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# **Information systems: foundations of e-business Volume 1**

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Undergraduate study in  
**Computing and related programmes**

This is an extract from a subject guide for an undergraduate course offered as part of the University of London International Programmes in Computing. It contains sample material from Volume 1 of the subject guide plus the table of contents for Volume 2. Materials for these programmes are developed by academics at Goldsmiths.

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# Introduction

This is a level one full-unit subject for the BSc Computing and Information Systems and Creative Computing programme. It aims to serve as an introduction to information systems from the viewpoint of a business professional.

Anyone working in a commercial company or government organisation who manages other people, or who works in a professional area such as engineering, law, sales, manufacturing, accounting or education, will encounter a number of information systems in their workplace, and may have responsibility for these systems as part of their job.

The growth of the Internet, and the evolution of technology over the last 20 or so years has revolutionised the ways in which organisations use information systems in every part of their business. Today, organisations across the world are using the Internet to help satisfy their communication, network, research and business needs.

This subject guide is split into two volumes. The first volume will introduce you to some important topics including:

- the role of information systems today
- the different functions of information systems
- how organisations use information systems
- how the growth of technology raises ethical and moral questions
- the growth of electronic commerce.

It is the aim of this subject to give students a detailed understanding of the major issues regarding the use of Internet technologies within organisations and the role of information systems for business. Learning outcomes are given at the end of each chapter. These are a summary of what you should learn from the chapter. However, be aware that the examination questions may cover any of the material in the guide and any additional material covered in the coursework.

Each chapter also includes learning activities and chapter questions which can be used to test your understanding. You should attempt these questions and activities as they will improve your understanding and give you the opportunity to find examples and illustrations to use when answering your coursework and examination questions.

The activities do not have solutions because there is often no right or wrong answer. The chapter questions have guideline answers given at the back of the subject guide, but as with the activities, these questions do not always have definitive answers as your answer will depend on your own opinion and experience.

## Method of assessment

There will be one examination lasting three hours at the end of the academic year. This examination consists of six questions; candidates have to answer **any four out of these six** questions to achieve full marks. The examination is worth 80% of your final mark for this subject. Two examination papers (with solutions) are given at the end of the second volume of this guide so that you can see the type and level of questions to expect in the examination.

You are also expected to complete **four** coursework assignments. These count in total as 20% percent of your final mark. The coursework assignments typically

include some independent research and practical work. Three previous coursework assignments are given at the end of this volume. Guideline solutions and hints as to how to tackle the assignments are given. Please note however that these are not intended to be *model solutions* as your answers will depend on your own experience and the companies that you research and use as examples in your solutions.

## Essential reading

The subject guide is based on following book:

Laudon, K. and J.Laudon *Management Information Systems: Managing the Digital Firm* (Pearson, 2010) eleventh edition [ISBN-13: 978-0-13-609368-8](pbk)

Material in Laudon and Laudon is examinable. You should also be aware that rapid developments in the world of technology mean that neither the subject guide nor the recommended text can ever be completely up-to-date. You are therefore advised to access further reading wherever possible to keep abreast of the current state of technology available.

Following is a list of books that are recommended. By no means do you need to have copies of all of these books but a selection of your choice would complement the material covered in the subject. Some of these textbooks are very expensive and so I have given Internet addresses for additional reading wherever possible. You should also find your own additional reading by using a search engine to find appropriate material when possible.

## Additional reading

Oz, Effy, *Management Information Systems* (Course Technology, 2008) sixth edition [ISBN-13 978-1323901785](hbk)

Turban, E. and L. Volonino *Information Technology for Management – Transforming Organizations in the Digital Economy* (Wiley, 2010) seventh edition [ISBN: 978-0-470-40032-6] (pbk). See also <http://bcs.wiley.com/he-bcs/Books?action=index&itemId=0470400323&bcsId=4953> for the student companion site for this textbook which is free to access.

See Steven Alter's website at <http://www.stevenalter.com> for some interesting articles and links.

See Wikipedia for a great example of a wiki as well as lots of useful information. Note however that material on Wikipedia is not guaranteed to be accurate and you should double check references from here using another source.  
<http://en.wikipedia.org/wiki/>

## How to use this subject guide

The role of this subject guide is to complement the recommended textbook and suggested additional reading. This subject guide should be viewed as the *glue* that holds these disparate sources of information together. To study this subject effectively it is important that you understand the complementary nature of this subject guide. Often within the guide you are asked to go online to read further material, or you are required to research online to answer the activities and chapter questions. Wherever possible, you should do this. This subject guide is not intended to cover everything that the examination may contain, Keep this fact in mind at all times and do not neglect to do your own additional reading and research.

This guide is mainly concerned with summarising, highlighting or drawing your attention to the points covered in a more exhaustive manner in the recommended text and additional reading material. It can therefore be used to help you to concentrate your efforts on the major points and issues.

## Guide to chapters

- **Chapter 1** provides an overview of the role that technology plays in businesses today, and the different ways in which information systems can be viewed and studied.
- In **Chapter 2** we describe business processes and the different types of information systems that exist to aid different types of business processes. We will also discuss the relationship between these systems and describe enterprise applications that span the entire organisation.
- In **Chapter 3** we will have a more detailed look at the environment that organisations operate within, and consider how the internal culture, politics and structure of the organisation, as well as external factors including competitors, suppliers and customers effect the organisation and its ability to maintain a competitive advantage. We will discuss how information systems, and in particular the Internet, can be used to help the organisation keep ahead of its competitors.
- In **Chapter 4** we will consider the moral and ethical issues raised by the increased use of technology.
- In **Chapter 5** we will discuss electronic commerce, its history, failures and success stories. We will look at the advantages and disadvantages of electronic commerce when compared with traditional retail businesses. We will compare the different business and revenue models that electronic commerce companies may adopt.

In volume 2 of the subject guide we will look in more detail at:

- IT infrastructure
- databases and information management
- telecommunications, the Internet and wireless technology
- information security
- how to build an information system.

Information systems:  
Foundations of e-business  
Volume 1

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# Chapter 1

## An overview of information systems

---

### 1.1 Introduction

Throughout business, entertainment, media and design, information systems are used to support the distribution, processing, management and evaluation of data and information. In a global world, where businesses and corporations operate, it is important that they understand why information systems are so essential to the business they conduct.

Put simply, an information system is a collection of hardware, software and people that work together to collect, store, sort and process information. In this chapter, we will discuss how information systems affect businesses in terms of their relationship to the global world. You will also get an understanding of the essential components that make up an information system, how these components interact with each other, and what effect such interactions cause.

This chapter also provides an overview of the management, organisation and technology components of information systems. An explanation is given of how these components are formed and used.

In the second half of this chapter, we will define the assets a business has that complement the effective use of information systems. Well trained staff ensure that information systems provide real business solutions (rather than becoming merely hardware and software investments).

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#### Essential reading

Laudon and Laudon, *Management Information Systems Managing the Digital Firm*, Chapter 1.

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#### Additional reading

"*In Search of Simplicity*" (*Beyond the Search for Excellence*) *Information Management Tools: Their Future and Their Potential Impact on the Corporation*, Grulke, Wolfgang E. This article was published in 1987 and won the NACCA award for the best business article of the year. See how accurate Grulke's predictions proved to be. Available at <http://www.futureworld.org/Archives/tlksimpl.html>.

---

## 1.2 Learning outcomes

After studying this chapter and the recommended reading, you should be able to:

- describe different types of information systems and explain why they are so essential to businesses today
  - compare and contrast information systems from a technical and business perspective and provide detailed examples of both
  - describe and evaluate the dimensions of information systems and the importance of deploying such systems in a business context
  - identify and describe complimentary assets and contemporary approaches to information systems.
- 

## 1.3 The role of information systems

Today information systems are everywhere. They have an impact on nearly all aspects of our lives. The emergence and growth of the Internet as a global information resource for all businesses has meant that computers are not only the way in which we communicate at work, but also with our family, friends and the community at large. It is clear that the *dot com bubble* that burst in the late 1990s was only part of a much larger Internet story. Today thousands of new companies, with real (i.e. profitable) revenue models, have been founded online. These digital companies not only have good planning and good products, but they also have excellent revenue and business models. Such companies have been successful, in part, because they also have an understanding of how information can be used as a business resource.

### 1.3.1 A networked business world

One of the greatest recent transformations in the way that businesses operate is how much they now rely on networked technology. It is now commonplace for businesses to have a website. Such a website will be accessed through both wired and wireless networks. Both customers and employees may use networked technologies such as PC, laptops, blackberries and mini notebooks to access information and services of the business. Put simply, if an organisation does not have an online presence, it is very difficult for it to take advantage of the global opportunities available for business.

The move to the use of online technologies has meant that businesses can drastically reduce the costs associated with operating on a global scale. Businesses can now operate 24 hours a day, seven days a week and offer services worldwide.

The global nature of online business today also causes some challenges. These include the idea that there is now nearly perfect knowledge of the market and often perfect knowledge of what competitors are offering. This means that customers are often smarter and better informed and they can easily choose alternative suppliers. In turn this means that businesses face the challenge of how to be competitive on a worldwide scale. There are even businesses operating online who sell the service of

telling customers where they can get the best deal for a particular product or service. These *price comparison websites* sell pure information rather than a physical product or service.

---

### Learning activity

Find three different comparison websites and describe the service or services offered by each of them. How do price comparison websites make money for their owners?

---

The many changes in the ways that businesses operate has led to the establishment of some firms which are purely digital. Digital firms conduct nearly all of their significant business relationships online. They speak to customers, suppliers and employees digitally and expect them to do the same. Their core business processes, the set of logically related tasks and behaviours used to develop products and services, are also conducted digitally. Digital networks within a digital firm will span the entire organisation. In general, their key corporate assets are not tangible but are information based. Such assets can include intellectual property, core technical skills, finance and people. In a digital firm we would normally expect any piece of information to be available at any time, anywhere in the firm.

Digital firms normally participate in time and shape shifting.

- **Time shifting** refers to the ability for a business to operate 24 hours a day seven days per week rather than a narrow working day of nine to five.
- **Shape shifting** refers to the idea that the business can work anywhere in the world. They use a global workshop that knows no national boundaries.

---

### Learning activity

Research an Internet business that you think is successful. Describe the following aspects of this business.

