# MODUL SITEM INFORMASI MANAGEMEN
# (MAN 611)

## MODUL PERTEMUAN 02
## Information System in Business Globalization Era

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# THE ROLE OF INFORMATION SYSTEMS IN BUSINESS TODAY

## A. Kemampuan Akhir Yang Diharapkan

1. How are information systems transforming business, and what is their relationship to globalization?
2. Why are information systems so essential for running and managing a business today?

## B. Uraian dan Contoh

It's not business as usual in America anymore, or the rest of the global economy. In 2012, American businesses will spend over $540 billion on information systems hardware, software, and telecommunications equip- ment. In addition, they will spend another $650 billion on business and management consulting and services—much of which involves redesign- ing firms' business operations to take advantage of these new technologies. Figure 1.1 shows that between 1980 and 2011, private business investment in information technology consisting of hardware, software, and communications equipment grew from 32 percent to 52 percent of all invested capital.

As managers, most of you will work for firms that are intensively using information systems and making large investments in information technol- ogy. You will certainly want to know how to invest this money wisely. If you make wise choices, your firm can outperform competitors. If you make poor choices, you will be wasting valuable capital. This book is dedicated to helping you make wise decisions about information technology and informa- tion systems.

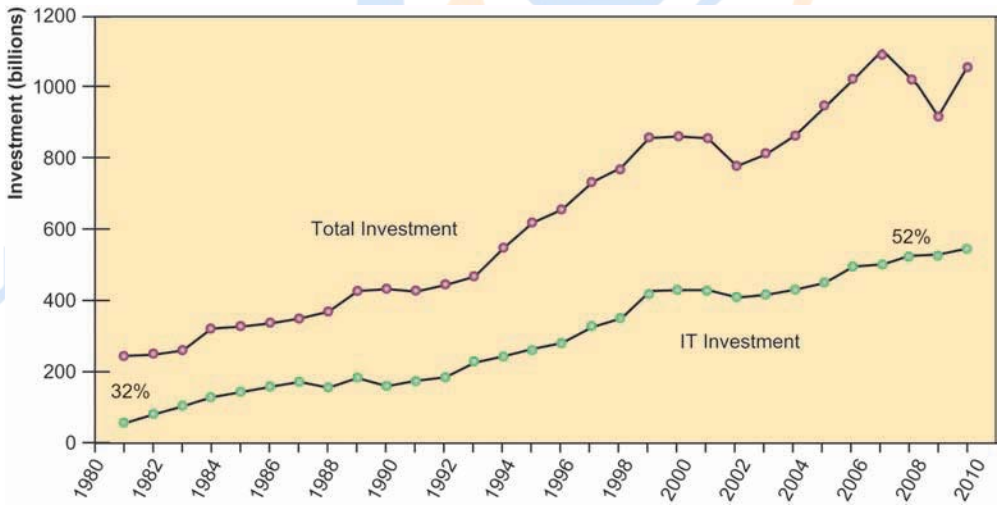
### 1.1. HOW INFORMATION SYSTEMS ARE TRANSFORMING BUSINESS

You can see the results of this massive spending around you every day by observing how people conduct business. More wireless cell phone accounts were opened in 2012 than telephone landlines installed. Smartphones, texting, e-mail, and online conferencing have all become essential tools of business. One hundred twenty-two million people in the United States access the Internet using mobile devices in 2012, which is half of the total Internet user population.

Informa tion technology capital investment, defined as hardware, software, and communications equipment, grew from 32 percent to 52 percent of all invested capital between 1980 and 2011. Source: Based on data in U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Product Accounts, 2012.

(eMarketer, 2010). There are 242 million cell phone subscribers in the United States, and nearly 5 billion worldwide (ITU, 2011). By June 2012, more than 104 million businesses worldwide had dot-com Internet sites registered (Whois, 2012). Today, 184 million Americans shop online, and 150 million have purchased online. Every day about 67 million Americans go online to research a product or service.

**FIGURE 1.1 INFORMATION TECHNOLOGY CAPITAL INVESTMENT**




In 2012, FedEx moved over 9 million packages daily worldwide (6 million in the United States), mostly overnight, and the United Parcel Service (UPS) moved over 15 million packages daily worldwide. Businesses sought to sense and respond to rapidly changing customer demand, reduce inventories to the lowest possible levels, and achieve higher levels of operational efficiency. Supply chains have become more fast-paced, with companies of all sizes depending on just-in-time inventory to reduce their overhead costs and get to market faster.

As newspaper readership continues to decline, more than 150 million people read a newspaper online, and millions more read other news sites. About 67 million people watch a video online every day, 76 million read a blog, and 26 million post to blogs, creating an explosion of new writers and new forms of customer feedback that did not exist five years ago (Pew, 2012). Social network- ing site Facebook attracted 162 million monthly visitors in 2012 in the United States, and over 900 million worldwide. Google+ has attracted over 100 million users in the United States. Businesses are starting to use social networking tools to connect their employees, customers, and managers worldwide. Many Fortune 500 companies now have Facebook pages, Twitter accounts, and Tumblr sites.

Despite the economic slowdown, e-commerce and Internet advertising con- tinue to expand. Google's online ad revenues surpassed $36 billion in 2011, and Internet advertising continues to grow at more than 10 percent a year, reaching more than $39.5 billion in revenues in 2012.

