CHAPTER 1: Introduction to Information Systems

Chapter Outline

1.1 Why Should I Study Information Systems?
1.2 Overview of Computer-Based Information Systems
1.3 How Does IT Impact Organizations?
1.4 Importance of Information Systems to Society

Learning Objectives

1. *Begin the process of becoming an informed user of your organizations' information systems.*
2. *Define the terms data, information, and knowledge, and give examples of each.*
3. *Define the terms information technology, information system, computer-based information system, and application.*
4. Identify three ways in which you depend on information technology in your daily life.
5. Discuss three ways in which information technology can impact managers and three ways in which it can impact non-managerial workers.
6. List three positive and three negative societal effects of the increased use of information technology.

Teaching Tips and Strategies

Most of today's college students use information in ways that were not dreamed of just a few years ago. However, because most students have grown up with information technology, they normally do not think about the whys and wherefores that underlie it.

It is therefore important for students to step back and learn the basic terms that define the foundation of Management Information Systems (MIS). Unfortunately, some of them will find this task boring or even complain they already know it all.

Because most students use technology in their everyday lives, they often fail to see the importance of MIS and how it relates to them. In order to involve students in the class, it is vital to let them know what is in it for them. This step should be taken early in the course to engage the students from the beginning. You may want to find each student's major and explain how MIS knowledge can enhance their course of study and their chosen career. Knowing each student's major and career goals will help you tailor examples, classroom assignments, and discussions to the students' individual interests. Point out the "What's In It for Me" end-of-chapter section so that students know there are links to each major for each chapter.

Explaining how MIS has affected businesses as well as workers helps to get students interested in this class. It also helps them to appreciate the relevance of the history of how computers have evolved and how MIS and DSS applications have made managerial decision making easier and more reliable.

The importance of computer technology is underscored by examples of how companies save money by using e-mail as an alternative to the postal service. Students should be introduced to the concept that IT must be paired with business processes to harness its potential. IT is important to business leaders all over the world. In Canada, immigration lawyers use an online system to assess potential salaries for different types of job (http://www.canadavisa.com/canada-salary-wizard.html). Students should be encouraged to become familiar with this website. Salary statistics for IT related jobs in Canada can be obtained from http://www.itworldcanada.com/salarycalculator/. because salary information seems to attract students' attention, especially if they realize that if they are more technology savvy, then they will likely make more money.

Review Questions

Section 1.1 – Before you go on…

1. Rate yourself as an informed user.

You will receive all types of answers to this question. Significantly, some students are convinced they possess a higher level of technology knowledge than they actually do. Ask the students to be specific about their skills and why they think they are proficient in those skills.

2. Explain the benefits of being an informed user of information systems.

Informed users tend to get more value from whichever technologies they use. You will enjoy many benefits from being an informed user of IT. First, you will benefit more from your organization's IT applications because you will understand what is "behind" those applications (see Figure 1.1). That is, what you see on your computer screen is brought to you by your MIS department operating "behind" your screen. Second, you will be in a position to enhance the quality of your organization's IT applications with your input. Third, even as a new graduate, you will quickly be in a position to recommend — and perhaps help select — the IT applications that your organization will use. Fourth, being an informed user will enable you to keep abreast of both new information technologies and rapid developments in existing technologies. Remaining "on top of things" will help you to anticipate the impacts that "new and improved" technologies will have on your organization and to make recommendations on the adoption and use of these technologies. Finally, you will understand how IT can be used to improve your organization's performance and teamwork as well as your own productivity. In addition to the organizational productivity, the instructor should emphasize the personal use of information systems.

3. Discuss the various career opportunities offered in the IT field.

Career opportunities in IS are strong and are projected to remain strong over the next ten years. In fact, when *Money Magazine's* Best Jobs in America (http://money.cnn.com/magazines/moneymag/bestjobs/2010) listed the "top jobs" in America

in 2010, 10 of the top 30 jobs related directly to information technology. The situation would be similar here in Canada. These jobs (with their ranks) are:

Software architect (#1)
Database administrator (#7)
Information systems security administrator (#17)
Software development director (#18)
Information technology manager (#20)
Telecommunications and networking manager (#21)
Network operations manager (#24)
Information technology business analyst (#26)
Information technology consultant (#28)
Software development engineer (#30)

It would be worthwhile asking the students to explore this site which shows IT salaries in Canada: http://www.itworldcanada.com/salarycalculator/

Section 1.2 - Before you go on…

1. *What is a computer-based information system?*

A computer-based information system (CBIS) is an information system that uses computer technology to perform some or all of its intended tasks. Although not all information systems are computerized, today most are. For this reason the term "information system" is typically used synonymously with "computer-based information system."