- What information based products does the business sell?
  - How does the business market these products?
  - Who are the customers?
  - Who are the major competitors?
- 

## 1.3.2 Strategic business objectives and information systems

As we have already seen, information systems are essential components of many businesses today. Much of a business's investment will be in information systems and associated technologies. This is because there is a growing interdependence between a firm's ability to use information technology, and its ability to meet its corporate objectives and execute its subsequent strategies. For example, if a business decides that its strategic business objective is to become a cost leader in a particular market (i.e. be the cheapest provider of a product or service) then it will need to exploit the possibilities of using information systems to reduce its costs to the lowest levels possible. Alternatively, if a business's strategic objective is to address a specific niche

market, then it must use information systems to ensure that targeting this niche market is done in a cost effective and efficient manner.

Information systems can be used to help a business to achieve the following six core strategic objectives.

- Excellence in the way it operates and conducts business.
- The development of new products, services and business models.
- The establishment of intimate customer and supplier relations.
- Supporting the decision-making process.
- Establishing a competitive advantage.
- Surviving in a competitive world.

We will consider in turn each of these strategic objectives, and how technology can be used to help achieve them.

### **Operational excellence**

It is clear that if a business can achieve improved levels of efficiency then it can establish higher profitability. Information systems and their associated technologies provide managers with some of the most important tools and techniques to improve efficiency and productivity levels. These technologies must be complemented by effective business practices and management approaches.

### **Development**

New products and services require an entire life cycle supported by information systems. Ideas can be developed online. Products can be designed using computer aided design (CAD) tools. They can be built with production lines controlled and managed by information technologies and systems. Finally the product can be sold through online outlets such as websites or digital downloads.

Information systems also allow firms to create entirely new business models that describe how digital firms produce, deliver and sell products and services. A classic example of this is the Apple Incorporated information system store, *Applestore*, where digital downloads of music and video have replaced the old business model of selling vinyl records, tapes and compact disks. It is clear today that the old way of distributing films via video stores is now being surpassed as people have the ability to order DVDs online and have them delivered to their home address, or even to download films for instant viewing.

### **Business relationships**

Every good business person knows that it is much harder to get a new customer than to keep an existing one. Furthermore, it is clear that if you serve your customers well then they will return, often with others to whom they have recommended your products and services. Therefore it is important that information systems are used to create a real intimacy between the business and its customers. Such an intimacy will allow the business not only to anticipate customer wants and desires, but also to

communicate with them in a manner that suits the customer. For example, hotels may use their information systems to keep track of customer preferences, wishes and desires, and ensure that these are met so that the customer feels truly at home when they are staying at the hotel.

### **Decision-making**

If a firm does not have accurate information with which to make its decisions, then at best it can guess what is the best thing to do, at worst, it is completely in the dark. This can lead to over or under-production of goods and services, the misapplication of resources, and poor customer service and response times. All of these problems can lead to rising costs and customers defecting to alternative suppliers. It is crucial for business managers to have good information on which to base decisions and this often means good information systems. Many companies now provide their managers with web-based real-time information on customer orders, complaints and the production cycles of their businesses.

### **Competitive advantage**

A competitive advantage, put simply, is having a method or a product that means that you can do things better than your competitors. Such advantages could take the form of having the ability to:

- charge less for products
- respond more quickly to customer requirements
- have a greater understanding of customer needs
- deliver more tailored products and services.

It is important that businesses use information systems to deliver better performance, create superior products and respond to customers promptly.

Note that a competitive advantage, once gained, must be maintained. If a firm does not improve its business processes continually and exploit new opportunities when they are available, then its competitors will soon catch up. What previously was an advantage will soon become mainstream.

### **Survival**

The reality today for many businesses is that if they do not invest in information systems they cannot survive. Information systems are now a necessity in many business environments. For example, can you imagine a bank that did not offer its customers automatic teller machines (ATMs) or online banking facilities? These information systems, once seen as a competitive advantage, are now industry necessities.

### 1.3.3 Interdependence of organisations and information technology

In order for a firm to achieve its business objectives it will need significant investment in information technology. Such investment will be in hardware, software, data management and telecommunications technologies. The strategic objectives and business processes of the organisation will, in part, be impacted by the information systems available to it. This is a two-way relationship because businesses rely on information systems to help them achieve their goals, and information systems are also products of the businesses that produce them. Therefore businesses shape information systems, and information systems shape businesses.

---

## 1.4 Defining information systems

An information system can be defined as a set of related and connected software and hardware components that are used to collect or retrieve, then process and store, and finally to distribute, information. This information is used to support decision-making processes and provide controls on the business processes an organisation undertakes. Information systems are also used to analyse problems, make predictions, create new products and services, and co-ordinate business communications. Information systems can be key resources when we want to find out who significant people in an organisation are, what skills or services they can provide, and how we can contact them.

Information itself can be defined as data that has a structure and has been formed so that it is meaningful and useful to human beings. Data is merely facts and figures. Information is when these facts and figures are analysed and presented in such a way that they can be used for decision-making. For example, a list of names is data. A register of who attended a class is information.

Figure 1.1 shows a receipt from a major chain store. There is a lot of data on this receipt, and the data can be used to provide information. For example the numbers to the left of the items tell the information system operating at the store that the item has been sold so that their inventory can be updated and replacement goods ordered.

---

#### Learning activity

What *data* is shown on the receipt in figure 1.1 and how is this, or how could this be processed to give *information*? See figure 1.3 on page 46 of Laudon and Laudon for some ideas.

---

Three key activities define an information system:

- inputs
- processing
- outputs.

**Inputs** are the raw data and information that comes into an information system from its external environment.

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00424981 GUARDIAN	1.00
 Balance to pay 5 items	 <b>15.74</b>
Cash tendered	20.00
Cash due	<b>4.26</b>
05/01/10 12:56 15491326 5310 502 3133	
Last day for a refund or exchange	
<b>09/02/10</b>	
After this you may still be entitled to a refund in line with your legal rights	



611 207 2908 3386 8862

Figure 1.1: Data and information on a receipt

**Processing** is what the information system does with inputs to turn them into information. This can involve classifying, arranging, calculating and formatting.

**Outputs** are how the processed information is presented back to the people who will use it. These people will often give feedback into the input process. Such feedback will be used to evaluate or correct the input stage of the information system.

Figure 1.2 shows the functions of a typical information system. See how using feedback completes the information processing loop. If information is turned into data, but that data is not fed back to the appropriate managers and systems, then the value of the information system is greatly diminished. The diagram also shows the environment that the organisation operates within. Data from suppliers, customers,

regulatory agencies, stockholders and competitors will all be fed into the information system.

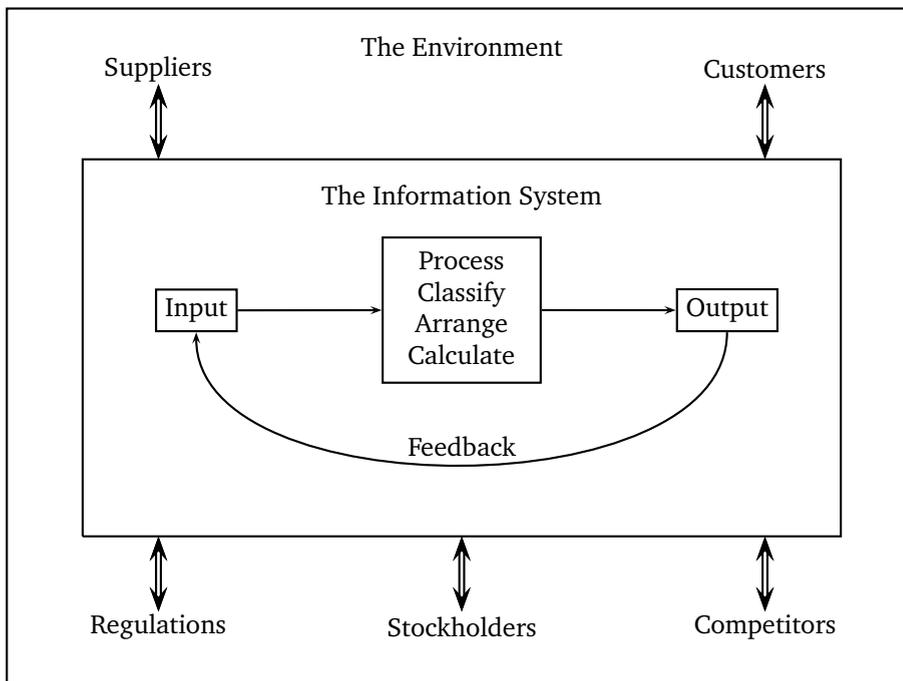


Figure 1.2: The functions of an information system shown in the environment in which the organisation must operate

---

### Learning activity

1. One example of how data can be processed to become information is a list of businesses (data) which, when grouped by the services they provide and listed in alphabetical order, becomes a business directory which is a powerful information resource for potential customers.  
Give five further examples of data and how it can be processed to become information.
2. Draw a diagram similar to that shown in figure 1.2 which can be used to decide whether or not a customer should be eligible for a loan from a bank. Describe appropriate inputs, processing and outputs. You will also need to describe the external environment in terms of competitors, stakeholders, regulatory agencies and suppliers.

---

## 1.5 Understanding the dimensions of information systems

Some people think that information systems are just the hardware and software required to produce information. This is incorrect. In order to truly understand how to use information systems effectively and efficiently, you must understand the broader management, technology and organisational dimensions of information systems. You must become *information systems literate* rather than just *computer literate*. **Management information systems**, or MIS, is the study of these broader dimensions of information systems literacy.

Management information systems try to address the behavioural as well as technical issues surrounding the development and use of information systems. We will now give a brief description of each of the key dimensions of information systems. However, it is important that you research each dimension and provide your own examples of how they impact on the overall efficiency of information systems technology.

### 1.5.1 Information systems and organisations

Today most organisations rely on information systems which have become an integral part of their operations. Key elements of any organisation are its people, structure, business processes, politics and culture. For example, an organisation's structure may be composed of different levels and specialities. These structures may define divisions of labour, authority and responsibility. Or they may be used to address particular business requirements.