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

## 1.2. WHAT'S NEW IN MANAGEMENT INFORMATION SYSTEMS?

Lots! What makes management information systems the most exciting topic in business is the continual change in technology, management use of the tech- nology, and the impact on business success. New businesses and industries appear, old

ones decline, and successful firms are those that learn how to use the new technologies. Table 1.1 summarizes the major new themes in business uses of information systems. These themes will appear throughout the book in all the chapters, so it might be a good idea to take some time now and discuss these with your professor and other students.

There are three interrelated changes in the technology area: (1) the emerging mobile digital platform, (2) the growing business use of "big data," and (3) the growth in "cloud computing," where more and more business software runs over the Internet. IPhones, iPads, BlackBerrys, and Android tablets and smartphones are not just gadgets or entertainment outlets. They represent new emerging comput- ing platforms based on an array of new hardware and software technologies.

Managers routinely use online collaboration and social technologies in order to make better, faster decisions. As management behavior changes, how work gets organized, coordinated, and measured also changes. By connect- ing employees working on teams and projects, the social network is where works gets done, where plans are executed, and where managers manage. Collaboration spaces are where employees meet one another—even when they are separated by continents and time zones.

The strength of cloud computing and the growth of the mobile digital platform allow organizations to rely more on telework, remote work, and distributed decision making. This same platform means firms can outsource more work, and rely on markets (rather than employees) to build value. It also means that firms can collaborate with suppliers and customers to create new products, or make existing products more efficiently.

You can see some of these trends at work in the Interactive Session on Management. Millions of managers rely heavily on the mobile digital platform to coordinate suppliers and shipments, satisfy customers, and manage their employees. A business day without these mobile devices or Internet access would be unthinkable. As you read this case, note how the emerging mobile platform greatly enhances the accuracy, speed, and richness of decision making.

## 1.3. GLOBALIZATION CHALLENGES AND OPPORTUNITIES: A FLATTENED WORLD

In 1492, Columbus reaffirmed what astronomers were long saying: the world was round and the seas could be safely sailed. As it turned out, the world was populated by peoples and languages living in isolation from one another, with great disparities in economic and scientific development. The world trade that ensued after Columbus's voyages has brought these peoples and cultures closer. The "industrial revolution" was really a world-wide phenomenon energized by expansion of trade among nations.
In 2005, journalist Thomas Friedman wrote an influential book declaring the world was now "flat," by which he meant that the Internet and global commu- nications had greatly reduced the economic and cultural advantages of devel- oped countries. Friedman argued that the U.S. and European countries were in a fight for their economic lives, competing for jobs, markets, resources, and even ideas with highly educated, motivated populations in low-wage areas in the less developed world

(Friedman, 2007). This “globalization” presents both challenges and opportunities for business firms

**TABLE 1.1 WHAT'S NEW IN MIS**

| CHANGE | BUSINESS IMPACT |
|---|---|
| TECHNOLOGY | |
| Cloud computing platform emerges as a major business area of innovation | A flexible collection of computers on the Internet begins to perform tasks traditionally performed on corporate computers. Major business applications are delivered online as an Internet service (Software as a Service, or SaaS). |
| Big data | Businesses look for insights from huge volumes of data from Web traffic, e-mail messages, social media content, and machines (sensors) that require new data management tools to capture, store, and analyze. |
| A mobile digital platform emerges to compete with the PC as a business system | The Apple iPhone and Android mobile devices are able to download hundreds of thousands of applications to support collaboration, location-based services, and communication with colleagues. Small tablet computers, including the iPad, Google Nexus, and Kindle Fire, challenge conventional laptops as platforms for consumer and corporate computing. |
| MANAGEMENT | |
| Managers adopt online collaboration and social networking software to improve coordination, collaboration, and knowledge sharing | Google Apps, Google Sites, Microsoft Windows SharePoint Services, and IBM Lotus Connections are used by over 100 million business professionals worldwide to support blogs, project management, online meetings, personal profiles, social bookmarks, and online communities. |
| Business intelligence applications accelerate | More powerful data analytics and interactive dashboards provide real-time performance information to managers to enhance decision making. |
| Virtual meetings proliferate | Managers adopt telepresence videoconferencing and Web conferencing technologies to reduce travel time, and cost, while improving collaboration and decision making. |
| ORGANIZATIONS | |
| Social business | Businesses use social networking platforms, including Facebook, Twitter, and internal corporate social tools, to deepen interactions with employees, customers, and suppliers. Employees use blogs, wikis, e-mail texting, and messaging to interact in online communities. |
| Telework gains momentum in the workplace | The Internet, wireless laptops, smartphones, and tablet computers make it possible for growing numbers of people to work away from the traditional office. Fifty-five percent of U.S. businesses have some form of remote work program. |
| Co-creation of business value | Sources of business value shift from products to solutions and experiences, and from internal sources to networks of suppliers and collaboration with customers. Supply chains and product development become more global and collaborative; customer interactions help firms define new products and services. |

A growing percentage of the economy of the United States and other advanced industrial countries in Europe and Asia depends on imports and exports. In 2012, more than 33 percent of the U.S. economy resulted from foreign trade, both imports and exports. In Europe and Asia, the number exceeded 50 percent. Many Fortune 500 U.S. firms derive half their revenues from foreign operations. For instance, 85 percent of Intel's revenues in 2011 came from overseas sales of its microprocessors. Eighty percent of the toys sold in the United States are manufactured in China, while about 90 percent of the PCs manufactured in China use American-made Intel or Advanced Micro Design (AMD) chips.

