization (Davenport et al., 1992).
Firms characterized by technocratic utopianism are fascinated with the technology.
There is an assumption in the firm that technology will solve all problems.

The firm will develop databases, desktop workstations, and networks, and purchase large amounts of software. This organization often lacks a vision of how all of this technology will be used to further its objectives.

Anarchy results when technology is not managed. Management abrogates its responsibilities to control IT and "lets a thousand flowers bloom." This strategy may encourage the bold to acquire computers and connect them, but as the firm matures, the lack of overall planning and standards will create tremendous problems. Many firms practiced this style of management in the early days of PCs, letting users purchase whatever equipment they pleased. As a result, these firms found it very difficult and expensive to connect their diverse computers to a network.

In the feudal model, powerful executives control technology within their divisions and departments. These executives determine what information to collect and choose the technology for their fiefdoms. They also make the decision on

INFORMATION POLITICS

Technocratic utopianism
Anarchy
Feudalism
Monarchy
Federalism
Reliance on technology; model the firm's IT structure and rely on new technologies
No overall information management policy
Management of IT by individual business units; limited reporting to the corporation
Strong control by senior management; information may not be shared with lower levels of the firm
Management through consensus and negotiation about key IT decisions and structures what infonnation to forward to higher levels of management. This model is most often found when the finn stresses divisional autonomy. Because it is unlikely that two chiefs will follow the same model, again it can be very difficult to coordinate different feudal systems if senior management decides that coordination is a more appropriate technology strategy.

In a monarchy, the CIO becomes the CIC, the chief information czar. Instead of playing the consultant role, the CIO establishes and enforces standards that will be followed throughout the corporation. The monarchy often emerges when the finn finds that it has suffered too long from the feudal model. A possible halfway point between feudalism and a monarchy is a constitutional monarchy, in which a document sets out the powers reserved to senior management and those that fall to the divisions.

In today's environment, the federal model may be the most appropriate. The finn tries to reach a consensus on which IT decisions belong at each level and how infonnation should be shared. The emphasis is on which policies make the most sense for the corporation as a whole, not just for a specific department or division.
Senior management recognizes that local divisions need some autonomy; local managers recognize that infonnation belongs to the company and may often be of great strategic value.
In most cases, it makes sense for infrastructure like networks to be designed and operated centrally. If there are many opportunities to share systems across divisions, corporate management will encourage a strong role for a central IS group.
Also, if the divisions have line managers who have little knowledge of IT, a central group has a major role to play in helping the divisions. In the case of very dissimilar divisions where there is little opportunity for sharing, we would expect to see the local unit have a lot of responsibility for IT decision making. A central IT group will provide some coordination, but most decisions will be left to local managers.
This decentralization will be more pronounced if local managers are very knowledgeable about infonnation technology.

SOCIAL RESPONSIBI LITIES

There are a number of issues for public policy concerning information technology.
In this chapter, we consider some of the most important topics for an informed manager and citizen. Table 25- 1 summarizes the issues according to the following categories:
• Technology. Issues that relate to the nature of the technology itself
• Applications. Problems that arise from applying technology
• Impact. Issues regarding the impact of technology on individuals, the organization, and society

Technology:

Complexity and Integrity Society in general is becoming more complex, as is information technology. As you look at the confluence of computers and communications technology, the increase in technological complexity is evident. What is the interaction between IT and societal complexity? Will IT make things more complicated? Will IT help us cope with the growing complexity inherent in a postindustrial, information-based economy? The answer to the last two alternatives is probably yes. We may be able to trade off some organizational and societal complexity for information systems, but these systems in turn are likely to be complex in their own right.
The movement to client-server architectures and networking create greater complexity and dependence on machines. pes bring power to the user's

desktop, but at the cost of a more complicated environment. It takes considerable effort to learn a graphical user interface like Windows 98 and to operate five or six applications packages. Using a networking environment is more complex than using a standalone computer. All of this complexity can result in problems with the technology:
Software does not run right, there is downtime on the network, users encounter problems accessing data or programs on the server, and there can be printing difficulties.
Because the environment is more complex, it can take longer to diagnose the problem and fix it compared with the days of simpler technology. The Internet is a huge, decentralized and distributed network with over 150 million users.

