Module 8: E-commerce, transaction processing, and enterprise resource planning

Overview

This module looks at electronic commerce (e-commerce) as a rapidly expanding use of the Internet, with emphasis on e-commerce between businesses, and describes the methods of electronic payment. Module 8 explains the e-commerce model, technology infrastructure, strategies, applications, electronic payment systems, and threats to successful e-commerce.

Transaction processing is the core of business operations; this module therefore also covers transaction processing systems, including accounting applications.

Test your knowledge

Begin your work on this module with a set of test-your-knowledge questions designed to help you gauge the depth of study required.

Topic outline and learning objectives

8.1 Introduction to e-commerce
   - Identify the advantages of e-commerce, and outline a multistage model of e-commerce. (Level 1)

8.2 Mobile commerce
   - Describe mobile commerce and the technology required to support it. (Level 1)

8.3 E-commerce applications
   - Identify several e-commerce applications. (Level 2)

8.4 Threats to e-commerce
   - Identify the major issues that pose significant threats to the continued growth of e-commerce. (Level 1)

8.5 Strategies for successful e-commerce
   - Outline the key components of a successful e-commerce strategy. (Level 2)

8.6 Technology infrastructure
   - Outline the key components of the technology infrastructure required for successful e-commerce. (Level 1)

8.7 Electronic payment systems
   - Describe key features of the electronic payment systems needed to support e-commerce. (Level 2)

8.8 Transaction processing systems
   - Identify the basic activities and business objectives common to all transaction processing systems. (Level 1)

8.9 Enterprise resource planning
   - Define enterprise resource planning, and describe the advantages and disadvantages of ERP. (Level 1)

Module summary

Print this module
Module 8: Test your knowledge

1. Which of the following is the biggest class of e-commerce by dollar volume of business?

   1. Business-to-business (B2B)
   2. Consumer-to-consumer (C2C)
   3. Business-to-consumer (B2C)
   4. E-government

2. What is a major advantage of implementing an ERP system?

   1. Low cost to implement the system
   2. Ease of integration with other systems
   3. Elimination of costly, inflexible legacy systems
   4. Limited risk of working with one vendor

   Solution

2. Chapter 8, Review question 4, page 358

   Solution

3. Chapter 8, Review question 16, page 358

   Solution

4. Chapter 9, Review question 2, page 389

   Solution
Solution 1

a. 1) Topic 8.1
b. 3) Topic 8.9
Solution 2

(Topic 8.1)

A successful e-commerce system must address the many stages consumers experience in the sales life cycle:

1. Search and identification — finding items that are wanted and who sells them
2. Selection and negotiation — getting quotes on price
3. Purchasing — sending purchase orders and choosing payment method
4. Product and service delivery — aligning with other products
5. After-sales service — answering customer inquiries and providing warranty service
Solution 3

(Topic 8.6)

The key elements of technology infrastructure required to successfully implement e-commerce within an organization are hardware, Web-server software, e-commerce software, and e-commerce transaction processing.
Solution 4

(Topic 8.8)

Transaction processing systems are the foundation of an organization’s computing infrastructure. TPSs are used to perform basic business activities such as customer order input, purchase order input, receipt creation, time card input, and payroll functions. TPSs generally involve data input and updates of an organization’s records to reflect all daily activities. The following table summarizes these basic activities:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data collection</td>
<td>Process of capturing and gathering all data essential to transaction</td>
</tr>
<tr>
<td>Data editing</td>
<td>Cycle where data is checked for validity and completeness</td>
</tr>
<tr>
<td>Data correction</td>
<td>Process of correcting data that has been mis-keyed or mis-scanned</td>
</tr>
<tr>
<td>Data manipulation</td>
<td>Perform calculations and other data transformations related to business transactions</td>
</tr>
<tr>
<td>Data storage</td>
<td>Update of database(s) following a new transaction</td>
</tr>
<tr>
<td>Document production</td>
<td>Generation of output records and reports (usually not very sophisticated)</td>
</tr>
</tbody>
</table>
8.1 Introduction to e-commerce