It's not just goods that move across borders. So too do jobs, some of them high-level jobs that pay well and require a college degree. In the past decade, the United States lost several million manufacturing jobs to offshore, low-wage producers. But manufacturing is now a very small part of U.S. employment (less than 12 percent and declining). In a normal year, about 300,000 service jobs move offshore to lower wage countries. Many of the jobs are in less-skilled information system occupations, but some are "tradable service" jobs in architecture, financial services, customer call centers, consulting, engineering, and even radiology.

On the plus side, the U.S. economy creates over 3.5 million new jobs in a normal, non-recessionary year. However, only 1.1 million private sector jobs were created due to slow recovery in 2011. Employment in information systems and the other service occupations is expanding, and wages are stable. Outsourcing has actually accelerated the development of new systems in the United States and worldwide.

The challenge for you as a business student is to develop high-level skills through education and on-the-job experience that cannot be outsourced. The challenge for your business is to avoid markets for goods and services that can be produced offshore much less expensively. The opportunities are equally immense. Throughout this book, you will find examples of companies and individuals who either failed or succeeded in using information systems to adapt to this new global environment.

What does globalization have to do with management information systems? That's simple: everything. The emergence of the Internet into a full-blown international communications system has drastically reduced the costs of operating and transacting on a global scale. Communication between a factory floor in Shanghai and a distribution center in Rapid Falls, South Dakota, is now instant and virtually free. Customers can now shop in a world- wide marketplace, obtaining price and quality information reliably 24 hours a day. Firms producing goods and services on a global scale achieve extraordi- nary cost reductions by finding low-cost suppliers and managing production facilities in other countries. Internet service firms, such as Google and eBay, are able to replicate their business models and services in multiple countries without having to redesign their expensive fixed-cost information systems infrastructure. Half of the revenue of eBay (as well as General Motors) in 2011 will originate outside the United States. Briefly, information systems enable globalization.

### 1.4. THE EMERGING DIGITAL FIRM

All of the changes we have just described, coupled with equally significant organizational redesign, have created the conditions for a fully digital firm. A digital firm can be defined along several dimensions. A **digital firm** is one in which nearly all of the organization's *significant business relationships* with customers, suppliers, and employees are digitally enabled and mediated. *Core business processes* are accomplished through digital networks spanning the entire organization or linking multiple organizations.

**Business processes** refer to the set of logically related tasks and behaviors that organizations develop over time to produce specific business results and the unique manner in which these activities are organized and coordinated. Developing a new product, generating and fulfilling an order, creating a marketing plan, and hiring an employee are examples of business processes, and the ways organizations

accomplish their business processes can be a source of competitive strength. (A detailed discussion of business processes can be found in Chapter 2.)

*Key corporate assets*—intellectual property, core competencies, and financial and human assets—are managed through digital means. In a digital firm, any piece of information required to support key business decisions is available at any time and anywhere in the firm.

Digital firms sense and respond to their environments far more rapidly than traditional firms, giving them more flexibility to survive in turbulent times. Digital firms offer extraordinary opportunities for more flexible global organiza- tion and management. In digital firms, both time shifting and space shifting are the norm. *Time shifting* refers to business being conducted continuously, 24/7, rather than in narrow "work day" time bands of 9 a.m. to 5 p.m. *Space shifting* means that work takes place in a global workshop, as well as within national boundaries. Work is accomplished physically wherever in the world it is best accomplished.

Many firms, such as Cisco Systems, 3M, and IBM, are close to becoming digital firms, using the Internet to drive every aspect of their business. Most other companies are not fully digital, but they are moving toward close digital integration with suppliers, customers, and employees. Many firms, for example, are replacing traditional face-to-face meetings with "virtual" meetings using videoconferencing and Web conferencing technology. (See Chapter 2.)

## 1.5. STRATEGIC BUSINESS OBJECTIVES OF INFORMATION SYSTEMS

What makes information systems so essential today? Why are businesses investing so much in information systems and technologies? In the United States, more than 21 million managers and 154 million workers in the labor force rely on information systems to conduct business. Information systems are essential for conducting day-to-day business in the United States and most other advanced countries, as well as achieving strategic business objectives.

Entire sectors of the economy are nearly inconceivable without substantial investments in information systems. E-commerce firms such as Amazon, eBay, Google, and E*Trade simply would not exist. Today's service industries— finance, insurance, and real estate, as well as personal services such as travel, medicine, and education—could not operate without information systems. Similarly, retail firms such as Walmart and Sears and manufacturing firms such as General Motors and General Electric require information systems to survive and prosper. Just as offices, telephones, filing cabinets, and efficient tall build- ings with elevators were once the foundations of business in the twentieth century, information technology is a foundation for business in the twenty-first century.

There is a growing interdependence between a firm's ability to use informa- tion technology and its ability to implement corporate strategies and achieve corporate goals (see Figure 1.2). What a business would like to do in five years often depends on what its systems will be able to do. Increasing market share, becoming the high-quality or low-cost producer, developing new products, and increasing employee productivity depend more and more on the kinds and quality of information systems

in the organization. The more you understand about this relationship, the more valuable you will be as a manager.
Specifically, business firms invest heavily in information systems to achieve six strategic business objectives: operational excellence; new products, services, and business models; customer and supplier intimacy; improved decision making; competitive advantage; and survival.

In contemporary 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.

**Operational Excellence**

Businesses continuously seek to improve the efficiency of their operations in order to achieve higher profitability. Information systems and technologies are some of the most important tools available to managers for achieving higher levels of efficiency and productivity in business operations, especially when coupled with changes in business practices and management behavior.