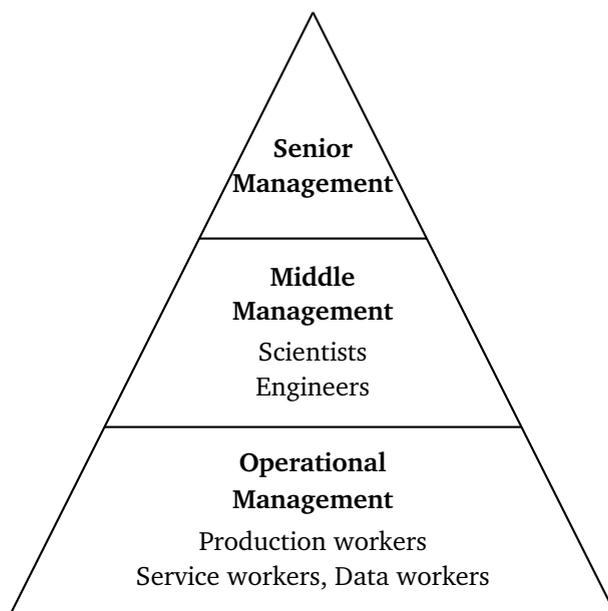


Figure 1.3: A highly structured organisation has hierarchical levels of management

In a highly structured organisation, a pyramid structure such as the one shown in Figure 1.3 may be observed in which authority and responsibility rise upwards. In such a structure, the upper levels will consist of managerial staff whilst the lower levels will consist of operational personnel. It is the responsibility of senior management to make strategic decisions about products and services. Middle management then devise and carry out programmes and plans to meet the strategic needs defined by the senior management. Operational management is responsible for the monitoring of the daily business activities that are organised by middle management plans and undertaken by workers. Knowledge workers, such as

scientists and engineers, design the products and/or services used to create knowledge for a firm. Data workers input and process the data needed by the firm and often manage its output. Production or service workers actually make products and deliver services to customers.

A business will typically undertake four key functions:

- human resources
- finance and accounting
- manufacturing and production
- sales and marketing.

These functions are co-ordinated through a set of business processes. Such processes will define a set of rules for accomplishing these functions as a series of tasks. The rules help and guide employees on how they are to react to particular requests. They also detail procedures that need to be undertaken. The majority of rules should be written down. However, some business processes have an element of informal work practices that may or may not be written down.

An organisation's culture may also have an influence on how it utilises information systems. The culture of an organisation may be understood to be a fundamental set of assumptions about the way things are achieved and what things are valued. This culture will nearly always be found in the way the information systems in that organisation are designed and used. In Chapter 3, the impact that information systems have on organisations is discussed in greater detail.

### **1.5.2 Management and information systems**

Management can be understood to be 'formulating action plans to solve business problems and ensuring that these plans are executed in an efficient and effective manner'. The role of management is to perceive business challenges and to set the organisational strategy for meeting these challenges. Managers must also allocate resources and co-ordinate work. A major component of management is leadership. This leadership not only extends to managing what already exists, but also taking the lead in creating new products and services. Managers must be creative, knowledgeable and flexible. Information systems can play a key role in helping managers meet these objectives.

### **1.5.3 Technology and information systems**

Possibly the best understood aspect of information systems is that of the technologies they comprise. Information systems consist of:

- computer hardware – the physical equipment used for input, output and processing
- computer software – the programmes used to control and co-ordinate the hardware components
- application programmes – the programmes used to analyse and process data
- data management – software for organising and serving data to users, managing physical storage of media and virtual resources.

A key technology of information systems is networking and communications. Networks consist of both physical devices such as network cards, router, hubs and cables, and software such as operating systems, web servers, data servers and application servers. There is often a strong interconnection between computers and communications equipment. Today telecommunications and computer networks allow the seamless sharing of voice, data, images, sound and video across the whole organisation.

The Internet has created a new universal technology platform for products, services and business models. The same software technologies that support the Internet (such as TCP/IP(Transmission Control Protocol/Internet Protocol) and HTTP(Hypertext Transfer Protocol)) have just as much value internally within organisations. When an internal corporate network uses Internet technology, it is referred to as an **Intranet**. When these intranets are extended to authorised users outside an organisation, they are referred to as **Extranets**. The world wide web which uses universally adopted standards for exchanging information has become the cornerstone of much electronic business. Multimedia web pages containing hyperlinks serve as the foundation for new kinds of information systems and information resources.

All of these technologies, along with the people required to run and manage them, represent the set of resources called the **information technology infrastructure**. Such an infrastructure must be carefully designed and managed.

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#### Learning activity

Think about a large supermarket that you are familiar with. Describe the dimensions of the information systems used in this supermarket. Give details of the information technology infrastructure and how it is used to provide customers with an efficient and effective service when shopping at the supermarket.

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## 1.6 Understanding information systems from a business perspective

A business invests in its information technology and systems in order to gain real economic value. All businesses expect a return on their investment, and such a return, it is hoped, will be larger than any other investments they make. Returns may take the form of:

- increased revenue
- increased productivity
- stronger strategic position.

From a business perspective an information system is therefore a way to create value for a firm. Information systems enable the increasing of revenue and the decreasing of costs.

All businesses have an *information value chain*. This details the steps taken to process the raw data required and transform it into information that adds value. Businesses expect information systems to:

- help them make better decisions
- become more efficient.

A good information value chain provides an organisation and its management with solutions, based on information technology, to the challenges faced in conducting business. In order to understand a business's value chain, one needs to take a business perspective on how it views information systems. Figure 1.7 on page 55 of Laudon and Laudon shows a business information value chain.

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## 1.7 Understanding complementary assets and information systems

It is important to have an awareness of the organisational and management dimension of information systems as these can help us to understand why certain firms achieve better results from their information systems than others. Analysis of studies undertaken into how information technology investments yield returns, show that there is a considerable variation between firms. Some firms invest a great deal of money and resources and receive few returns, whilst others invest less but receive much more. It is clear then that investing in the technology itself does not guarantee a good return. The question is, 'what does?'

The answer seems to lie in the business model adopted by the firm. If a firm holds on to an old business model, perhaps one originally designed not to operate online, it may find that merely moving the same business model to an online environment has little effect.

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### Learning activity

Can you describe a business model that has been moved to an online environment and failed to yield significant returns?

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Complementary assets are required to derive value from a primary investment such as an investment in information technology. Research indicates that firms that support their information investments with investments in complementary assets such as new business processes, management behaviour, organisation culture or training, receive superior returns on their investment. Such investments in complementary assets are often referred to as organisational and managerial capital.

When describing the complementary assets required to optimise returns on information technology, it is clear that these revolve around the organisational, managerial and social aspects of businesses.

**Organisational assets** include:

- an appropriate business model
- having efficient business processes
- decentralised authority
- good use of information systems.

**Managerial assets** include:

- support by senior management for IT

- incentives for innovation
- good team-working environment
- programme of training
- valuing flexibility and knowledge-based decision-making.

**Social assets** include:

- making use of the Internet and telecommunications infrastructure
- raising employees' computer literacy
- standards (both government and private sector)
- laws and regulations
- technology used by suppliers/partners to assist business processes.

## 1.8 Contemporary approaches to information systems

Information systems is a multidisciplinary field and many different theories and perspectives have been used to describe it. Disciplines such as computer science, operational research, sociology, economics, psychology and management science all contribute to our understanding of how information systems can be used and applied. Broadly speaking, the field of information systems can be subdivided into technical and behavioural approaches.

From a *technical approach*, an information system is viewed from a mathematical perspective. Mathematical models are used to study information systems and to explain how they can be applied. Using a technical perspective, management wish to establish theories of computability which can be used to understand how to apply information systems.

A *behavioural approach* is concerned with issues that arise with the development and maintenance of information systems. Such issues are important because without the correct people a technical solution is useless. Consider the following questions.

- How does one integrate a new information system?
- How does one design an appropriate information system?
- How does one manage an information system?

Issues such as these cannot be explored usefully using technical models alone. The behavioural approach does not ignore technology, but uses it as the basis for solving non-technical managerial issues related to its use in business.

### 1.8.1 Sociotechnical systems

The field of Management information systems (MIS) incorporates the study of the interactions of four key players:

- suppliers of hardware and software
- business firms making investments
- managers and employees seeking to achieve business value

- the legal, social and cultural context in which the business is operating.

The study of management information systems tries to combine the work of computer science, management science and operational research, to develop information system solutions to real world problems. Management information systems is also concerned with behavioural issues surrounding the development and use of information systems.

Taking a sociotechnical perspective, the performance of a system is optimised when both the technology and organisation mutually adjust to one another until a satisfactory fit is obtained. In this subject we will adopt this contemporary perspective on information systems.

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## 1.9 Summary

In this chapter we have explained the role of information systems in businesses today. We have described the emergence of new digital firms and the strategic business objects these firms have when deploying information systems. This chapter has also provided you with several different perspectives on information systems and definitions of the dimensions of information systems. We have investigated contemporary approaches and shown that an information system is more than just its technology.

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## 1.10 A reminder of your learning outcomes

After studying this chapter and the recommended reading you should be able to:

- describe different types of information systems and explain why they are so essential to businesses today
- compare and contrast information systems from a technical and business perspective and provide detailed examples of both
- describe and evaluate the dimensions of information systems and the importance in deploying such systems in a business context
- identify and describe complementary assets and contemporary approaches to information systems.

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## 1.11 Chapter questions

1. What is the difference between computer literacy and information literacy? Why is it important for businesses to understand this difference?
2. It could be said that there are three elements to an information system: hardware, software and people. Which of the three do you consider to be the most important and why?
3. How do complementary social, managerial and organisational assets help to optimise returns from information technology investments?

4. What changes in the business environment have been brought about by technology in the last five years? Use Table 1.1 on page 37 of Laudon and Laudon, and examples from your own personal experience to help you to answer.
5. It is becoming increasingly important to view information systems and technology from a sociotechnical aspect. Why do you think this is?



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## Chapter 2

# Using information systems

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### 2.1 Introduction

In this chapter, we will discuss and describe business processes and how they relate to the design and implementation of information systems. Some business processes support the major business functions of sales and marketing, manufacturing and production, finance and accounting, and human resources. Others provide supporting roles in terms of activities such as training, research and development and forecasting. We will look at the role of information systems in supporting the many and various types of business processes. This chapter will also describe the role played by information systems in serving the needs of management at various levels within a business. Finally the role of the information systems function in a business is explored.

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#### Essential reading

Laudon and Laudon, *Management Information Systems Managing the Digital Firm*, Chapter 2.