SOCIAL ISSUES

Issue	Concern
	Technology
Complexity and integrity	Are systems so complex that we cannot understand and manage them?
Reliability and failure	What are the risks if systems are not reliable; what if critical systems fail?
Piracy	What is the impact of piracy on the economy, trade, and international relations?
	Applications
Securities markets	Has technology made securities markets more unstable? Has it negatively affected the small investor?
Monitoring	Should management use technology to monitor individual workers? What about workgroups?
Harassment	How can we prevent systems from harassing individuals?
Defense	Could "Cyberwar" disrupt the economy?
	Impact
Education	Is the U.S. educational system preparing students for the technology they will face as adults?
Technology gap	Are individuals who do not learn about technology at a significant disadvantage?
Employment	Does technology make it more difficult for the unskilled to get jobs? What is its impact on middle managers?
Privacy	Do we have a right to privacy? Does technology make it possible to violate that right?
Security	What harm can result when the security of systems is compromised? What is the risk to the U.S. infrastructure of security violations?
International business	Can IT policies be used to inhibit the activities of firms trying to conduct business in foreign countries?

These problems are exacerbated by the extent to which we have become dependent on technology. Organizations use technology to process most transactions, to operate infrastructure systems used in transportation and communications, and to assure safety in air travel. The head of Synopsys, a company that sells software, spoke of this dependence. Almost all computers in a company are linked to an Intranet, the Internet, and to the public phone network for remote 10- gons from anyplace in the world. At his company, if the Internet goes down, they cannot book an order, enter a purchase order, or process salaries. The software his company develops is 100 percent dependent on the company Intranet. Web pages contain product data

sheets, marketing data, and general corporate information. A program allows users to search a knowledge base looking for articles; there are 15,000 registered users inside and outside the company. Customers and company engineers download 23,000 articles a month. Many of the examples in the text demonstrate this kind of dependency on technology, a dependency that will only continue to grow.

Reliability and Failure We have discussed some of the problems of control and system reliability. Information technology is extremely complex. Although systems in the future are expected to feature more redundancy and lower failure rates, there is always the possibility of a system failing. The results of such a system failure range from inconvenience to catastrophe. There is serious public concern about seeing that systems are designed and installed with adequate considerations of reliability and backup. For example, critical on-board systems in airliners have long featured redundancy, that is, several separate and independent hydraulic systems.

For the most part, the IS profession has not yet approached such levels of redundancy.

Some systems have extensive hardware redundancy, but very few systems have software that is independently developed and executed on separate machines to provide reliability and backup. Obviously, such an approach is costly, but for certain kinds of systems envisioned in the future, it may become necessary.

More research is needed to conduct the costlbenefit analysis necessary for selecting the proper design for reliability. The profession in general does not have a well-developed procedure for analyzing the risks of various types of system failures.

Without this assessment capability, it is difficult to determine the steps necessary to achieve acceptable levels of reliability for any given system. There are also many problems related to the prevention of system failure. In airline reservation system failed for 1 2 hours, the longest period ever, creating problems for travel agents, airline personnel, and travelers.

Piracy the technology industry in the U.S. is a strong engine for growth and jobs. Yet this industry is threatened by piracy, primarily of software. Piracy is highly organized with factories and distribution channels. It is a violation of what is often referred to as intellectual property rights. The AsialPacific region is considered by most companies to be the largest center of piracy. Estimates of piracy in the People's Republic of China run as high as 98 percent! The score for Russia and Latin America is estimated to be 90 percent. An attorney for Microsoft estimated that the company is losing half its revenue worldwide to piracy. By his calculation, pirates are stealing another whole Microsoft. Given the U.S. dominance in software, piracy is a serious threat to the economy.