Learning objective

- Identify the advantages of e-commerce, and outline a multistage model of e-commerce. (Level 1)

Required reading

- Chapter 8, pages 327-336

LEVEL 1

Most of you use e-commerce more and more in your jobs and personal lives. Many organizations, particularly financial institutions, encourage clients to use electronic processing for faster service to the client and reduced costs to the organization. Businesses also turn to e-commerce to cost effectively transact business with each other. As an accounting professional, it is important for you to have a basic understanding of the concepts, techniques, strategies, and issues faced by businesses using e-commerce.

There are two main classes of e-commerce: business-to-business (B2B) and business-to-consumer (B2C). B2B is significantly larger in dollar volume than B2C, and is expected to continue to grow over the next decade. Two major features of e-commerce are reduction of paperwork and increase in the speed of transactions, which can result in substantial cost savings. At the retail level, companies can not only serve a larger market (increasing sales), but also reduce the need for stores and sales personnel (reducing costs).

Some financial institutions, such as ING Direct and Ally Canada, operate in Canada with no tellers or branch offices. Business is conducted electronically over the Internet, with a service and support group reached by telephone.

Note: You are not responsible for detailed knowledge of the consumer-to-consumer (C2C) and eGovernment forms of e-commerce for this course.

Multistage model for e-commerce

The sales cycle is the foundation of e-commerce, and any system must deal with the various stages in the cycle. These stages are as follows:

- **Search and identification** of the items that are wanted and who sells them

- **Selection and negotiation** of price quotations and which items to order from whom, then setting delivery and price terms

- **Purchasing** with an electronic purchase order and choosing a payment method (Note the difference between a continuing customer and a first-time or one-time customer, and also the methods of ensuring a secure payment transaction.)

- **Product and service delivery** either in the normal manner or electronically over the Internet (As a CGA student, you receive course material online using the Internet.)

- **After-sales service** using customer and electronic order information stored on a database and retrieved to answer customer inquiries or provide warranty service
E-commerce challenges

Companies moving to e-commerce face three operational challenges related to the four challenges noted in the textbook (on page 334).

Business-to-business (B2B)

B2B provides opportunities for particular industries as well as for society. For example, a manufacturer such as an automobile maker can reduce its inventory-carrying costs by linking with its parts and materials suppliers to deliver the materials when they are required for production (known as the just-in-time approach). Carrying costs of inventory reduced, storage facility requirements and handling costs are thereby reduced. Furthermore, the invoicing and payment processes between the manufacturer and its suppliers can also be handled as B2B transactions. The B2B links extend further when the suppliers of parts link to the industries that supply the raw materials on a B2B basis.

Businesses are also consumers of goods such as office supplies, and they can also obtain these online on a B2B basis.

Consumer-to-consumer (C2C)

The Web allows individuals to sell directly to other consumers through web auction sites such as eBay and Kijiji.

Global e-commerce

Additional international e-commerce challenges, which are not addressed in the textbook, arise from local culture, cross-border taxation issues, and restrictions on the transfer of customer information across countries.
8.2 Mobile commerce

Learning objective

- Describe mobile commerce and the technology required to support it. (Level 1)

Required reading

- Chapter 8, pages 336-337

LEVEL 1

Mobile commerce (m-commerce) is growing rapidly; it uses wireless handheld devices (such as smart phones) to direct e-commerce at individuals. The wireless application protocol (WAP), explained in Module 7, is an essential part of the m-commerce infrastructure. The main benefits of m-commerce are similar to those for e-commerce — reduced costs for providing services, improved accuracy and speed of transactions, and better customer service.