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#### Additional reading

Turban and Volonino Tutorial 1 from the student companion website for *Information Technology for Management*. This can be found at <http://bcs.wiley.com/he-bcs/Books?action=resource&bcsId=4953&itemId=0470400323&resourceId=17218&chapterId=48688>

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### 2.2 Learning outcomes

After studying this chapter and the recommended reading you should be able to:

- describe business processes in terms of functional areas and understand how information systems can be used to increase the efficiency of these processes
- outline the difference between looking at information systems from a functional or a constituency perspective
- describe, and give examples of, transaction processing systems, management information systems, decision support systems and executive support systems
- discuss why the information systems within a company should not be disjointed, and how enterprise applications can be used to prevent this

- discuss the four types of enterprise applications, namely enterprise systems, supply chain systems, customer support systems and knowledge management systems
- describe collaboration and communication systems and discuss how these enable companies to work effectively in a global environment
- explain what is meant by the terms *e-commerce*, *e-business* and *e-government* and give examples of each of these
- outline the different roles played by the employees in a typical IS department.

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## 2.3 Business processes

All businesses must deal with information from many sources including suppliers, customers, employees, manufacturers and the government. Businesses must also organise themselves in such a way that they use this information to operate efficiently and effectively. Information systems are used to manage information, make better decisions and improve the execution of a company's business processes. A business process may be understood to be the way in which work is organised, co-ordinated and focused to produce a product or a service. As such, business processes may be used to describe the flow of materials, information or knowledge. Business processes may also be understood to be the way in which management chooses to co-ordinate work. Every business can be seen as a collection of business processes. Some of these processes are part of larger encompassing processes.

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### Learning activity

Describe the set of business processes used in a restaurant from the moment a customer arrives until they leave the restaurant.

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The performance of a business process will ultimately depend upon how it is designed and co-ordinated. As such, a well designed business process can lead to a competitive advantage. On the other hand, a badly designed business process can lead to an organisation being inefficient and making losses.

Many business processes are defined and described in terms of a particular function or functional area. For example, the sales and marketing function might be responsible for dealing with, identifying and serving customers. The personnel functional area could have business processes relating to the paying of staff. Some business processes may cross multiple functional areas, for example processes relating to security or quality control. Table 2.1 on page 73 of Laudon and Laudon lists examples of functional business processes.

When we look at the classical function of the sales department receiving an order through to shipping the product to the customer, we can see that it is made up of several business processes which must all be co-ordinated and which span several areas. This is illustrated in figure 2.1.

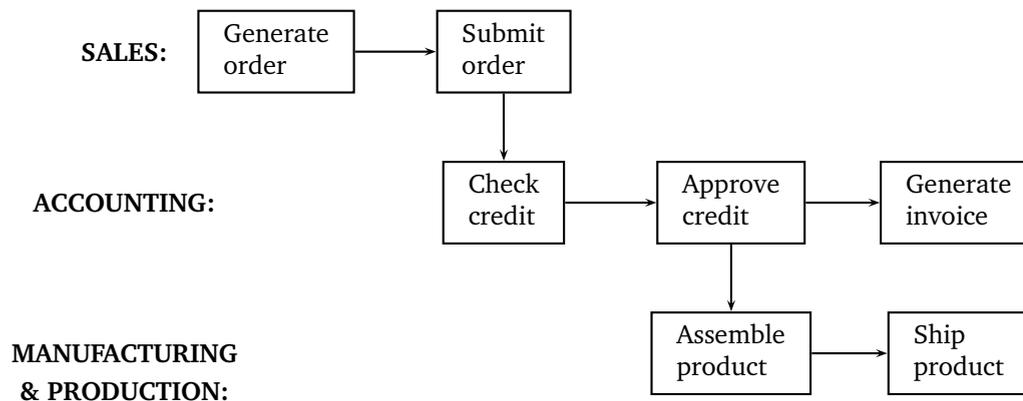


Figure 2.1: Fulfilling an order spans several business areas

### 2.3.1 Enhancing business processes using information technology

Information systems enhance business processes because they can not only be used to increase the efficiency of existing processes, but also to enable new processes that are capable of transforming the way in which an organisation conducts business. For example, through the use of information systems, orders can be input by customers from their own home, payment can be taken and suppliers can be informed about which products to build and where to ship them. This can all be done online via the Internet, thereby increasing the efficiency of the existing process of taking an order.

Through the use of information technology entirely new processes that are capable of transforming the business can be employed. Such processes may be used to change the flow of information within an organisation, replace sequential steps with parallel steps, and eliminate delays in decision making. Examples of entirely new business processes include:

- ordering books online and even downloading and reading them online
- paying for goods and services via the web
- downloading music from iTunes.

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## 2.4 Business information systems

Many types of information systems are used to support business processes in a firm. As a business may have tens or even hundreds of different business processes, they will require different types of software and support. Sometimes business information systems are particular to one area or group of people. At other times they may provide services to the whole organisation. One thing we are sure of, is that no single system can provide all of the information that an organisation needs.

Broadly speaking, business information systems can be viewed from a **functional perspective** whereby they are defined by their business function; or from a **constituency perspective** whereby the system is defined in terms of the organisational groups that it serves.

## **2.4.1 A functional perspective**

From a functional perspective we have systems for sales and marketing, systems for manufacturing and production, systems for finance and accounting, and systems for human resources. Each of these is now briefly described.

### **Sales and marketing**

The functional area responsible for selling an organisation's products or services is called the sales and marketing function. Marketing is the process of identifying new and existing customers for a firm's products and services, and determining what customers need or want. The marketing function also aims at planning and developing products and services to meet user needs. The sales function is primarily concerned with contacting customers, selling their products and services and taking orders. Sales is also responsible for following up initial sales with appropriate support and guidance. Each of these activities may be understood as separate business processes, each supported by sales and management information systems.

Senior management will use sales and marketing systems to help forecast and plan and to monitor the performance of competitors. Middle management will use such systems to support their market research and to analyse promotional campaigns and to make pricing decisions.

### **Manufacturing and production**

Production of a firm's goods and services is governed by the manufacturing and production function. This function is responsible for the planning, development and maintenance of production facilities. It is also responsible for identifying production goals, acquiring materials, scheduling equipment and labour required, and making the final product. Manufacturing and production information systems therefore cover areas such as machine control, production planning, and facilities location.

Senior management use manufacturing and production systems to address a firm's long-term manufacturing goals, and to make decisions about the locations of plants and the level and appropriateness of investing in new technologies. Manufacturing and production systems support middle management in analysing manufacturing costs. Such systems help operational management by providing them with information on day-to-day tasks.

### **Finance and accounting**

The finance function is primarily responsible for managing a firm's financial assets. They may also be in charge of managing the capitalisation of a firm. i.e. finding new assets in stocks, bonds or other forms of debt. The financial function is also responsible for maintaining the financial records of a company. These records will include invoices, receipts, payments, debts, stocks and payroll. They will keep a track of a firm's financial day-to-day assets and receipts.

Senior management will use finance and accounting systems to establish investment goals and long range forecasting. Middle management will use such systems to

oversee and control a firm's financial resources. Operational management will use accounting and finance systems to track the day-to-day flow of funds through the firm's transactions.

### **Human resources**

An important asset of a business is its workforce. The workforce provide the knowledge upon which a company's products and services are designed, produced and sold. The human resources function is responsible for managing the firm's workforce. Such systems support activities such as payroll, employee records, training and skills programmes.

Senior management use human resources systems to identify resource requirements and to focus on future needs. Middle management use human resources systems to monitor and analyse the current workforce in terms of recruitment, allocation and deployment. Operational management use human resources systems to track the recruitment and placement of employees.

## **2.4.2 A constituency perspective**

Although a functional perspective gives us a degree of understanding, it fails to tell us how systems help managers manage the firm. To understand this we need a constituency perspective. A constituency perspective allows us to examine information systems in terms of the various levels of management and the types of system they support. Different levels of managers need different types of information systems as they have different information needs. Broadly speaking, senior managers need summary information that can tell them about the overall performance of the firm. Middle management need specific information for decision-making. This information will generally detail the performance of different functional areas. Operational managers need transaction level information. This will tell them what has taken place on a daily basis, for example in terms of transactions made, sales completed or orders shipped.

From a constituency perspective we have systems for transaction processing, systems for management information, systems for decision support, and systems for executive support. Each of these is now briefly described.

### **Transaction processing systems**

The constituency of operational managers is required to keep track of every day activities and transactions within the organisation in which they work. Such transactions may include sales, deposits, payroll and flow of materials. Transaction processing systems record this kind of information.

In a supermarket, a till is a transaction processing system. In an airline, an airline reservation system is a transaction processing system. The principal purpose of such systems is to answer routine day-to-day questions and to track the flow of transactions. Transaction processing systems tend to deal with tasks that are highly structured and well defined.

Although managers need transaction systems to monitor the status of internal operations, they are also a major producer of information for other types of information systems. For example, an ordering system could supply data to a company's general ledger system. Transaction processing systems are so central to many businesses that their failure can lead to a firm's inability to conduct business within a few hours.

Figure 2.3 on page 77 of Laudon and Laudon shows how management information systems obtain their data from an organisations transaction processing system.

### **Management information systems**

The constituency of middle management requires systems to help them monitor, control and administer the activities of the firm. They try to answer this general question: "How well are things working?" The term 'management information system' designates a category of information systems that serves middle management. Such systems usually generate reports on the performance of all aspects of a business. Such information is used to monitor and control the business and to predict future performance. Management information systems therefore summarise and report on a company's basic operations using data supplied by transaction processing systems. They serve managers primarily interested in weekly, monthly and yearly reports.

**Decision support systems** are also used by middle management to support non-routine decision-making. Decision support systems focus on problems that are unique and rapidly changing. As such, procedures for arriving at these solutions may not be fully defined in advance. Therefore decision support systems must operate as "what if?" systems, whereby middle management can ask questions about the effects of changes in the way a business operates. Although decision support systems use internal information from transaction processing and management information systems, they may also use information from external sources such as competitor product pricing information. Decision support systems often use a variety of models to analyse data and to condense large amounts of information into a form in which it can be analysed by the decision-makers.

Figure 2.5 on page 79 of Laudon and Laudon is an example of a decision support system. The figure shows a decision support system for a company that conducts voyage estimating. Such a system would be used by managers who must develop bids on shipping contracts.