The violation of intellectual property rights is not confined to individuals selling pirated copies of software. Anytime you borrow a program a friend purchased with a licensing agreement and install it on your computer, you are probably violating the licensing agreement. (There are many programs that are available without charge on the Internet and through various "shareware" bulletin boards.) Software companies offer a variety of licensing arrangements. Frequently universities are licensed to use software in a computing lab at a very low fee in order to introduce students to the programs. For the software vendor, the misappropriation of its intellectual property rights is a major problem.

ETHICS AND INFORMATION TECHNOLOGY:

There is a professional code of conduct for computer professionals developed by the Association for Computing Machinery, a society of individuals who teach and work in the field. This code applies only peripherally to users and managers who may work with technology but who do not consider themselves professionals.

Does IT create any new ethical dilemmas for management?

The discussion of social problems at the beginning of this chapter raises some ethical issues associated with IT and management. Ethical considerations include concerns that:

• Data in the organization should be used for its intended purpose and the intended purpose should be legitimate.
• Monitoring of workers should be undertaken with their consent, and the data should be used to help rather than punish the workers involved.
• Systems and services made available to individuals external to the firm should behave as specified and cause no harm to others.
• Systems within the firm should not be guilty of harassment.
• Appropriate privacy should be maintained; for example, e-mail files should not be read by individuals not involved in the exchange of messages.
• Appropriate software copyrights should be observed and there should be respect for intellectual property.
• Systems should be secure and well controlled.

Ethical decisions arise frequently when dealing with information technology. Mason (1995) suggests how we can identify and approach a situation where ethical considerations arise.

The crucial point occurs when a moral agent-one that by definition has choices decides to change the state of information or information technology in a human system.

Changes in hardware, software, information content, information flow, knowledge based jobs, and the rules and regulations affecting information are among the many things that agents do that affect others . . . [W]e must

use our moral imagination to guide our choices so that we can contribute positively toward making the kind of ethical world in which we want to live and want to bequeath to our future generations.

How can we do this?

Fundamental is our conscience, aided by our understanding and expertise in information technology. If we have an inkling our behavior . . . might in some way harm others, we probably should examine our decisions a little more carefully and from an ethical point-of-view.

The facts of an ethical situation can be summarized by four factors. The first factor is to clearly identify the moral agent. Whose actions will bring about the technology-induced change? The next factor is the set of alternative courses-of-action available to the agent. These are the real world acts that will have an effect on the human system under consideration. Acts have consequences, hence the third factor: . . . delineation of the results that are expected to occur if each act is taken. Finally, it is essential to identify the stakeholders who will be affected by the consequences of the acts . . . stakeholders have an interest in what the agent does.

It is easy to choose ethical behavior in a classroom setting when discussing a case study. It is much more difficult when working in an organization and facing budgetary constraints and pressure from peers, customers, top management, and stockholders. Kallman and Grillo (1993) suggest several informal guidelines for ethical behavior:

• The family test. Would you be comfortable telling your closest family members about your decision or action?

• The investigative reporter test. How would your actions look if reported in a newspaper or on a television news program?

• The feeling test. How does the decision feel to you? If you are uneasy about a decision or action but cannot understand why, your intuition is telling you it is not the right thing to do.

• The empathy test. How does this decision look if you put yourself in someone else's position? How would it look to another party affected by your actions?

Significant lapses in business ethics in the U.S. and around the world create a new awareness of the need for ethical behavior in highly interdependent societies and economies. The ethical issues surrounding technology are probably easier than most, and we hope your knowledge will help you make the right decisions.