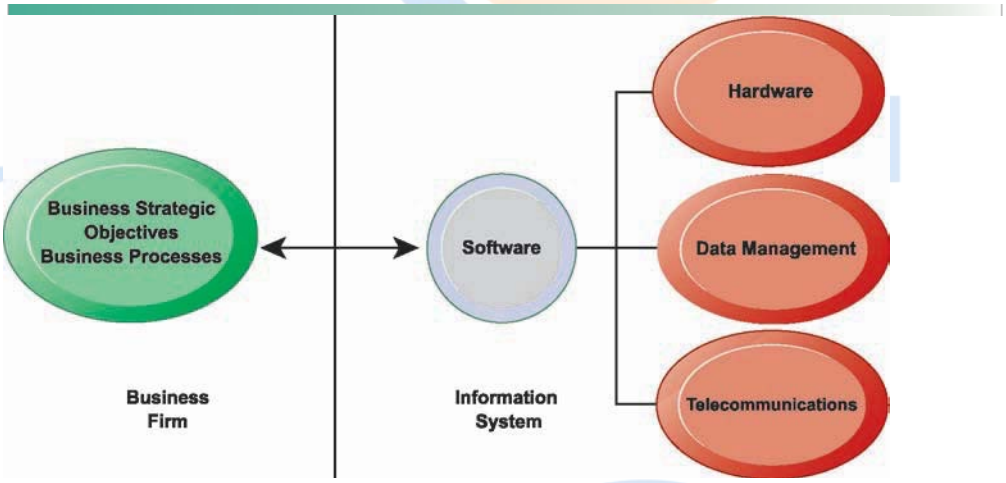
Walmart, the largest retailer on earth, exemplifies the power of infor- mation systems coupled with brilliant business practices and supportive management to achieve world-class operational efficiency. In fiscal year 2012, Walmart achieved $460 billion in sales—nearly one-tenth of retail sales in the United States—in large part because of its Retail Link system, which digitally links its suppliers to every one of Walmart's stores. As soon as a customer purchases an item, the supplier monitoring the item knows to ship a replacement to the shelf. Walmart is the most efficient retail store in the industry, achieving sales of more than $28 per square foot, compared to its closest competitor, Target, at $23 a square foot. Other retail firms producing less than $12 a square foot.

**New Products, Services, and Business Models**

Information systems and technologies are a major enabling tool for firms to create new products and services, as well as entirely new business models. A **business model** describes how a company produces, delivers, and sells a product or service to create wealth.
Today's music industry is vastly different from the industry a decade ago. Apple Inc. transformed an old business model of music distribution based on vinyl records, tapes, and CDs into an online, legal distribution model based on its own iPod technology platform. Apple has prospered from a continuing stream of iPod innovations, including the iTunes music service, the iPad, and the iPhone.

**Customer and Supplier Intimacy**
When a business really knows its customers, and serves them well, the custom- ers generally respond by returning and purchasing more. This raises revenues and profits. Likewise with suppliers: the more a business engages its suppli- ers, the better the suppliers can provide vital inputs. This lowers costs. How to really know your customers, or suppliers, is a central problem for businesses with millions of offline and online customers.

**FIGURE 1.2 THE INTERDEPENDENCE BETWEEN ORGANIZATIONS AND INFORMATION SYSTEMS**




The Mandarin Oriental in Manhattan and other high-end hotels exemplify the use of information systems and technologies to achieve customer intimacy. These hotels use computers to keep track of guests' preferences, such as their preferred room temperature, check-in time, frequently dialed telephone numbers, and tele- vision programs, and store these data in a large data repository. Individual rooms in the hotels are networked to a central network server computer so that they can be remotely monitored or controlled. When a customer arrives at one of these hotels, the system automatically changes the room conditions, such as dimming the lights, setting the room temperature, or selecting appropriate music, based on the customer's digital profile. The hotels also analyze their customer data to identify their best customers and to develop individualized marketing campaigns based on customers' preferences.

JCPenney exemplifies the benefits of information systems-enabled supplier intimacy. Every time a dress shirt is bought at a JCPenney store in the United States, the record of the sale appears immediately on computers in Hong Kong at the TAL Apparel Ltd. supplier, a contract manufacturer that produces one in eight dress shirts sold in the United States. TAL runs the numbers through a computer model it developed and then decides how many replacement shirts to make, and in what styles, colors, and sizes. TAL then sends the shirts to each JCPenney store, bypassing completely the retailer's warehouses. In other words, JCPenney's shirt inventory is near zero, as is the cost of storing it.

**Improved Decision Making**

Many business managers operate in an information fog bank, never really having the right information at the right time to make an informed decision. Instead, managers rely on forecasts, best guesses, and luck. The result is over- or underproduction of goods and services, misallocation of resources, and poor response times. These poor outcomes raise costs and lose customers. In the past decade, information systems and technologies have made it possible for managers to use real-time data from the marketplace when making decisions.

For instance, Verizon Corporation, one of the largest telecommunication companies in the United States, uses a Web-based digital dashboard to provide managers with precise real-time information on customer complaints, network performance for each locality served, and line outages or storm-damaged lines. Using this information, managers can immediately allocate repair resources to affected areas, inform consumers of repair efforts, and restore service fast.

**Competitive Advantage**

When firms achieve one or more of these business objectives—operational excellence; new products, services, and business models; customer/supplier intimacy; and improved decision making—chances are they have already achieved a competitive advantage. Doing things better than your competitors, charging less for superior products, and responding to customers and suppliers in real time all add up to higher sales and higher profits that your competitors cannot match. Apple Inc., Walmart, and UPS, described later in this chapter, are industry leaders because they know how to use information systems for this
purpose.