### **Executive support systems**

Senior managers need systems to address strategic issues and long-term trends. They want to know what will be happening both inside and outside the firm in the medium- to long-term future. Executive support systems aim to address questions such as:

- What will the employment market be like in the next five years?
- If production and demand within the market steadies within the next five years will our long-term profits be affected?
- What technological inventions are on the horizon that may impact on the products and services that we provide?

Executive support systems help senior management address these kinds of decision-making challenges. Senior management often deal with non-routine decisions requiring skill and judgement and based upon the evaluation of information generated both from within the business and from external sources. Executive support systems provide a generalised computing and communications environment that can incorporate data from external events and internal systems. Executive support systems filter, compress and track critical data, displaying the data which is of the greatest importance to senior managers.

### 2.4.3 The relationship between systems

Typically transaction processing systems provide content to management information systems and decision support systems. Both of these systems then provide information to executive support systems which are used by senior management. Sometimes management information systems provide information directly to decision support systems. In reality, in most business firms these systems are loosely integrated.

No business can afford to have disjointed information systems. All the functions of the business must work together to provide a coherent picture of the entire business. If data is not shared throughout the company this can have devastating effects – especially if different parts of the company have conflicting data which they do not share. To overcome this, **enterprise applications** have been developed, which span the entire enterprise of an organisation.

Enterprise applications focus on executing business processes across the business firm and include all levels of management. They help businesses become more flexible and productive by co-ordinating their business processes more closely and by integrating groups of processes together. There are four major types of enterprise applications:

- enterprise systems
- supply chain systems
- customer relationship management systems
- knowledge management systems.

Each of these enterprise applications integrates a related set of functions and business processes. See figure 2.7 on page 85 of Laudon and Laudon for an illustration of how enterprise applications span many business functions.

#### Enterprise systems

Enterprise systems are used to bridge the communication gap between the departments in a company. They do this by collecting data from the key departments such as sales and marketing, manufacturing and production, finance and accounting and human resources, and then storing this data centrally in a single software system. This enables the different departments to work more closely together. This is illustrated in figure 2.2.

An enterprise system automatically informs other departments of information that will have an impact on them. For example, suppose a customer places a large order

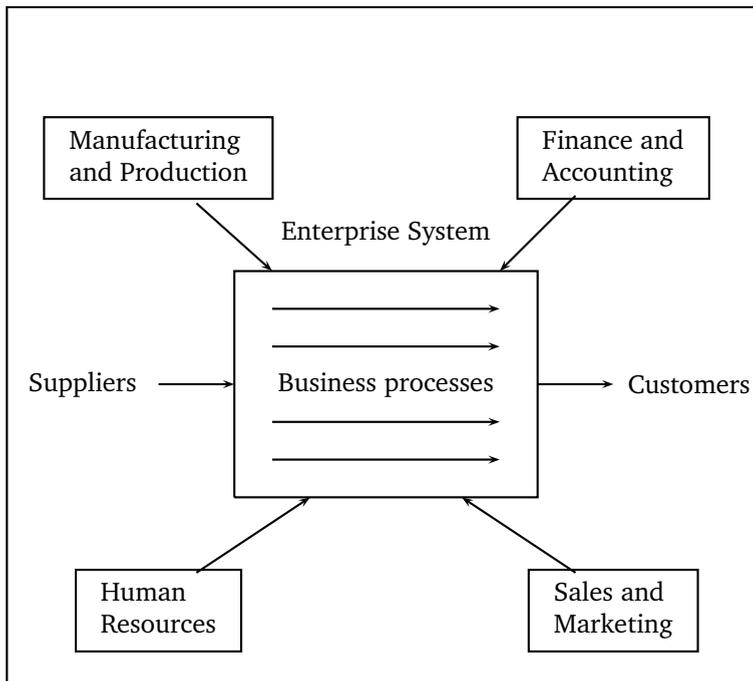


Figure 2.2: Enterprise systems

for 100,000 widgets. The information about this order will originate with the sales and marketing department. The manufacturing and production department will need to know about it so that they can arrange production and delivery. They will also need to contact suppliers to get all the necessary parts. Finance and accounting will also need to know about the order so that they can produce an invoice for the customer and also authorise payment for the parts. Human resources may be involved if the job requires overtime to complete on schedule, while finance and accounting will need to know about any overtime as well so that they can include it in the payroll. All the departments are involved, and an enterprise system makes sure that everyone gets the information they need in order to deliver the order to the customer.

### Supply chain systems

A **supply chain system** helps a company to manage its relationship with its suppliers. There is little point in having the best product at the best price if it is not possible to deliver it to the customer when required. Properly managing the supply chain means that products and services reach customers efficiently and effectively. Supply chain systems allow companies to share information with their suppliers and customers. Getting a product to a customer may involve suppliers, purchasing firms, distributors and logistic firms. Information is required about orders, production, inventory levels and delivery. The aim of the supply chain system is to ensure that the right amount of product is delivered from the source to the customer in the quickest and most cost effective manner.

Supply chain systems are a type of **interorganisational system** because they cross organisation boundaries. For example, the supplier, purchaser and logistics

companies are separate organisations, all of whom need to share data using the supply chain system. Interorganisational systems make it possible for companies to outsource their work to other companies when necessary.

Figure 2.9 on page 87 of Laudon and Laudon is an illustration of a supply chain system. It shows how a manufacturer of office furniture has integrated a Transportation Management System (TMS) with a Warehouse Management System (WMS) to optimise its supply chain management. The TMS produces the optimal lowest-cost delivery plans, based on analysis of customer orders, factory schedules, carrier rates and availability and shipping costs. The WMS controls the flow of finished goods from the distribution centres to the customers, acting on shipping plans from the TMS, together with on immediate conditions for space, equipment, inventory and personnel.

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### Learning activity

Describe a scenario, either real or imagined, whereby lack of communication between company departments has a devastating effect on the business of the company. Could an enterprise system have prevented this scenario from occurring?

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### Customer relationship management systems

Customer relationship management systems enable companies to maintain good relationships with their customers. A customer relationship management system should provide end-to-end customer care from the moment the customer places an order until the product is delivered. It will involve business processes in all the functional areas and every management level in the company. For example, a customer relationship management system should ensure that the sales and marketing department do not make promises to the customer that the manufacturing department cannot keep. Thus all the departments are working together to offer the best customer service possible, making customer satisfaction, and therefore customer retention, a reality.

Unprofitable customers can be identified more easily by a customer relationship management system, which means that the company can concentrate its efforts on more profitable customers. Customer relationship management systems also pull together information from customers gained from different sources, telephone, email, shops and web pages for example. Having detailed information about customers and their preferences means that the company can be more effective in its marketing campaigns.

### Knowledge management systems

Knowledge management systems enable companies to enhance their management of the capture and application of knowledge and expertise. They promote the creation of knowledge and its integration into the company.

Knowledge workers might be research scientists or engineers who discover a new method of production or packaging, or lawyers who can answer questions regarding product names, copyright and patenting.

Knowledge management systems include enterprise wide systems for managing the distribution of documents, graphics and other digital media from employees with specialist knowledge to others within the company. They may also create directories of employees' special areas of expertise so that it is easy to find out who in the company should be approached with a particular query or question.

### **Intranets and extranets**

In order to be effective, Enterprise systems require the co-operation of every department in the company. Each department may have to change the way it works and uses information. This can be costly to implement – both from a financial and time perspective. Not all companies have the resources to invest in enterprise systems, but they can achieve some measure of information integration by using intranets and extranets.

Intranets use standard Internet technology to create an internal network which can be used for the distribution of information to employees, and to make corporate policies, programs and data available to employees. An intranet may also include an email system, collaboration tools and tools for searching company documents and systems. An extranet is an intranet that is (perhaps only partially) available to outsiders such as customers. For example, a customer who has ordered a product from a company may be able to use the company extranet to track the status of their order.

Intranets and extranets provide a low cost, low maintenance platform that companies can use to distribute information amongst their employees and customers. They enable employees to work with each other, and external users to access company information.

### **2.4.4 Collaboration and communication systems**

It is not uncommon for a company to have employees working in different countries and different time zones. More and more companies now work round the clock, around the world. Somehow the people working in all the different locations need to be able to communicate and share information easily with each other.

Many new systems have been developed which enable employees to interact with each other, managers, vendors and customers. These have become essential in enabling the creation of the enterprise systems that global companies rely on to do business. These systems include:

- Internet based collaboration environments: these tools allow for work-group collaboration. Even if the people in the work-group are in different locations worldwide, groupware such as Lotus Notes, Groove and WebEx enable them to work together and share information effectively.
- Email and instant messaging: billions of emails are sent every day between employees, managers, customers and suppliers. It is nowadays hard to imagine business without email.
- Cell phones and smart-phones: these allow for instant communications at any time to (almost) any place.

- Social networking sites: these typically help people to share their interests and interact with each other. However they provide more than just a way for people to socialise electronically – social networking sites also give companies another way to share ideas, collaborate with each other, and communicate with their users.
- Wikis: the most well known wiki is of course Wikipedia – a huge collection of references, it has become the world’s most successful online encyclopedia. Wikis are ideal tools for storing and sharing company knowledge.
- Virtual worlds: in a virtual world real people are represented by avatars<sup>1</sup> who can meet, interact and exchange ideas. These are becoming more popular as a way for people to meet and interact.

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### Learning activity

For each of the collaboration and communication tools listed above, think of an example of when you have used this tool to conduct a business transaction. If you have not personally used all of these tools, then imagine a situation where you could use the tool to conduct a business transaction.

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## 2.4.5 E-business, e-commerce, e-government

We have just described a range of different systems and technologies that are frequently used by businesses these days, and which are transforming the ways in which companies operate. The term **e-business** or electronic-business simply means using digital technology and the Internet to execute business processes.

**e-commerce** or electronic-commerce is the part of the e-business that deals with the buying and selling of products or services over the Internet. Included under the e-commerce umbrella are those business processes which enable the buying and selling of goods or services over the Internet, such as advertising, marketing, customer support, payment and delivery.

Governments have also been able to make use of the new technologies associated with e-business and this has produced a change in the way that government departments operate. The Internet can be used to deliver information and services to the public, employees and business with whom the government departments operate. For example, in the UK it is now possible, amongst other things, to renew your car tax or complete your tax return online. People are encouraged to use the Internet to perform these tasks wherever possible. The term **e-government** or electronic-government refers to the use of technology and the Internet to enable government and other public sector departments to communicate with each other and the public to deliver services and information.