2. *Describe the components of computer-based information systems.*

- Hardware is a device such as the processor, monitor, keyboard, and printer. Together, these devices accept data and information, process them, and display them.
- Software is a program or collection of programs that enable the hardware to process data.
- A database is a collection of related files or tables containing data.
- A network is a connecting system (wireline or wireless) that permits different computers to share resources.
- Procedures are the set of instructions about how to combine the above components in order to process information and generate the desired output.
- People are those individuals who use the hardware and software, interface with it, or utilize its output.

3. *What is an application program?*

An application (or app) is a computer program designed to support a specific task or business process.

4. *Explain how information systems provide support for knowledge workers.*

Knowledge workers make decisions about situations that can significantly change the manner in which business is done. Information systems provide the databases, communications, and applications that allow these workers to store critical data used in analysis and tactical decision making.

5. *As we move up the organization's hierarchy from clerical workers to executives, how does the type of support provided by information systems change?*

At the lower organizational levels, systems are used primarily to automate routine tasks. At higher levels, systems are used to analyze information for decision-making purposes.

Section 1.3 … Before you go on…

1. Why should employees in all functional areas become knowledgeable about IT?

Regardless of the employee's functional area of responsibility, information systems are important for several reasons: (1) IT facilitates the organizational activities and processes of today's businesses. (2) Most professions students will enter after they graduate will require some knowledge of information technology. (3) Employees who can use information technology will enjoy an important advantage over their less-savvy peers in the workplace. (4) Information systems will enable the students to perform their jobs more effectively and efficiently.

2. Describe how IT might change the manager's job.

IT often provides managers with near real-time information. This positively and negatively impacts their jobs. Real time information enhances their decision making capability and reliability while at the same time providing them with less time to make decisions. A good resource for understanding various issues faced by Canadian IT managers is http://blogs.technet.com/b/cdnitmanagers/.

3. Discuss several ways in which IT impacts employees at work.

Many people have experienced a loss of identity because of computerization. They feel like "just another number" because computers reduce or eliminate the human element that was present in noncomputerized systems.

The Internet threatens to exert an even more isolating influence than computers and television. Encouraging people to work and shop from their living rooms could produce some unfortunate psychological effects, such as depression and loneliness.

IT can adversely affect individuals' health and safety. Two examples are increased job stress and physical problems such as carpal tunnel syndrome that result from long-term keyboard use.

Computers can create new employment opportunities for people with disabilities by integrating speech- and vision-recognition capabilities.

Section 1.4 … Before you go on…

1. *What are some of the quality-of-life improvements made possible by IT? Has IT had any negative effects on our quality of life?*

   The workplace can be expanded from the traditional 9-to-5 job at a central location to 24 hours a day at any location. IT can provide employees with flexibility that can significantly improve the quality of leisure time, even if it doesn't increase the total amount of leisure time. At the same time, however, IT can also place employees on "constant call" where they are never truly away from the office, even when they are on vacation. This inability to truly disengage from work can lead to problems such as stress, fatigue, and depression.

2. *Describe the robotic revolution, and consider its possible implications for humans.*

   "Cyberpooches," nursebots, and other mechanical beings may be our companions before we know it. Around the world, quasi-autonomous devices have become increasingly common on factory floors, in hospital corridors, and in farm fields. In our homes, iRobot (www.irobot.com) produces the Roomba to vacuum our floors, the Scooba to wash our floors, the Dirt Dog to sweep our garages, the Verro to clean our pools, and the Looj to clean our gutters.

3. *Explain how IT has improved healthcare practices.*

   Medical personnel use IT to make better and faster diagnoses and to monitor critically ill patients more accurately. IT also has streamlined the process of researching and developing new drugs. Expert systems now help doctors diagnose diseases, and machine vision is enhancing the work of radiologists. Surgeons use virtual reality to plan complex surgeries. They have also used a surgical robot to perform long-distance surgery by controlling the robot's movements. Finally, doctors discuss complex medical cases via videoconferencing. New computer simulations recreate the sense of touch, allowing doctors-in-training to perform virtual procedures without risking harm to an actual patient.