**Survival**

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

There are many federal and state statutes and regulations that create a legal duty for companies and their employees to retain records, including digital records. For instance, the Toxic Substances Control Act (1976), which regulates the exposure of U.S. workers to more than 75,000 toxic chemicals, requires firms to retain records on employee exposure for 30 years. The Sarbanes-Oxley Act (2002), which was intended to improve the accountability of public firms and their auditors, requires certified public accounting firms that audit public companies to retain audit working papers and records, including all e-mails, for five years. Many other pieces of federal and state legislation in health care, financial services, education, and privacy protection impose significant information retention and reporting requirements on U.S. businesses. Firms turn to information systems and technologies to provide the capability to respond to these challenges.

## C. Latihan

1. How are information systems transforming business, and what is their relationship to globalization?
    - Describe how information systems have changed the way businesses operate and their products and services.
    - Identify three major new information system trends.

- Describe the characteristics of a digital firm.
- Describe the challenges and opportunities of globalization in a "flattened" world.

2. Why are information systems so essential for running and managing a business today?
    - List and describe six reasons why information systems are so important for business today.

# PERSPECTIVES ON INFORMATION SYSTEMS

## A. Kemampuan Akhir Yang Diharapkan

1. What exactly is an information system? How does it work? What are its management, organization, and technology components?
2. What are complementary assets? Why are complementary assets essential for ensuring that informa- tion systems provide genuine value for an organization?
3. What academic disciplines are used to study information systems? How does each contribute to an under- standing of information systems? What is a sociotechnical systems perspective?

## B. Uraian dan Contoh

So far we've used *information systems* and *technologies* informally without defining the terms. **Information technology (IT)** consists of all the hard- ware and software that a firm needs to use in order to achieve its business objectives. This includes not only computer machines, storage devices, and handheld mobile devices, but also software, such as the Windows or Linux operating systems, the Microsoft Office desktop productivity suite, and the many thousands of computer programs that can be found in a typical large firm. "Information systems" are more complex and can be best be understood by looking at them from both a technology and a business perspective.

## 2.1. WHAT IS AN INFORMATION SYSTEM?

An **information system** can be defined technically as a set of interrelated components that collect (or retrieve), process, store, and distribute information to support decision making and control in an organization. In addition to sup- porting decision making, coordination, and control, information systems may also help managers and workers analyze problems, visualize complex subjects, and create new products.

Information systems contain information about significant people, places, and things within the organization or in the environment surrounding it. By **information** we mean data that have been shaped into a form that is meaningful and useful to human beings. **Data**, in contrast, are streams of raw facts representing events occurring in organizations or the physical environ- ment before they have been organized and arranged into a form that people can understand and use.

A brief example contrasting information and data may prove useful. Supermarket checkout counters scan millions of pieces of data from bar codes, which describe each product. Such pieces of data can be totaled and analyzed to provide meaningful information, such as the total number of bottles of dish detergent sold at a particular store, which brands of dish deter- gent were selling the most rapidly at that store or sales territory, or the total amount spent on that brand of dish detergent at that store or sales region (see Figure 1.3).

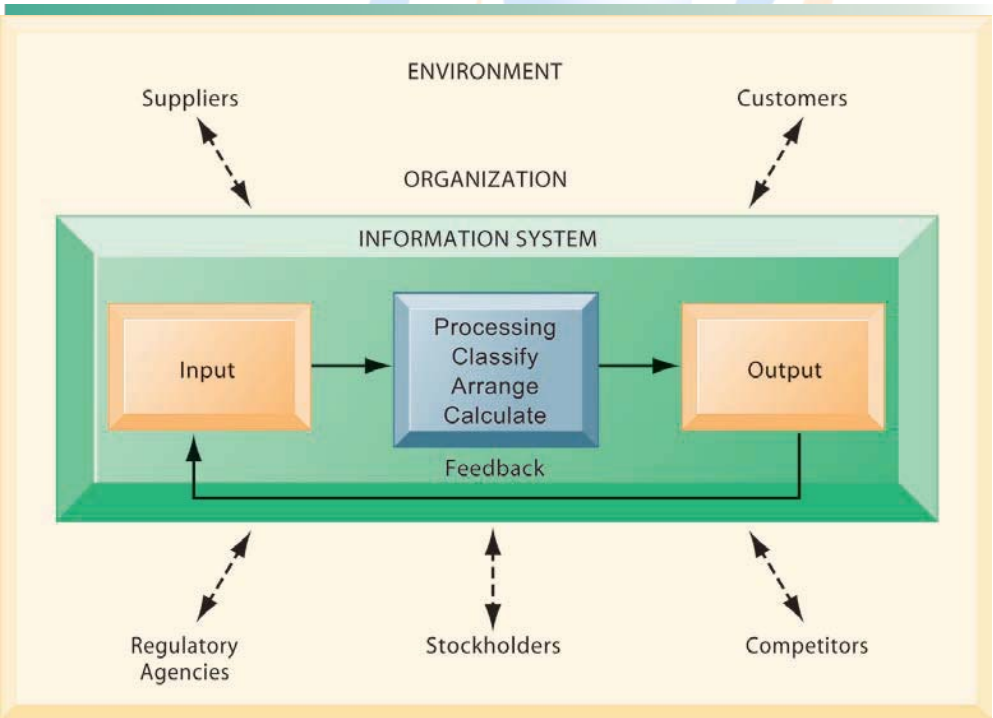
Three activities in an information system produce the information that organizations need to make decisions, control operations, analyze problems, and create new

products or services. These activities are input, processing, and output (see Figure 1.4). **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 informa- tion 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.