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### Learning activity

What are the advantages of e-government? Do you think there are any disadvantages? If so describe what these are.

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<sup>1</sup>graphical representations of themselves.

## 2.5 Functions of information systems in business

We have just said that all kinds of technologies are necessary nowadays for a company to operate. Someone has to run all of this technology. People often mourn the jobs that have been lost because new technology has taken the place of old jobs. However, technology has also created a new field of jobs. The IS department, previously a small group of people, has now become a mainstream department, responsible for the hardware, software, data storage and networks of the company.

### 2.5.1 The IS department

The IS department typically consists of the following people:

- **Programmers** – highly trained technical specialists who write the software for the company. They must understand both the technical side of computing, and the business processes within the company, so that they can adapt the technology to best meet the needs of the company.
- **Systems analysts** – perform the role of liaising between the IS department (the ‘techies’) and the rest of the company (the ‘non-techies’). Systems analysts have to translate the business problems and requirements into information requirements and systems.
- **Information systems managers** – lead the team of programmers and systems analysts. This role has grown in importance as the reliance on, and the recognition of the importance of, technology in the company has grown. Depending on the size of the company, there may be a **chief information officer**, a position on a par with chief financial officer. The chief information officer is expected to handle the whole range of problems and opportunities that the company faces in light of the technology available. It is the job of the Chief Information officer to integrate technology into the business processes of the company.

If the company is large enough, it may also have a separate:

- **Chief security officer** – responsible for implementing the company’s information security systems and enforcing their information security policies.
- **Chief privacy officer** – responsible for ensuring that the company meets the data protection laws.
- **Chief knowledge officer** – responsible for the knowledge management program of the company. This position is increasing in importance as companies rely more heavily on capturing and managing employee knowledge.

Although not strictly in the IS department, it is important not to forget the role of the **end user**. The responsibility for the successful integration of technology into the company has extended beyond the techies and has become part of everybody’s job. Very few people are isolated from the effects of computers and technology these days.

## 2.5.2 How the IS functions are organised

There are many ways in which the IS functions of a company are organised. This will depend on the size and the interests of the company. A very small organisation will not have a formal IS department – but someone should be responsible for managing the company computers. There might not be anyone who is able to develop or install software – in which case consultants may be employed to do this when necessary.

On the other hand, a large company will have an IS department, but this can be arranged in a number of ways. For example, there might be one IS department responsible for the management of all the technology used throughout the company; or each department (manufacturing and production, finance and accounting and so on) may have their own IS people; or if the company has several different divisions and product lines, then each division may have their own IS people. This is illustrated in figure 2.10, p.95, Laudon and Laudon.

### Governance of information technology

Every company must develop a strategy and policies for how they are going to use information technology. Management want to ensure that the company's use of technology supports and enhances the overall strategies and objectives of the company. **IT governance** policies determine who makes what decisions about how information technology should be used in the company. Governance also provides a framework for accountability – monitoring the use of IT and the returns on the IT investment, thereby ensuring that the right decisions have been taken (or enabling action to be taken if not).

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## 2.6 Summary

In this chapter, we have seen that business processes help a company to better organise, co-ordinate and focus its employees and operations to produce products or services. The success or failure of the business may depend on how well the business processes are designed and planned. We have described many types of information systems, including transaction processing systems, management information systems, decision support systems and executive support systems. We have also discussed enterprise applications such as enterprise systems, supply chain management systems, customer relationship management systems and knowledge management systems, which span the entire enterprise. We have seen how information systems allow companies to communicate and collaborate, and how they have enabled government information and services to be delivered online. Finally, we have described the different roles in a typical information systems department, and seen how these roles can be organised within the company.

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## 2.7 A reminder of your learning outcomes

After studying this chapter and the recommended reading you should be able to:

- describe business processes in terms of functional areas and understand how information systems can be used to increase the efficiency of these processes

- outline the difference between looking at information systems from a functional or a constituency perspective
  - describe, and give examples of, transaction processing systems, management information systems, decision support systems and executive support systems
  - discuss why the information systems within a company should not be disjointed, and how enterprise applications can be used to prevent this
  - discuss the four types of enterprise applications, namely enterprise systems, supply chain systems, customer support systems and knowledge management systems
  - describe collaboration and communication systems and discuss how these enable companies to work effectively in a global environment
  - explain what is meant by the terms *e-commerce*, *e-business* and *e-government* and give examples of each of these
  - outline the different roles played by the employees in a typical IS department.
- 

## 2.8 Chapter questions

1. Describe how a transaction processing system can help a company's management information system and decision support system.
2. There are four major types of information systems: transaction processing systems, management information systems, decision support systems and executive support systems. Which of these do you think is most valuable to a company and why?
3. Explain the benefits a company might gain if they incorporated an enterprise system. Why might a company not want to incorporate an enterprise system despite the benefits?
4. How can a customer relationship management system be used to improve the data and information of an e-business?
5. What are the values of wikis to business? Describe how a company that you know about could use a wiki.

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## Chapter 3

# Organisations and information systems

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### 3.1 Introduction

In this chapter, we will define an organisation and consider how the structure, environment, culture and politics of the organisation affects the way it operates. We will consider the impact that information systems, in particular the Internet, have had on organisations. We will describe Porter's five forces of competition model and business value chains models and see how these models can be used by companies to analyse their competition and business processes and use this information to keep ahead of their rivals.

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#### Essential reading

Laudon and Laudon, *Management Information Systems Managing the Digital Firm*, Chapter 3.

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#### Additional reading

Turban and Volonino Tutorial 2 from the student companion website for *Information Technology for Management*. This can be found at <http://bcs.wiley.com/he-bcs/Books?action=resource&bcsId=4953&itemId=0470400323&resourceId=17218&chapterId=48688>. See also <http://www.businessballs.com/portersfiveforcesofcompetition.htm> for a description of Porter's five forces of competition model.

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### 3.2 Learning outcomes

After studying this chapter and the recommended reading you should be able to:

- define an organisation and give examples of different organisations and the resources that they use and outputs they provide
- understand that the structure, culture and politics of the organisation, and the environment in which it operates has a great effect on the organisation
- describe different types of organisational structures and give examples of these
- describe the impacts, both positive and negative, that information systems have on organisations
- describe Porter's five forces of competition model and outline the importance of each of these five forces when determining the competitive advantage of a company

- split a company's activities into primary and secondary activities and draw a business value chain model.

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### 3.3 Information systems in the organisation

Which comes first, the organisation or the information system? In this chapter we will discover that this is a difficult question to answer, because both are equally important and dependent on each other.

#### 3.3.1 Defining an organisation

An organisation can be defined as a group of people that uses resources and processes them in some way to produce an output. In some cases, such as a widget factory, the output produced (widgets) is tangible and obvious. In other cases the output may be a service or even may be intangible, for example, a church is an organisation, but it is hard to define its output.

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#### Learning activity

- Think of five different organisations, and for each one describe the resources it uses and the outputs.
- Think of two groups of people that are not organisations, and describe why they are not organisations.

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In Chapter 1, we defined an information system (see section 1.4). An organisation is very similar to this. Compare the figure on page 8 with figure 3.1 below which shows an organisation.

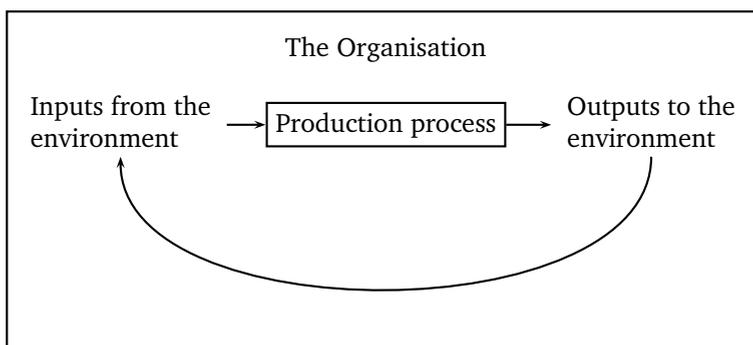


Figure 3.1: The inputs and outputs of an organisation making a complete circle

As you can see, the two figures have much in common. Information systems and organisations both require an input, have some sort of processing, have an output, and feedback is required for a successful completion of the loop. Both are a structured method of turning inputs (data/people) into outputs (information/producers).

### 3.3.2 Features of organisations

An organisation will have rules and a hierarchical structure. Within the organisation, different roles and responsibilities will be assigned to different individuals.

A **bureaucracy** is an organisation with clear cut division of labour and a hierarchy of specialists, with everyone being accountable to someone. The aim of the organisation is generally to achieve the greatest efficiency possible – producing the maximum outputs given the least inputs. Successful organisations typically become more efficient over time because individuals in the organisation develop **standard operating procedures** which enable them to deal efficiently and effectively with situations both expected and unexpected. A set of standard operating procedures, also called **routines** make a **business process** as discussed in section 2.3.

#### Organisational culture and politics

Consider the following questions:

- Is there a dress code in the organisation?
- Are there written rules surrounding the conduct of the individuals who are part of it?
- Is the organisation formal or informal?
- What benefits are available to individuals who are part of the organisation?
- Do the hierarchy believe in a certain way of doing things?
- Are there clearly defined aims for the organisation?

How these questions are answered by an organisation will help to shape its **culture** (what it feels like to be a part of the organisation) and **politics** (the way the organisation is run).

#### Organisational environments

Organisations differ because their goals differ, and because they operate in different environments. The answers to the following questions help to define the *environment* that the organisation is operating in:

- Does the organisation have many or few customers?
- Does the organisation function independently on its own, or is it part of a chain of other organisations?
- Does the organisation need a constant stream of new customers to provide inputs to its activities, or has it built up long-term relationships with existing customers?