THE FUTURE WITH INFORMATION TECHNOLOGY:

The last half of the twentieth century has seen a revolution in information technology.
Looking at the first mainframe computers, no one seriously considered the possibility of having a machine that was more powerful sitting on their desk or in their briefcase.
It has taken many years for information technology to make such vast changes in organizations and society. However, the pace of change has increased dramatically with innovations like the Internet. What can we say about the future of technology? How will new applications of information technology change the way we work and live?
The most recent and fastest growing innovation is the Internet and the World Wide Web. New models for business generally involve the Web and include ideas like electronic commerce, streamlined supply chains, electronic markets and even web-enabled appliances. The Internet provides, for the first time, a worldwide network infrastructure. Over 100 million people around the world can access applications and information placed on the Web.
This same technology allows knowledge workers to access vast amounts of corporate information online using an Intranet. All kinds of information access is possible through a single program, your Web browser. No longer is it necessary to create or use a custom interface for each application. By allowing customers and suppliers to access data on an Intranet and thus creating an Extranet, organizations change their business models.
The combination of computers, databases, and telecommunications, especially the Internet, provide the manager with an incredible number of options for improving the way an organization functions. Your challenge will be to choose appropriate technology, implement it successfully and continually manage change.

CREATING AND SUSTAINING A COMPETITIVE EDGE [UNIT 4]

There are different schools of strategy that describe how a firm gains and then sustains a competitive advantage. Theories by Teece (1986) and Barney (1991) apply particularly well to the case of using information technology for achieving a competitive advantage.

Using Resources to Advantage

A firm has a number of resources available to it including its employees and their knowledge, capital, products and services, and physical resources that may include a significant investment in a production facility. Some of these resource are likely to give a firm a strategic advantage, but which ones?

Resources, according to Barney

(1991), must be valuable, rare, imperfectly inimitable, and non substitutable to provide an advantage. Otherwise a competitor can develop exactly the same resource without much cost and duplicate your firm's strategy.

A resource must be valuable enough that a competitor will think twice before trying to acquire or create a copy. A rare resource is more difficult for a competitor to acquire or copy. A strategic resource has to be "imperfectly inimitable" as well to deter creating a direct imitation. A resource has to be non substitutable so that a competitor cannot find an easy substitute in the form of a different, more accessible resource that is easy to acquire.

Intel is an example of a company with resources that give it a competitive advantage.

First, it has the knowledge of how to build and produce complex logic chips; Intel regards its ability to build and run a chip fabrication plant as a major competitive advantage. It has the knowledge and engineering resources to create and operate these plants that cost in excess of $ 1 billion. Intel is also large enough to have the financial resources to build such expensive plants. This combination of resources is valuable, rare, imperfectly inimitable, and non substitutable.

Protecting an IT Innovation

Many innovations in IT are virtually impossible to protect from copying. It is difficult to copyright or obtain a patent on an application of technology. When FedEx established a Web site to let customers inquire about the status of their shipments,

United Parcel followed with a similar Web service within a month. The term "**regimes of appropriability**" is sometimes used to describe how easy it is to protect an innovation. A strong regime means you can protect an innovation, while weak appropriability means that others can easily duplicate your innovation. Most IT initiatives seem to have weak appropriability regimes. While a firm may have the appropriate resources to create an innovation, it can be difficult or impossible to sustain it.

There are, however, some conditions that favor the innovator. For example, if you have certain complementary assets (resources) that are unavailable to others, you may be able to protect your innovation. When IBM brought out its first personal computer in 1981, it had a strong complementary asset in the form of a marketing organization with contacts in major corporations around the world. A Co-specialized asset is one that has mutual dependency with the innovation. A good example of a co-specialized asset is the relationship between Microsoft's Internet Explorer and Windows 98. The Explorer depends on Windows since it must run on a computer controlled by this operating system; as the Explorer interface becomes a part of Windows, the operating system develops a dependence on this browser. It has been suggested that location can be a co specialized asset in the placement of ATMs; the first banks that installed ATMs were able to get the best locations for them (Dos Santos and Peffers, 1995).

There may be ways to use the technology, itself, to strengthen your regime of appropriability; see Clemons and Weber (1991). One of the most popular ways to sustain an advantage is to be the first mover. The first mover may be able to create an insurmountable lead over the competition. Merrill Lynch has many imitators; in fact the "sweep account" is very common in the investment business. However, no one has been able to overtake Merrill Lynch's lead; it has by far the largest number of cash management accounts of any other brokerage firm.