For example, in Disney World's systems for controlling crowds, the raw input consists of data from airline bookings and hotel reservations, satellite weather data, historic attendance data for the date being analyzed, and images of crowds from video cameras stationed at key locations throughout the park. Computers store these data and process them to calculate projected total attendance for a specific date as well as attendance figures and wait times for each ride and restaurant at various times during the day. The systems indicate which rides or attractions are too overcrowded, which have spare capacity, and which can add capacity. The system provides meaningful information such as the number of guests attending on a particular day or time period, the average wait time per ride, the average number of restaurant and shop visits, the average number of rides guests squeezed into a single day's visit, and the average amount spent per customer during a specific time period. Such information helps Disney management gauge the theme park's overall efficiency and profitability.

Although computer-based information systems use computer technology to process raw data into meaningful information, there is a sharp distinc- tion between a computer and a computer program on the one hand, and an information system on the other. Electronic computers and related software programs are the technical foundation, the tools and materials, of modern information systems. Computers provide the equipment for storing and processing information. Computer programs, or software, are sets of operat- ing instructions that direct and control computer processing. Knowing how computers and computer programs work is important in designing solutions to organizational problems, but computers are only part of an information system.

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




## 2.2. DIMENSIONS OF INFORMATION SYSTEMS

To fully understand information systems, you must understand the broader organization, management, and information technology dimensions of systems (see Figure 1.5) and their power to provide solutions to chal- lenges and problems in the business environment. We refer to this broader understanding of information systems, which encompasses an understand- ing of the management and organizational dimensions of systems as well as the technical dimensions of systems, as **information systems liter- acy**. **Computer literacy**, in contrast, focuses primarily on knowledge of information technology.

The field of **management information systems (MIS)** tries to achieve this broader information systems literacy. MIS deals with behavioral issues as well as technical issues surrounding the development, use, and impact of informa- tion systems used by managers and employees in the firm.
Let's examine each of the dimensions of information systems—organizations, management, and information technology.

### Organizations

Information systems are an integral part of organizations. Indeed, for some companies, such as credit reporting firms, there would be no business without an information system. The key elements of an organization are its people, structure, business processes, politics, and culture. We introduce these compo- nents of organizations here and describe them in greater detail in Chapters 2 and 3.

Organizations have a structure that is composed of different levels and specialties. Their structures reveal a clear-cut division of labor. Authority and responsibility in a business firm are organized as a hierarchy, or a pyramid structure. The upper levels of the hierarchy consist of managerial, professional, and technical employees, whereas the lower levels consist of operational personnel.

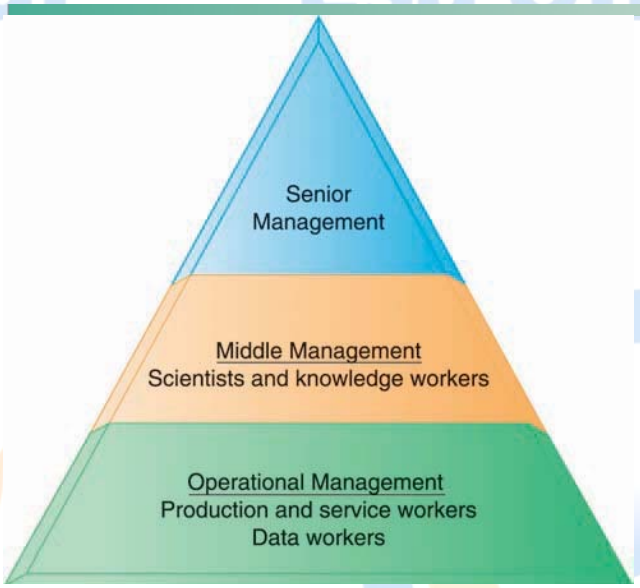
**Senior management** makes long-range strategic decisions about products and services as well as ensures financial performance of the firm. **Middle management** carries out the programs and plans of senior management, and **operational management** is responsible for monitoring the daily activi- ties of the business. **Knowledge workers**, such as engineers, scientists, or architects, design products or services and create new knowledge for the firm, whereas **data workers**, such as secretaries or clerks, assist with scheduling and communications at all levels of the firm. **Production or service workers** actually produce the product and deliver the service (see Figure 1.6).

Experts are employed and trained for different business functions. The major **business functions**, or specialized tasks performed by business organizations, consist of sales and marketing, manufacturing and production, finance and accounting, and human resources (see Table 1.2). Chapter 2 provides more detail on these business functions and the ways in which they are supported by information systems.

An organization coordinates work through its hierarchy and through its business processes, which are logically related tasks and behaviors for accom- plishing work. Developing a new product, fulfilling an order, and hiring a new employee are examples of business processes.

Most organizations' business processes include formal rules that have been developed over a long time for accomplishing tasks. These rules guide employ- ees in a variety of procedures, from writing an invoice to responding to customer complaints. Some of these business processes have been written down, but others
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.

**FIGURE 1.6 LEVELS IN A FIRM**



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

Parts of an organization's culture can always be found embedded in its information systems. For instance, UPS's first priority is customer service, which is an aspect of its organizational culture that can be found in the company's package tracking systems, which we describe later in this section.