#### Organisational structure

Practically every group of people is an organisation, but the structure of organisations varies greatly depending on the type of organisation, its environment, culture, policies and goals. Examples of different structures include:

- **Entrepreneurial** – a small start-up business is an example of an organisation with an entrepreneurial structure. Such organisations operate in a fast-changing environment and have a simple structure with a single chief executive officer managing the business.
- **Machine bureaucracy** – a medium-sized manufacturing firm is an example of an organisation with a machine bureaucracy. Standard products are produced in a slow-changing environment. Such organisations are dominated by a centralised management team.
- **Divisionalised bureaucracy** – a group or chain of organisations, each with their own machine bureaucracy, becomes a divisionalised bureaucracy. Each organisation in the group may produce its own product or provide a different service, but they are managed by a central headquarters which oversees the organisation as a whole.
- **Professional bureaucracy** – schools and hospitals are examples of professional bureaucracy where the outputs depend on the knowledge and expertise of professionals. Such knowledge-based organisations are typically dominated by department heads and have a weak centralised authority.
- **Adhocracy** – *ad hoc* means ‘put together for a purpose’ and some organisations, such as an emergency response team created in reaction to a sudden major disaster, are put together quickly for a short term purpose. Such organisations respond to a rapidly changing environment and typically consist of a large group of specialists who are organised into self-managing teams for short term projects and then regrouped as necessary. There is weak central management.

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#### Learning activity

- What are the differences between a fast food restaurant and a family firm of piano makers. What are the similarities?
- For each of the organisational structures described above, can you think of a specific example of an organisation of that type, that you have had some involvement with – perhaps as an employee, member or customer of the organisation?

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Organisations, like information systems, have a purpose, a structure and particular requirements. Therefore organisations and information systems influence each other. Information systems can enhance the characteristics of the organisation, on the other hand, the characteristics of the organisation should not be dictated by the use of information systems.

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### 3.4 The impact of information systems on organisations and businesses

Information systems have had a huge impact on the way that businesses operate. When computers were first introduced, employees had limited access to the data stored within them. As technology has developed, data storage has become more prevalent within organisations. With networked PCs, employees can now access information and information systems with an ease that was just not possible ten years ago.

### 3.4.1 Economic impact

We will consider the economic impact of information systems through an example. Suppose that a large organisation, with offices spread across the country, has to communicate a new policy to all employees. The organisation could communicate the new policy in several different ways. For example, it could:

- organise face to face meetings with its employees
- circulate an email to all of its employees
- post a letter to all of its employees
- put a message on the organisation's Intranet web page.

There are obviously large differences in the costs involved in these different communication approaches. Which of these approaches is most appropriate will depend on the circumstances. For example, if the organisation is making changes to salary, overtime or holiday rights, then this information should (at the least) be sent, in hard copy, to all employees affected. However, if the new policy is that office parties for Christmas are not to be held this year due to the recession then a message on the Intranet might suffice.

By using appropriate materials and information systems, an organisation can save not only materials and resources but also staff time. Not only can administrative duties be made easier and less time consuming by the introduction of new information systems, but efficiencies can also be gained in the way that organisations are managed.

### 3.4.2 How the Internet can bring about organisational change

The Internet has obviously had a big impact on the way that people communicate with each other. Sending e-mails is faster and cheaper than using traditional post. Businesses can use e-mails to communicate with their employees, customers and suppliers more efficiently.

The Internet also allows information to be stored and distributed much more easily. For example you may be reading this subject guide online. This means that wherever you are in the world, if you have access to the Internet, then you have access to your learning materials.

Organisations can use the Internet to promote their products and encourage online transactions. Even government organisations such as the tax office and DVLA (Driver and Vehicle Licensing Agency) are using the Internet to communicate with people, gather information and process transactions.

Orders can be processed almost instantaneously on the Internet because customers can see straight away whether or not the product that they want is in stock, arrange a delivery date and so on without having to go through a middleman.

To make full use of all the opportunities that the Internet has brought about, organisations are having to quickly redesign some of their key business processes to incorporate Internet technology. The result of such redesign is typically simpler business processes, flatter management structures and fewer employees.

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### Learning activity

Describe how the Internet has changed the way that University of London communicates with, and delivers materials to, its International students. Are these changes all positive, or are there any downsides to utilising Internet technology?

---

In order to deliver genuine benefits for an organisation, information systems must be designed and built with a proper understanding of that organisation. When planning a new information system, the following factors must be taken into account:

- the environment in which the organisation operates
- the structure of the organisation
- the culture and politics of the organisation
- the style of management
- the people affected by the organisation – its employees and other interested parties
- the goal of the information system – what is the task, decision, business process etc. that this information system is supposed to assist with?

### 3.4.3 (Possible) unwelcome impacts of information systems

In commercial organisations, management was often traditionally about communicating information from one section of the organisation to another. With networked information systems, the need to communicate information across an organisation is reduced, as more and more employees have access to the same level of information on their PCs. The need for meetings is reduced, and the need for management is reduced too. As a result of changes in information systems, commercial organisations often have a flatter hierarchical structure as illustrated in figure 3.2.

The number of levels in an organisation can be reduced because information systems give managers the ability to supervise a larger group of people than was previously possible. Information systems also give lower-level employees more information and therefore decision making ability.

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### Learning activity

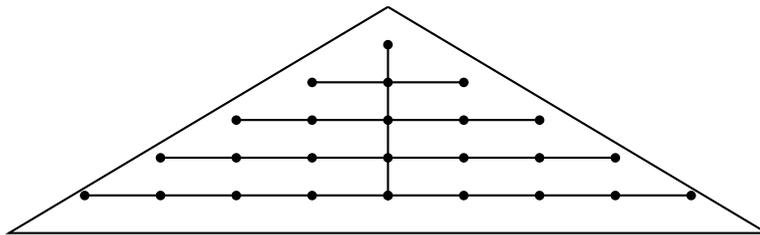
Can you think of an example where the flattening of management as described above would be welcomed? Where would it not be so welcome?

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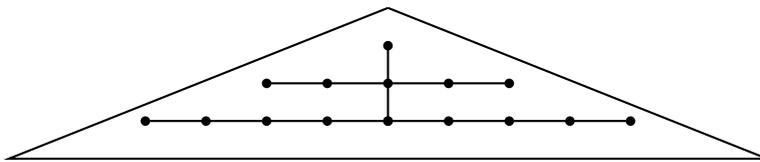
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## 3.5 How information systems can help an organisation

Why do some companies perform better than others? In almost every industry, there will be some companies that are considered to be the star performers. For example, Amazon is the name that springs to mind when thinking about online retailers,



There are many layers in a traditional management structure



The introduction of technology can result in the flattening of the management structure

Figure 3.2: Increased use of technology typically flattens the structure of the management hierarchy in an organisation

Apple's iTunes when thinking about downloadable music, and so on. Companies that perform well in their industry are said to have a **competitive advantage**.<sup>1</sup> Perhaps they have access to resources that their competitors do not, or they are able to use resources more efficiently than their competitors. Whatever the reason, the company with the competitive advantage will do better in terms of revenue growth, profitability and efficiency, ultimately leading to increased share price for the company.

Being able to analyse an organisation to understand why it has a competitive advantage, (or why it doesn't) and developing a strategy to increase the competitive advantage of your own organisation, is key to keeping ahead of the game. One way to understand competitive advantage is to use Michael Porter's competitive forces model.

### 3.5.1 Porter's five forces of competition

Porter's model, shown in figure 3.3 shows the strategic position of the organisation in relation to five other forces including not only the traditional competitors, but also new suppliers, substitute products, suppliers, and customers.

Porter's model indicates the importance of keeping up to date with product information in a competitive business environment. The information needed comes from a number of sources.

<sup>1</sup> Although this may not be the sole goal of a company, we will assume that 'helping an organisation' means 'increasing the competitive advantage of an organisation'.

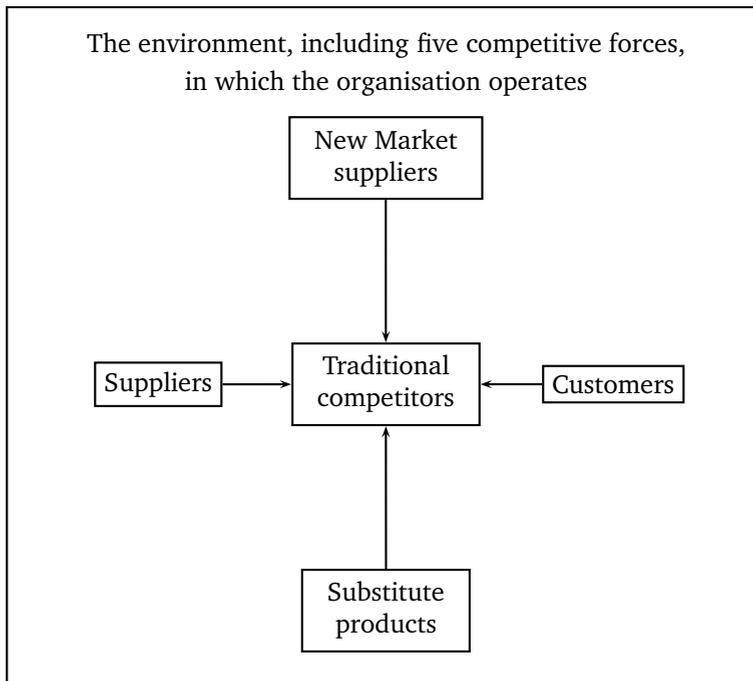


Figure 3.3: Porter's five forces of competition model

- **Traditional competitors** – Historically, how has your organisation managed to stay ahead of its competitors? For example, you will need to know:
  - the number and size of firms in the same market
  - the size of the industry and trends within it
  - fixed versus variable cost bases
  - the range of products/services currently offered
  - the strategies of your competitors and differences between them.
- **New market suppliers** – Who will your organisation be competing with next? For example, you will need to know:
  - how easy or hard it is for a new supplier to enter the market
  - whether geographical factors will give you (or a new supplier) an advantage
  - whether a new supplier might have a new strategy which gives them a competitive advantage
  - whether a new supplier might find a new route to market.
- **Substitute products** – Are new products being developed that could be seen as a replacement for your product? For example, you have to take into account:
  - alternative products that vary in price and quality
  - changes in market distribution
  - fashion and trends
  - the effects of legislation.
- **Suppliers** – How many have you got and what do you know of their intentions? In relation to your suppliers you will need to consider:
  - the brand reputation

- the geographical coverage of your suppliers
  - the quality of the product/service provided
  - the relationship between the suppliers and your customers
  - the efficiency of your relationship with the suppliers.
- **Customers** – As with suppliers, are you confident that they will remain your customers? How do you value their loyalty? In relation to your customers you will need to consider:
- the choices that they are making
  - how many customers you have
  - how much and how often they spend
  - how important your product/service is to them.