Another way to sustain an advantage is to overwhelm the competition with technological leadership. United and American airlines have more than 70 percent of the domestic market for reservation systems in travel agencies. These firms had the resources to make large investments in technology and for developing skilled staff members who could implement reservation systems. The companies applied their resources to create the CRSs in the first place, and the CRSs themselves became resources for competing. Apollo and SABRE today are travel supermarkets that would be extremely difficult and expensive to imitate. By continuously investing in technology and managing it well, these two airlines provide significant barriers to entry for other airlines and vendors of potential reservation systems. (A consortium of several airlines now owns the original United CRS, Apollo.)

Closely related to technological leadership is continuous innovation. Successful strategic applications such as the classic American Hospital Supply Baxter Health Care order entry system demonstrate continuous innovation. Today, with this system,

Allegiance, a Baxter spin-off now a part of Cardinal Health Care, offers a service that is the virtual inventory for a "stockless" hospital. IT and a superb logistics system let Allegiance promise just-in-time deliveries to different departments in a hospital.

A final approach to sustaining an advantage is to create high switching costs.

By making it very expensive or inconvenient to switch a customer's business to a competitor, you are assured that customers will continue to do business with you.

The airline CRS vendors have been very clever at locking in travel agencies. At this time, almost all agencies in the U.S. are automated. Increases in the number of customers and market share only come from converting an agency from a competitor's CRS to your own. Each CRS vendor has created very high switching costs for an agency to convert to a competitor's CRS.

Simply finding a strategic application of technology and implementing it successfully are not enough. This approach should provide a short-term competitive advantage, but the innovator must constantly be searching for ways to sustain an advantage as the competition tries to imitate its success. When planning and developing a strategy, think about the kinds of resources you have to provide an advantage and the difficulties of protecting an IT innovation. Do you have specialized or co specialized assets to enhance the innovation? Can you tum the IT innovation into a resource, itself, that is valuable, rare, inimitable, and non substitutable through some combination of being the first mover, technological leader, continuous innovator, andlor the creator of high switching costs?

An Example of Technology for Competitive Advantage

Clemons and Row (1991) describe how a small travel agency expanded to a nationwide business through the use of IT. Rosenbluth Travel, headquartered in Philadelphia, grew from $40 million in sales in 1980 to $1.3 billion in 1990. It is now one of the five largest travel management companies in the United States and has more than 400 offices.

According to the authors, Rosenbluth was extremely effective in taking advantage of the opportunities offered by deregulation in the travel industry. The firm has used technology to help manage the complexity of modem travel and to obtain economies of scale. Rosenbluth invested in IT over a period of years. While the expenditure in any one year was not inordinate, Rosenbluth created a technology base that is extremely difficult for a new entrant or even a competitor to match.

Prior to deregulation in 1976, travel agents wrote about 40 percent of all tickets.

The role of the agent was only to make a reservation and distribute a ticket. Deregulation changed the role of travel agents and forced them to manage the increased complexity of travel. American Airline's SABRE system contains more than 50 million fares and processes 40 million changes a month. The airline reservation systems used by travel agents were biased toward the airlines, though no more so than one would find calling the airline itself for information. The travel agent, however, could be expected to help the client without a bias toward a particular airline. By 1985 travel agencies were distributing more than 80 percent of air tickets.

Businesses are very interested in managing their travel. I t i s the third largest expense for most firms after payroll and information technology. Firms began to negotiate rates with airlines, hotels, and rental-car companies. One of Rosenbluth's major business focuses has been the corporate travel market.

The following list of critical technology moves by Rosenbluth illustrates how the firm has used IT for expanding its business:

• In about 1981 the firm experimented with processing data from airline computerized reservation systems (CRSs) to provide information for corporate accounts.

• In 1983 Rosenbluth introduced a product called READOUT that listed flights by fare instead of by time of departure. This program made it possible to see the fare implications of taking a particular flight. The normal flight display was by departure time, and the agent had to move to another screen to obtain fare information.