Different levels and specialties in an organization create different interests and points of view. These views often conflict over how the company should be run and how resources and rewards should be distributed. Conflict is the basis for organizational politics. Information systems come out of this cauldron of differing perspectives, conflicts, compromises, and agreements that are a natural part of all organizations. In Chapter 3, we examine these features of organizations and their role in the development of information systems in greater detail.

**Management**

Management's job is to make sense out of the many situations faced by organizations, make decisions, and formulate action plans to solve organiza- tional problems. Managers perceive business challenges in the environment; they set the organizational strategy for responding to those challenges; and they allocate the human and financial resources to coordinate the work and achieve success. Throughout, they must exercise responsible leadership. The business information systems described in this book reflect the hopes, dreams, and realities of real-world managers.

But managers must do more than manage what already exists. They must also create new products and services and even re-create the organization from time to time. A substantial part of management responsibility is creative work driven by new knowledge and information. Information technology can play a powerful role in helping managers design and deliver new products and services and redirecting and redesigning their organizations. Chapter 12 treats manage- ment decision making in detail.

**Information Technology**

Information technology is one of many tools managers use to cope with change. **Computer hardware** is the physical equipment used for input, processing, and output activities in an information system. It consists of the following: comput- ers of various sizes and shapes (including mobile handheld devices); various input, output, and storage devices; and telecommunications devices that link computers together.
**Computer software** consists of the detailed, preprogrammed instructions that control and coordinate the computer hardware components in an informa- tion system. Chapter 5 describes the contemporary software and hardware platforms used by firms today in greater detail.

**Data management technology** consists of the software governing the organization of data on physical storage media. More detail on data organization and access methods can be found in Chapter 6.
**Networking and telecommunications technology**, consisting of both physical devices and software, links the various pieces of hardware and transfers data from one physical location to another. Computers and communications equipment can be connected in networks for sharing voice, data, images, sound, and video. A **network** links two or more computers to share data or resources, such as a printer.
The world's largest and most widely used network is the **Internet**. The Internet is a global "network of networks" that uses universal standards (described in Chapter 7) to connect millions of different networks with nearly 2.3 billion users in over 230 countries around the world.

The Internet has created a new "universal" technology platform on which to build new products, services, strategies, and business models. This same technology platform has internal uses, providing the connectivity to link differ- ent systems and networks within the firm. Internal corporate networks based on Internet technology are called **intranets**. Private intranets extended to authorized users outside the organization are called **extranets**, and firms use such networks to coordinate their activities with other firms for making purchases, collaborating on design, and other interorganizational work. For most business firms today, using Internet technology is both a business necessity and a competitive advantage.

The **World Wide Web** is a service provided by the Internet that uses univer- sally accepted standards for storing, retrieving, formatting, and displaying infor- mation in a page format on the Internet. Web pages contain text, graphics, ani- mations, sound, and video and are linked to other Web pages. By clicking on highlighted words or buttons on a Web page, you can link to related pages to find additional information and links to other locations on the Web. The Web can serve as the foundation for new kinds of information systems such as UPS's Web- based package tracking system described in the following Interactive Session.

All of these technologies, along with the people required to run and man- age them, represent resources that can be shared throughout the organiza- tion and constitute the firm's **information technology (IT) infrastruc- ture**. The IT infrastructure provides the foundation, or *platform*, on which the firm can build its specific information systems. Each organization must carefully design and manage its IT infrastructure so that it has the set of technology services it needs for the work it wants to accomplish with infor- mation systems. Chapters 5 through 8 of this book examine each major tech- nology component of information technology infrastructure and show how they all work together to create the technology platform for the organization.

The Interactive Session on Technology describes some of the typical tech- nologies used in computer-based information systems today. UPS invests heav- ily in information systems technology to make its business more efficient and customer oriented. It uses an array of information technologies, including bar code scanning systems, wireless networks, large mainframe computers, hand- held computers, the Internet, and many different pieces of software for track- ing packages, calculating fees, maintaining customer accounts, and managing logistics.

Let's identify the organization, management, and technology elements in the UPS package tracking system we have just described. The organization element anchors the package tracking system in UPS's sales and production functions (the main product of UPS is a service—package delivery). It speci- fies the required procedures for identifying packages with both sender and recipient information, taking inventory, tracking the packages en route, and providing package status reports for UPS customers and customer service representatives.

The system must also provide information to satisfy the needs of managers and workers. UPS drivers need to be trained in both package pickup and deliv- ery procedures and in how to use the package tracking system so that they can work efficiently and effectively. UPS customers may need some training to use UPS in-house package tracking software or the UPS Web site.

UPS's management is responsible for monitoring service levels and costs and for promoting the company's strategy of combining low cost and superior service. Management decided to use computer systems to increase the ease of sending a package using UPS and of checking its delivery status, thereby reducing delivery costs and increasing sales revenues.

The technology supporting this system consists of handheld computers, bar code scanners, desktop computers, wired and wireless communications networks, UPS's data center, storage technology for the package delivery data, UPS in-house package tracking software, and software to access the World Wide Web. The result is an information system solution to the business challenge of providing a high level of service with low prices in the face of mounting competition.

## 2.3. IT ISN'T JUST TECHNOLOGY: A BUSINESS PERSPECTIVE ON INFORMATION SYSTEMS

Managers and business firms invest in information technology and systems because they provide real economic value to the business. The decision to build or maintain an information system assumes that the returns on this invest- ment will be superior to other investments in buildings, machines, or other assets. These superior returns will be expressed as increases in productivity, as increases in revenues (which will increase the firm's stock market value), or perhaps as superior long-term strategic positioning of the firm in certain markets (which produce superior revenues in the future).