There are two major disadvantages to m-commerce — users face high transaction costs and pay for telecom airtime as opposed to almost free Internet access in the e-commerce world. Wireless networks (m-commerce platforms) are also inherently less secure than wired networks (e-commerce platforms).
8.3 E-commerce applications

Learning objective

- Identify several e-commerce applications. (Level 2)

Required reading

- Chapter 8, pages 338-344

LEVEL 2

The following are areas where e-commerce is widely used.

Retail and wholesale

Electronic retailing sites use the well-known catalogue and shopping cart model, or perhaps a cybermall (a website that offers a number of retailers and products). Wholesale opportunities are available for companies that spend large amounts on manufacturing, repair, and operations (MRO). E-commerce software for plant operations can result in significant savings.

Manufacturing

The text covers several aspects of manufacturing. An electronic exchange is where companies join with competitors and suppliers to sell goods. However, there are obstacles to this form of e-commerce, including the natural distrust of competitors, unwillingness to share expertise, and the possibility of government scrutiny around collusion or other violations of antitrust legislation. E-commerce exchange can also be used to reduce the costs of distribution and sales.

Marketing

E-commerce is widely used in combination with online marketing. Information obtained from customers to target a particular group with e-mails and other advertising messages is known as market segmentation. Some companies now use targeted electronic coupons and m-commerce advertisements to market their products.

Investment and finance

The Internet has revolutionized the investment and finance industry partly because the industry has so many built-in inefficiencies. The huge volume of transactions in the finance industry also makes it easier to recover the costs of developing and implementing e-commerce. Although some institutions offer their services at no cost, others charge a small fee per transaction and many achieve savings through reduced operating costs.

Stock trading online allows the investor to review information about stocks, including profiles and recommendations, from a variety of websites and sources. Among other services, online banking allows customers to process paperless payments and transfers.
8.4 Threats to e-commerce

Learning objective

- Identify major issues that pose significant threats to the continued growth of e-commerce. (Level 1)

Required reading

- Chapter 8, pages 344-347

LEVEL 1

The following issues present threats to the continued growth of e-commerce, and must be addressed to ensure that transactions are safe and customers are protected.

Security

E-commerce relies on user identification and encryption technology to protect business transactions. A shopper wants to know that sites are legitimate, and e-businesses must be concerned about customer information. This is particularly important when dealing with information that is confidential or sensitive. To improve the level of security of online transactions, best practices are to use a combination of authentication methods.

For example, credit card security procedures such as “verified by Visa” where the card owner inputs a password when using a Visa card for online purchases and the use of card verification numbers on the back of credit cards are two additional authentication methods.

Biometrics is suggested as one way of addressing security issues. However, it should be noted that biometrics also raises important privacy issues (especially as it becomes widely used). It may also raise unrealistic expectations around security as criminals find ways of tricking biometric identification methods.

Intellectual property

Intellectual property is an idea or content that is protected by copyright, patent, or trademark. Downloading copyright items from the Internet has given rise to many lawsuits; the most well-known example is probably Napster’s original model of making music freely available over the Internet. Other industries also have concerns about the electronic transmission of copyrighted material.

The opposite side of the copyright issue is the concern that too much protection may slow down economic activity. For example, some countries either do not recognize or do not allow legal action to be taken regarding copyrights. However, there have always been “bootleg” copies of popular material in circulation. You should be aware that these versions are illegal and their use is unethical. Consider that copying your legally owned CD onto your iPod for personal use only is legal but copying for any other reason is illegal. In the United States, for instance, individuals breaching copyright have been actively prosecuted by music recording companies and artists.

Fraud

Internet users need assurance that they are dealing with legitimate businesses. Better Business Bureau’s seal, TRUSTe seal, and VeriSign are three ways to identify legitimate businesses. However, the seals are not infallible, and some businesses that do not have the seals are legitimate. Despite the security measures, Internet users must be vigilant against swindlers who use the Internet to reach huge numbers of people in many countries; they need only to fool a small percentage of their audience to make large sums of money.
Following is a description of some Internet fraud, including advice to protect the user:

- **Online auction fraud** — The person-to-person sites leave the buyer and seller to negotiate terms with no guarantee or protection. The seller may take the buyer’s money without delivering the goods or services.