### 3.5.2 How information systems can improve competitive advantage

Properly designed and used, information systems can improve the competitive advantage for an organisation in many ways.

- **Leadership** – the organisation can save money through the introduction of information systems and new technologies can restore the competitive advantage over competitors.
- **Products** – Internet technology enables the customer to have a greater choice in specifying the product required. Cutting out the middleman reduces costs and these savings can be passed on to the customer.
- **Markets** – customised websites can be developed which ensure that the particular needs of a target audience are catered for.
- **Customer relations** – improving the communication and developing a good relationship with your customers (and suppliers) increases customer loyalty.

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#### Learning activity

Think of an organisation that has developed its information systems in recent years and describe how information systems have improved the organisation in terms of its management, products, markets and customers as described above.

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#### How the Internet can improve competitive advantage

Porter identifies five forces which have an effect on the competitive advantage of an organisation. The Internet has made an impact in each of these five areas as described in table 3.1.

Competitive Force	Impact of the Internet
Traditional Competitors	Increases the number of competitors as traditional geographic boundaries become less important; increases pressure to compete on price; reduces the differences between competitors.
New market suppliers	Increases the ease with which new players can enter the market.
Substitute products	Enables easy comparison of products and easy marketing and placement of new products.
Suppliers	Competition between suppliers is increased which lowers prices; suppliers can use the Internet to cut out the middleman and supply the customer directly.
Customers	Ease of comparing products and prices gives customers greater bargaining power.

Table 3.1: How the Internet impacts on the forces of competition

### 3.5.3 The business value chain model

Porter's model helps us to identify competitive forces, but it does not tell us what to do in order to gain a competitive advantage. This is where a business value chain model is used. A value chain model strips down the organisation's activities, and divides them into **primary activities** and **support activities**.

Primary activities are those which are directly related to the production and distribution of the organisation's product or service. They include:

- inbound logistics – getting the materials necessary to make the product
- operations – making the product
- sales and marketing – selling the product
- service – maintaining/repairing the product
- outbound logistics – delivering the product to the customers.

Secondary activities enable the delivery of the primary activities. They include:

- administration and management
- human resources
- technology
- procurement.

Figure 3.11 on page 131 of Laudon and Laudon gives an illustration of a value chain model. For each stage of the value chain, the organisation can ask itself 'How can value be added at this stage of the value chain?' **Benchmarking** is a way of an organisation judging itself against its competitors. **Best practice** can be identified by analysing the value chain of an organisation that is successfully and consistently achieving its objectives.

By continually improving its value business chain, the organisation can gain (or keep) a competitive advantage.

### Extending the value chain

You can see in figure 3.11 on page 131 of Laudon and Laudon that the value chain of an organisation is linked to the value chains of its suppliers, distributors and customers. This is important because the performance of nearly all organisations depends not only on the organisation itself but also the other organisations that it relies upon. The Internet can be used to promote good relations with customers and suppliers, thereby enhancing the competitive advantage.

### 3.5.4 Keeping ahead

Using Information systems to keep ahead of your competitors is not always that easy. If you have a good strategic system in place, it is likely that your competitors can copy it thereby reducing your competitive advantage. Managers must be continually reviewing and adapting the way their company uses technology, in order to keep up with the fast pace of changes in what it is possible to do with technology. For some employees, as soon as they have got used to a new information system or business process, it is changed again. It is a hard job for managers to keep ahead and keep everyone happy.

It is very important that companies align IT initiatives with their business objectives. Failures in this process are often attributable to people not understanding information technology that well and trying to ignore it for as long as possible. Managers need to be clear that they have fully understood the structure of the industry that their company is operating in, analysed the business value chain for their company, and aligned IT in the company with the business strategies and goals of the company. Managers also need to remember that there is more to information systems than technology – at the heart of every organisation are people and without their co-operation and understanding information systems are just computers.

---

## 3.6 Summary

In this chapter we have seen that organisations and information systems influence each other. Every organisation shares some common characteristics that an information system can enhance. On the other hand, every organisation has unique characteristics that must be taken into account when incorporating technology. It is up to the organisation to determine how the technology is to be incorporated, the information system should not be allowed to dictate the structure of the organisation.

We have discussed the impact that information systems and the Internet can have on organisations – both positive and for some people negative. Technology can reduce costs and increase the amount of information people have access to. However, the changes brought about by the introduction of new technology and business processes must be carefully managed. A successful manager must always keep in mind the effect the changes will have on the people of the organisation. Companies need to tailor their information systems to meet the needs of the organisation instead of letting advances in technology drive the organisation.

Using information systems can help a company differentiate itself from its competitors and gain a competitive advantage by providing services that are

valuable to both customers and suppliers. Companies can also use information systems to reduce costs. Information technology is challenging the traditional concepts of competition and partnerships that have existed for many years.

A well-developed strategic information system that is integrated throughout the company and aligned with the company's business strategies and goals can be used to lower overall costs and provide greater value to the company, the supplier and the customer.

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### 3.7 A reminder of your learning outcomes

After studying this chapter and the recommended reading you should be able to:

- define an organisation and give examples of different organisations and the resources that they use and outputs they provide
- understand that the structure, culture and politics of the organisation, and the environment in which it operates has a great effect on the organisation
- describe different types of organisational structures and give examples of these
- describe the impacts, both positive and negative, that information systems have on organisations
- describe Porter's five forces of competition model and outline the importance of each of these five forces when determining the competitive advantage of a company
- split a company's activities into primary and secondary activities and draw a business value chain model.

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### 3.8 Chapter questions

1. Think about an organisation that you belong to. Describe how decisions are made in this organisation.
2. Find examples of two competing organisations that have different structures, culture and politics. How does each maintain a competitive advantage – or is one company doing far better than the other? If so, why?
3. Describe Porter's five forces of competition model. Give an outline of the information that an organisation needs in order to keep its products up to date and competitive.
4. Describe how information systems can improve competitive advantage. Illustrate your answer with an example of company, within a traditional industry such as agriculture, that has used technology to its advantage by changing or supplementing its existing traditional business processes.
5. Draw a value chain model (see figure 3.11 on page 131 of Laudon and Laudon) for a company that you are familiar with, identifying the primary and support activities.

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## Appendix B

# Solutions

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### B.1 Solutions to Chapter 1 Questions

1. Computer literacy focuses on how hardware and software works. Information literacy is more concerned with creating information that is useful to an organisation and its employees. As the use of technology spreads beyond traditional computers into every corner of our lives, being information literate will enable employees to help their organisation gain a competitive edge over their rival companies.
2. In an information system, hardware generally enables the input and output functions, software enables the processing function. People enable the feedback component and ensure effective use of the information system. Opinions will vary as to which element is most important – the three elements have to work together. It is important to remember, however, that without the feedback component the information system does not accomplish much. Hardware and software alone make for computer literacy not information literacy.
3. Simply investing in new information technology such as hardware or software does not ensure an organisation's success. In order for a company to maximise its advantage from its investment, it must use complementary social, managerial and organisational assets to support its employees to accomplish the desired technological changes and improvements.
4. Answers will vary depending on personal experience, but should make reference to a growing dependence on Internet technologies in the workplace, increased globalisation of businesses, round the clock availability of many business processes to the customer, and the rise of the information economy.
5. The technical approach to information systems addresses the *hard* side of technology. The behavioural approach to information systems addresses the *soft* side of technology. As the importance of technology to businesses increases it is essential to unite both the soft and hard sides. Using a sociotechnical approach helps to avoid a purely technological approach to information systems. Organisations can achieve more efficient and effective performance by optimising both their social and their technical systems.

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### B.2 Solutions to Chapter 2 Questions

1. A transaction processing system gathers data about the day-to-day operations of the organisation from all functional areas. This data can be fed into the other systems to help the business meet its objectives. It can also help prevent islands of information forming within the organisation.
2. Answers will vary as everyone has their own opinion. However your answer should include the reason(s) why you think that the information system that you have chosen is the most important with examples where possible.

3. Benefits of an enterprise system include a consolidated view of the organisation, unified platforms, more efficient and customer-driven business processes. This leads to huge cost savings in the long run and increased efficiencies in business processes which give the company an advantage over its competitors. However, a company may choose not to implement an enterprise system despite the benefits because of the high costs, difficult implementation, inflexibility and difficulty in pinpointing future benefits that the system will bring.
4. Answers should describe how a good customer relationship management system provides end-to-end customer care from receipt of order through to delivery of product or service. CRM systems can help the company to keep good customers and weed out bad non-profitable customers. An example should be given of a particular e-business that you know about and how CRM systems work for them.
5. Wikis are specially created websites that allow users to contribute and edit text and graphic content about a wide range of topics. The best known example of a wiki is Wikipedia. Wikis are generally less expensive than formal knowledge management systems and may be more dynamic and up-to-date. As companies have an increased need to share and store their employees' knowledge, wikis are growing in popularity. Some of the benefits of using wikis include:
  - ease-of-use
  - a consolidated location for knowledge and information
  - the ability to capture employee experience and expertise
  - they are less costly than a traditional KM system
  - the company can choose to share (some of the) content with external users.

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### B.3 Solutions to Chapter 3 Questions

1. Answers will vary but should include references to the operating procedures, culture and politics of the organisation that you are discussing.
2. Perhaps two schools, one with a very relaxed culture and another with a very strict culture, would be a good example to use here – although there are many other examples. In the case of schools, even though they may have very different structures, cultures and politics, they are both aiming towards the same goal (provide a good education and not go bankrupt say) and they may both be able to achieve this because they are catering for different types of children. In other examples, one type of structure may prove to be far more successful than others.
3. See section 3.5.1 on Porter's five forces of competition as well as the recommended reading  
<http://www.businessballs.com/portersfiveforcesofcompetition.htm>.
4. Answers will vary but should include the material given in section 3.5.2 as well as an example of a company that is using technology to its own advantage from your own research or experience.
5. Think about a company that you are familiar with, and split up its activities into primary (core) activities, and support activities (ones which enable the core activities to be implemented). Fill these in on the value chain model in the appropriate places.



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**Computing and related programmes**

**Goldsmiths**  
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This guide was prepared for the University of London International Programmes by:

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