   Of the thousands of other applications related to healthcare, administrative systems are critically important. These systems range from detecting insurance fraud to creating nursing schedules to financial and marketing management.

   The Internet contains vast amounts of useful medical information (see www.webmd.com, for example). In an interesting study, researchers at the Princess Alexandra Hospital in Brisbane, Australia, identified 26 difficult diagnostic cases published in the New England Journal of Medicine. They selected three to five search terms from each case and then conducted a Google search. The researchers selected and recorded the three diagnoses that Google ranked most prominently and that appeared to fit the symptoms and signs. They then compared these results with the correct diagnoses as published in the journal. They discovered that their

Google searches had found the correct diagnosis in 15 of the 26 cases, a success rate of 57 percent.

The researchers caution, however, against the dangers of self-diagnosis. They maintain that people should use the information gained from Google and medical Web sites such as WebMD (www.webmd.com) only to participate in their healthcare by asking questions of their physician. Canada Health Infoway (https://www.infoway-inforoute.ca/) is a major initiative for transforming health care in Canada through health information technology.

IT's About Business Questions

IT's About Business 1.1
E-Meals

1. *Provide two examples of how Jane uses information technology to provide her service.*

   Jane utilizes her Web site to promote her products and to convince customers to sign up for her service.
   She also uses Twitter and Facebook to promote her products and to create a community of customers for newsletters. In addition, customers can use these technologies to manage their accounts to determine which particular plan they will join

2. *Provide two additional examples of how Jane might use information technology to improve her service. Be specific.*

   Jane could expand the meal service to include meal planning for individuals and/or families with specialized diets due to medical conditions and/or religious limitations.

   She could also sell specialized ingredients (spices, etc) online.

IT's About Business 1.2
Build Your Own Multinational Company

1. Identify and evaluate the advantages and disadvantages of outsourcing work overseas.

The primary advantage is that labor is cheaper overseas. Outsourcing can also put you closer to international customers and enable you to incorporate unique skill sets. The disadvantages include loss of control, difficulties in coordinating your various operations, and poor quality.

2. Can anyone do what Randy and Nicola Wilburn are doing? Or, does their strategy require special qualifications or knowledge? Support your answer.

   Students' answers will vary, but they should include details about connectivity using resources that are available online.

3. *Explain how global outsourcing can affect people who are starting their own business. Hint: Consider capital outlay, labor costs, IT infrastructure costs, etc.*

   Startup and operating costs are low. Little or no local inventory is required. At least initially, IT can be located at a hosting site. It is relatively easy to operate if you are planning a small or a single-person operation.

4. *Would you like to be a digital nomad? Why or why not? Be specific.*

Answers will depend on your students, but the question will lead to an interesting discussion if any of them already has a site where they outsource part or all of their distribution.

IT's About Business 1.3
Electronic E-Discovery Software Replaces Lawyers

1. *What are the advantages of e-discovery software? Provide specific examples.*

   It reduces the cost of having to search massive amounts of electronic documents to locate the necessary information. Some applications can extract relevant concepts, even in the absence of specific terms, and can deduce patterns of behavior that would have eluded lawyers examining millions of documents.

2. *What are the disadvantages of e-discovery software? Provide specific examples.*

   One analyst estimates that the shift from manual document discovery to e-discovery will eliminate many jobs because one lawyer can now do the work that once required hundreds of lawyers. E-discovery could also encourage increased litigation by enabling lawyers to conduct in-depth searches much more quickly.

3. *Based on this scenario, how do you think e-discovery software will affect the legal profession?*

   It will provide another tool for attorneys to use when collecting evidence in a case.

Discussion Questions

1. *Describe a business that you would like to start. Discuss how you would use global outsourcing to accomplish your goals.*

   Answers will vary depending on each student's background and major. The response related to global outsourcing will depend on the product verses service the business would be providing.

2. *Your university wants to recruit high-quality high school students from your state. Provide examples of (1) the data that your recruiters would gather in this process, (2) the information*

that your recruiters would process from these data, and (3) the types of knowledge that your recruiters would infer from this information.

- Senior testing scores (2) scores and percentile ranks of a student's performance (3) potential for success in college classes
- (1) IELTS scores (2) scores and percentile ranks of a student's performance (3) potential for success in college classes
- (1) Student Location (2) number of instate schools student is applying to (3) likelihood that student may want to stay close to home
- Alumni parents (2) amount of alumni involvement– (3) likelihood parents would want their children to attend same school as they did

3. *Can the terms data, information, and knowledge have different meanings for different people? Support your answer with examples.*

Students may have different responses based on their personal experiences and possibly their majors.