- **Phishing** — Messages that request personal information appear to come from a legitimate site, such as a bank, but are used for identity theft.

- **Spam** — Unsolicited e-mail is sent to huge numbers of people at no cost to the sender and may contain fraudulent advertising or deals. Variations of old tricks prevail, such as the one offering very large amounts of money for allowing a so-called foreign official to use the victim’s bank account to, in effect, launder money. This type of activity may be part of organized crime, where the information is used to create documents and credit cards that give false identities to criminals. The best policy is never to give out financial or personal information and to report attempts to obtain such information.

- **Investment fraud** — This type of fraud is primarily related to the marketing and sale of fictitious investments through SPAM e-mails.

- **Stock scams** — These scams arise through the scammer using the Internet and newsgroups to spread rumours or offer tips on stocks that the scammer has bought at a low price, and when the rumours cause the price to rise, the scammer sells for a nice profit. Users of these sites should also use the free search engines for opinions offered by several sites, obtain at least three or four opinions, and look at the price performance of the stock. Investment site users should also learn how to use financial and other information to make wise investments. In Canada, the [Canadian Shareowner](https://www.canadianshareowner.ca) offers tutorials and information.

**Privacy**

The privacy of individuals should be a concern to all who use the Internet. The development of customer profiles to target groups and individuals has been addressed in earlier topics. There are independent nonprofit private initiatives designed to promote trust and consumer confidence when using accredited websites — the [Better Business Bureau](https://www.bbb.org), [TRUSTe](https://www.truste.org), and VeriSign (look for their seals on websites). These organizations promote consumer trust by reviewing the business’s privacy and security practices and customer policies prior to allowing the use of the seals on the business’s website. A set of **safe harbour principles** addresses the issues of notice, choice, and access related to privacy. The European Union countries practise strong central control and apply government safeguards for their citizens, while North American governments encourage the industry to regulate itself.

**Pornographic sites**

There is a huge number of pornographic sites on the Internet, many of which are not obvious as such. Many sites automatically pick up information on a visitor, whether accessed by accident or design, and this information is used to contact the person with e-mails and other material. The unsuspecting user should use the capabilities of his browser software to delete these sites using the Internet options cookie manager feature or a similar tool. Organizations should ensure that their corporate website domain is identified in such a way that it will not be similar to a pornographic site.

**Viruses**

Major threats to e-commerce privacy are attacks by viruses, spyware, and other criminal hacking activities. (These are addressed in detail in future topics.)
8.5 Strategies for successful e-commerce

**Learning objective**

- Outline the key components of a successful e-commerce strategy. (Level 2)

**Required reading**

- Chapter 8, pages 347-351

**LEVEL 2**

E-commerce is a highly competitive market, with companies setting up websites daily. To be successful, a company must set up a website that attracts customers, is easy to use, and meets the goals of the company, while being affordable and easy to maintain.

**Establishing a web site**

It is vital to start by deciding what objectives a company’s site is designed to achieve. Then the first step in building the website is to obtain and register a domain name, preferably one that represents the company’s products or services. In the past, a company had to recruit experts for in-house development or contract professionals to design, develop, maintain, and support websites; today there are other alternatives:

- Some companies offer **website hosting and development services**. They specialize in assisting you in creating your website, getting your site up and running in a matter of days, and also provide a host server free or for a small charge.

- Another option is a **storefront broker**, which acts as a middleman between the company and other companies or individuals who have the merchandise. The company uses the broker’s website but needs to create its own web pages.

**Building traffic to a website**

A company needs to attract customers to its website by making it easy for search engines to find it. This is done by including relevant keywords that can be picked up and indexed by search engines.