We can see that 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. For example, the information system for analyzing supermarket checkout data illustrated in Figure 1.3 on page 46 can increase firm profitability by helping managers make better decisions as to which products to stock and promote in retail supermarkets.

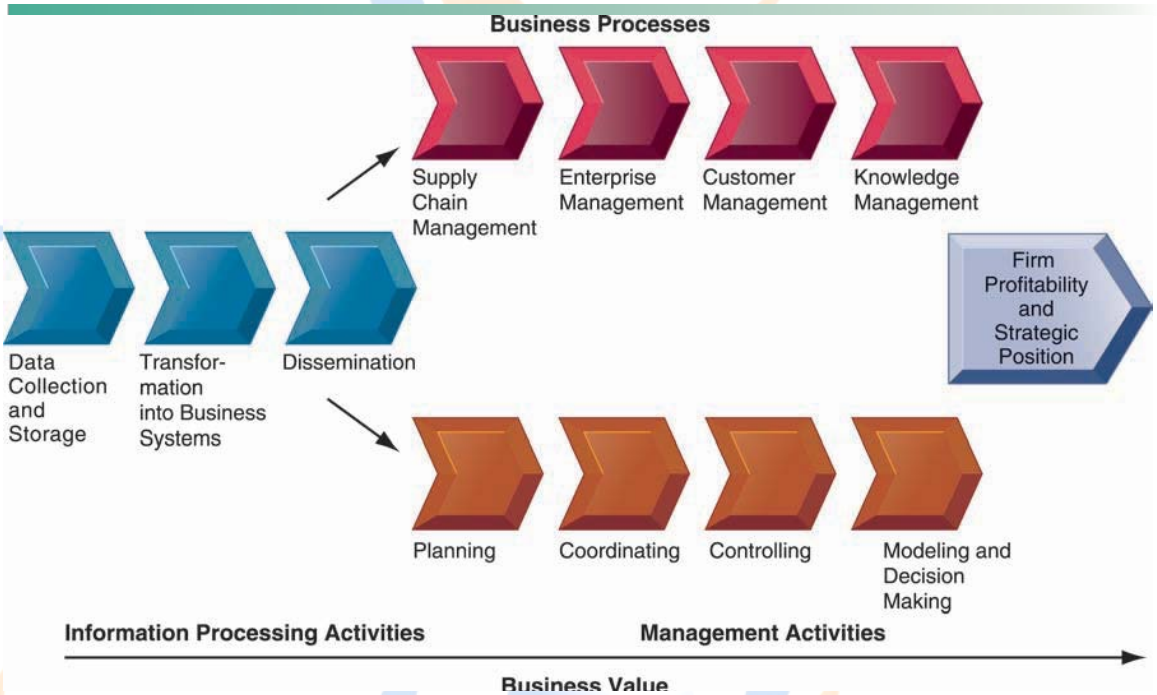
Every business has an information value chain, illustrated in Figure 1.7, in which raw information is systematically acquired and then transformed through various stages that add value to that information. The value of an information system to a business,

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. Although there are other reasons why systems are built, their primary purpose is to contribute to corporate value.

From a business perspective, information systems are part of a series of value-adding activities for acquiring, transforming, and distributing informa- tion that managers can use to improve decision making, enhance organiza- tional performance, and, ultimately, increase firm profitability.

The business perspective calls attention to the organizational and managerial nature of information systems. An information system represents an organiza- tional and management solution, based on information technology, to a chal- lenge or problem posed by the environment. Every chapter in this book begins with a short case study that illustrates this concept. A diagram at the beginning of each chapter illustrates the relationship between a business challenge and resulting management and organizational decisions to use IT as a solution to challenges generated by the business environment. You can use this diagram as a starting point for analyzing any information system or information system problem you encounter.
Review the diagram at the beginning of this chapter. The diagram shows how the Ponsse wood production firm systems solved the business problem pre- sented by the need to integrate its production and manufacturing processes.

**FIGURE 1.7 THE BUSINESS INFORMATION VALUE CHAIN**




From a business perspective, information systems are part of a series of value-adding activities for acquiring, transforming, and distributing information that managers can use to improve decision making, enhance organizational performance, and, ultimately, increase firm profitability.

These systems provide a solution that takes advantage of new interactive digital technology and opportunities created by a host of technologies such as GPS. The firm developed new ways to coordinate production, manufacturing, and sales. The diagram also illustrates how management, technology, and organiza- tional elements work together to create system solutions.

## C. Latihan

1. What exactly is an information system? How does it work? What are its management, organi- zation, and technology components?
    - Define an information system and describe the activities it performs.
    - List and describe the organizational, manage- ment, and technology dimensions of informa- tion systems.
    - Distinguish between data and information and between information systems literacy and computer literacy.
    - Explain how the Internet and the World Wide Web are related to the other technology components of information systems.
2. What are complementary assets? Why are complementary assets essential for ensuring that information systems provide genuine value for an organization?
    - Define complementary assets and describe their relationship to information technology.
    - Describe the complementary social, manage- rial, and organizational assets required to optimize returns from information technology investments.
3. What academic disciplines are used to study information systems? How does each contrib- ute to an understanding of information systems? What is a sociotechnical systems perspective?
    - List and describe each discipline that contrib- utes to a technical approach to information systems.
    - List and describe each discipline that contrib- utes to a behavioral approach to information systems.
    - Describe the sociotechnical perspective on information systems.

## D. Daftar Pustaka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