4. *Information technology makes it possible to "never be out of touch." Discuss the pros and cons of always being available to your employers and clients (regardless of where you are or what you are doing.)*

This discussion should touch on e-mail and Instant Messaging and their impact on a 24/7 business environment. If you are teaching an online class or if the students are familiar with the concept, discuss how being available has changed the way you are interacting with students. Applications such as FACEBOOK, GOOGLE+, and Twitter should also be considered in the overall discussion, given that businesses have embraced these technologies as marketing tools.

5. Robots have the positive impact of being able to relieve humans from working in dangerous conditions. What are some negative impacts of robots in the workplace?

Potentially reducing or eliminating some non-skilled, repetitive production line jobs.

6. Is it possible to endanger yourself by accessing too much medical information on the Web? Why or why not? Support your answer.

Discuss the reliability of the information sources and the dangers associated with self-diagnosis. Also discuss problems related to non-tested "miracle cures" and possible negative interactions with medications a patient may be taking for other conditions.

7. Is the vast amount of medical information on the Web a good thing? Answer from the standpoint of a patient and from the standpoint of a physician.

Patient … Good: Provides the patient with information he or she can discuss with the doctor. Also provides information and possibly options not mentioned by physician.

Bad: Provides some erroneous or false information that might be misinterpreted by the patient, possibly wasting the physician's time or causing a misdiagnosis by the patient.

Physician … Good: Provides access to current trends that assist with diagnosis and treatments. Enables and encourages collaboration with other physicians. If patient records are available online, the physician can view the results of tests that were performed at other locations.

Bad: Security issues regarding patients' records (e.g., PHIPA (Personal Health Information Protection Act)).

8. *Describe other potential impacts of IT on societies as a whole.*

Most of your students have grown up using technology and will not remember a time when it was not around. Open the discussion by asking how many students have FACEBOOK (FB) and/or GOOGLE+ profiles. Ask them how they kept up with their friends before FB. Then expand the discussion as to how they use FACEBOOK/GOOGLE+, how often they access their account, how many "friends" they have, whether they block any potential "friends," and how often they post. If any students have hundreds of friends in FB, ask why they do and whether they consider it a problem. Ask how many of the students have smart phones. For those who do, how often do they use text messaging, and for what? Do they maintain an electronic calendar to remind them of events (including birthdays and doctor appts)? This question has a number of possibilities.

9. *What are the major reasons why it is important for employees in all functional areas to become familiar with IT?*

Hopefully this course will provide an answer to the question. However, the basis of the answer is to help employees understand what is going on around them within the business and industry so they can make knowledge-based decisions on how to use technology to strategically support or enhance the business process.

10. *Refer to the study at Princess Alexandra Hospital (in section on Improvements in Healthcare). How do you feel about Google searches finding the correct diagnosis in 57 percent of the cases? Are you impressed with these results? Why or why not? What are the implications of this study for self-diagnosis?*

Ask whether the students consider 57 percent a good or a bad success rate. What are some of the implications of a false positive diagnosis? False negative?

Problem Solving Activates

1. *Visit some Web sites that offer employment opportunities in IT. Prominent examples are : www.dice.com, www.hotjobs.com, www.monster.com, http://www.monster.ca/, www.collegerecruiter.com, www.careerbuilder.com, www.jobcentral.com, www.job.com,*

www.career.com, www.simplyhired.com and www.trucareers.com. Compare the IT salaries offered to accountants, marketing personnel, financial personnel, operations personnel, and human resources personnel. For other information on IT salaries check Computerworld's annual salary survey.

Students will provide comparisons about IT positions (suggest classifications – analyst, developers, IT support) and salary ranges using the sites listed.

2. *Enter the Web site of UPS (http://www.ups.com/content/ca/en/index.jsx).*

   a. *Find out what information is available to customers before they send a package.*

      The site provides a detailed interface, and it contains information about its multitude of services.

   b. *Find out about the "package tracking" system.*

      Visit http://www.ups.com/content/us/en/resources/track/check/index.html?WT.svl=Footer to get information about the tracking system and its policies.

   c. *Compute the cost of delivering a 10" x 20" x 15" box, weighing 40 pounds, from your hometown to Long Beach, California (or to Lansing, Michigan, if you live in or near Long Beach). Compare the fastest delivery against the least cost.*

      Cost can vary from ~ $200 for overnight to $42 for slowest option.

3. *Surf the Internet for information about the Department of Homeland Security. Examine the available information, and comment on the role of information technologies in the department.*

   Students will discuss their findings after searching the Internet.

4. *Access www.irobot.com, and investigate the company's Education and Research Robots. Surf the Web for other companies that manufacture robots, and compare their products with those of iRobot.*

   Students will discuss their findings after searching the site.

Team Assignments

1. a. *Create an online group for studying IT or a part of it you are interested in. Each member of the group must have a Yahoo e-mail account (free). Go to Yahoo!: Groups (http://groups.yahoo.com) and at the bottom see a section titled "Create Your Own Group."*

Step 1: Click on "Start a Group Now."
Step 2: Select a category that best describes your group (use the Search Group Categories, or use Browse Group Categories tool). You must find a category.
Step 3: Describe the purposes of the group and give it a name.
Step 4: Set up an e-mail address for sending messages to all group members.
Step 5: Each member must join the group (select a "profile"); click on "Join this Group."
Step 6: Go to Word Verification Section; follow the instructions.
Step 7: Finish by clicking "Continue."
Step 8: Select a group moderator. Conduct a discussion online of at least two topics of interest to the group.
Step 9: Arrange for messages from the members to reach the moderator at least once a week.
Step 10: Find a similar group (use Yahoo!'s "Find a Group" and make a connection). Write a report for your instructor.

b. Now follow the same steps for Google Groups.
c. Compare Yahoo Groups and Google Groups.

Students will come up their report based on comparing their experiences at the two sites.

2. *Review the Wall Street Journal, Toronto Star, Globe and Mail , Canadian Business (http://www.canadianbusiness.com/) and local newspapers for the last three months to find stories about the use of Web-based technologies in organizations. Each group will prepare a report describing five applications. The reports should emphasize the role of the Web and its benefit to the organizations. Focus on issues described in this chapter, such as productivity, competitive strategies, and globalization. Present and discuss your work.*

Students will come up their report based on their selected article.

Closing Case

L'Oreal Retools Its Information Systems

The Problem
Headquartered in France, the L'Oreal Group (www.loreal.com) is the world's largest cosmetics and beauty company. Concentrating on hair color, skin care, sun protection, make-up, perfumes, and hair care, the company is active in dermatology and pharmaceuticals. The company's philosophy is that everyone aspires to beauty, and its core mission is to help people around the world realize that aspiration.

L'Oreal employs more than 67,000 people in 130 countries, and it supports 23 global brands. The firm's products are manufactured in more than 40 factories located around the world. The company has a tremendous challenge to produce high-quality, consistent products globally. It must ensure that all of its products are created with uniform production processes and quality control. By 2010 L'Oreal had come to realize that its current enterprise resource planning (ERP) system, based on software manufactured by SAP, could not support its goal of global product uniformity without consolidating its many different information systems located around

the world. For example, L'Oreal had multiple versions of SAP running in different regions and countries. As a result, the company used to take between two and five years to upgrade to the latest version of SAP. L'Oreal also wanted to improve productivity, safety, and quality by standardizing the best-practice business processes throughout the firm.

The Solution

To accomplish its mission, L'Oreal re-engineered its entire manufacturing process to work more efficiently while still supporting the quality and integrity of its brands. The company integrated its SAP ERP system with Apriso's (www.apriso.com) FlexNet for operations management. FlexNet is a unified set of manufacturing software applications that coordinate a company's manufacturing operations within a plant, between plants, and across an entire supply chain. The integration of SAP and FlexNet resulted in a global, central IT system called the Integrated Solution for Industrial Systems (ISIS). ISIS consists of all the transactional applications, financial controls, and purchasing transactions integrated into the manufacturing operations on the plant floor. FlexNet and ISIS support all factory processes – including production, quality assurance, and purchasing – while promoting L'Oreal's best practices.

ISIS runs in L'Oreal's central data center in Montpellier, France, where the master data for the business are stored. FlexNet runs on servers located in individual factories so that each factory can continue operations in case a problem arises in the central data center.

The Results

In its re-engineering process, L'Oreal implemented a single, global instance of SAP and FlexNet, so the last upgrade took only one weekend. By upgrading so quickly, the firm was able to update its systems without disrupting its factories.

The new software implementation also allows L'Oreal to bring factories online much more quickly. In the past, when L'Oreal acquired a factory, it took years to bring it online. In contrast, the new software enabled L'Oreal to integrate an Yves St. Laurent factory that it had acquired, along with its quality assurance, safety, and efficiency practices, in two months.

Every one of L'Oreal's manufacturing facilities handles thousands of different recipes for L'Oreal cosmetic products. Every ingredient must be tested for quality, and every worker must follow each recipe exactly. This demanding level of complexity can lead to human error, which can threaten quality, slow the workflow, and create waste. The new software guides the operators through each recipe and automatically records the weight of each ingredient to ensure that the quantities are exactly correct. Once raw materials are tested for quality, they are given a label that the worker must scan before adding them to the recipe. This step ensures that all materials are tested. The labels also give forklift drivers directions as to which materials need to be taken to the packaging station. They also provide information on shelf life. Shop workers confirm that the new system is easy to use and has reduced confusion and stress.

By deploying a single, global instance of SAP and FlexNet, L'Oreal has increased its overall capacity, decreased its discrepancies in actual-versus-planned production, and reduced its wasted materials. As a result, the company is able to maintain lower, better-managed inventories at significant cost savings.

Questions

Describe several reasons why L'Oreal needed to reengineer its information systems.

The company needed to follow uniform production processes and quality control to achieve quality and consistency in its global production.

Describe the benefits of L'Oreal's new information systems. Explain how the benefits you describe are related to L'Oreal's strategic goals, using specific examples to support your arguments.

The benefits of the new information systems are: increased overall production capacity, decreased variance in its production planning and reduced waste.

Glossary

application (or app) : a computer program designed to support a specific task or business process.

business intelligence (BI) systems: provide computer-based support for complex, nonroutine decisions, primarily for middle managers and knowledge workers.

computer-based information system (CBIS): an information system that uses computer technology to perform some or all of its intended tasks.

Dashboards: a special form of IS that support all managers of the organization, by providing rapid access to timely information and direct access to structured information in the form of reports.

Database: a collection of related files or tables containing data.

data items: An elementary description of things, events, activities, and transactions that are recorded, classified, and stored but are not organized to convey any specific meaning.

database : a collection of related files or tables containing data.

electronic commerce (e-commerce): a type of interorganizational information system that enables organizations to conduct transactions, called business-to-business (B2B) electronic commerce, and customers to conduct transactions with businesses, called business-to-consumer (B2C) electronic commerce.

enterprise resource planning (ERP) systems: information systems that correct a lack of communication among the functional area ISs by tightly integrating the functional area ISs via a common database.

Ergonomics: the science of adapting machines and work environments to people, focuses on creating an environment that is safe, well lit, and comfortable.

expert systems: attempt to duplicate the work of human experts by applying reasoning capabilities, knowledge, and expertise within a specific domain.

functional area information systems: IS that support a particular functional area within the organization.

Hardware: a device such as a processor, monitor, keyboard, or printer. Together, these devices accept data and information, process them, and display them.

Information: Data that have been organized so that they have meaning and value to the recipient.

information system (IS): Collects, processes, stores, analyzes, and disseminates information for a specific purpose.

information technology (IT): relates to any computer-based tool that people use to work with information and support the information and information-processing needs of an organization.
information technology components: hardware, software, databases, and networks.
information technology infrastructure: IT components plus IT services.
information technology platform: formed by the IT components of hardware, software, networks (wireline and wireless), and databases
information technology services: IT personnel use IT components to perform these IT services: develop information systems, oversee security and risk, and manage data.
informed user: A person knowledgeable about information systems and information technology.
interorganizational information systems (IOSs): Information systems that connect two or more organizations.
Knowledge: Data and/or information that have been organized and processed to convey understanding, experience, accumulated learning, and expertise as they apply to a current problem or activity.
knowledge workers: professional employees such as financial and marketing analysts, engineers, lawyers, and accountants, who are experts in a particular subject area and create information and knowledge, which they integrate into the business.
Network: a connecting system (wireline or wireless) that permits different computers to share resources.
Procedures: the set of instructions about how to combine the above components in order to process information and generate the desired output.
Software: a program or collection of programs that enable the hardware to process data.
supply chain: the flow of materials, information, money, and services from suppliers of raw materials through factories and warehouses to the end customers.
transaction processing system (TPS): supports the monitoring, collection, storage, and processing of data from the organization's basic business transactions, each of which generates data.