**Maintaining a website**

If the website is well-designed and offers what people want, business should grow. With more transactions, the site must ensure acceptable response times that may require software, hardware, or databases to be upgraded. The site may be designed to personalize transactions to encourage repeat business and to market special offerings geared to individual tastes. It is also important that the website content is kept up to date.
8.6 Technology infrastructure

Learning objective

- Outline the key components of the technology infrastructure required for successful e-commerce. (Level 1)

Required reading

- Chapter 8, pages 351-352

LEVEL 1

As noted in previous topics, for e-commerce to be successful, the company must have a site that attracts customers and is easy to use. It is also important that the service be reliable, accurate, and provide rapid response. In e-commerce, it is easier for the potential customer to go elsewhere if the process is slow or when they encounter problems with the order itself. Therefore, it is essential to build a good working system with a complete and sound technological infrastructure.

The key infrastructure components are

- the organization’s internal technology in the form of networks linked to the Internet by high-speed equipment, and

- e-commerce software working in conjunction with the server software and operating system on the server hardware platform.

These infrastructure components must be carefully chosen and integrated to support a large number of customers, suppliers, and business partners around the world.

Hardware

A key component is a Web server hardware platform complete with appropriate software. A key decision at the outset is whether a company should host its own website or outsource it to a Web server provider. This is a typical make-or-buy decision, where the decision maker must consider the costs of establishing the site and maintaining it, including the capital cost, the development cost, and the maintenance cost, all of which require an investment in specialist staff.

Because there is considerable variation in estimations of how much traffic will be handled by the site, in-house and hosted solutions should be scalable.

Web server software

Web server software works with the server operating system to perform several functions, including the following:

- security and identification, including access control and encryption

- retrieving and sending Web pages using http (or https for secured transactions) and HTML

- website tracking, including logging visitor information and URL
website development with website development tools that come in a package, including a development kit and instructions on how to use a language such as Java — Web page construction software that uses editors and extensions to produce a static or dynamic Web page (a static page is unchanging, but a dynamic page responds to queries by searching databases for current information relevant to that particular query).

E-commerce software

When you have built a site on a host server or selected a service provider, you must select appropriate e-commerce software. There are different requirements for B2B and B2C software:

- B2C must be able to handle invoicing or direct payment that includes local sales-related taxes such as GST or HST in Canada and VAT in the U.K.

- B2B software must be able to handle a variety of transactions between business partners.

These are the five types of e-commerce software:

1. **Catalogue management software** — usually runs in a real-time environment.

2. **Product configuration software** — helps buyers build the desired product, such as a computer system.

3. **Shopping cart software** — allows buyers to add items, change them, and build a total order, and then leads to checkout procedures for order completion and payment information.

4. **E-commerce transaction processing software** — automates the transaction processes and enables communication between trading partners. The software may complete the purchase by calculating all costs including shipping, and may automatically notify the carrier. Where the company has outsourced the inventory management and order filling to a third party, the software routes order information to the shipping companies. It is important to have good back-office systems and processes to support transactions.

5. **Web traffic data analysis software** — turns data that is captured by a website into useful information.
8.7 Electronic payment systems

Learning objective

- Describe key features of the electronic payment systems needed to support e-commerce. (Level 2)

Required reading

- Chapter 8, pages 353-357

LEVEL 2

Electronic payment systems are essential for the growth of e-commerce. While they currently comprise only a small percentage of the dollar volume, this number is increasing. A digital certificate is used by SSL to verify the identity of a website. A certificate authority (CA) is a third party that issues digital certificates. Although SSL handles the encryption part of a secure e-commerce transaction, a digital certificate is necessary to provide server identification.

Secure sockets layer

Many people are reluctant to shop on the Internet because they fear that their credit card and banking information could be stolen. Sensitive data is secured by the secure sockets layer (SSL) that sits above the TCP layer of the OSI model, and other protocols such as https sit on top of SSL. (The text describes the SSL on page 353.)

Electronic cash

Electronic cash is an amount of money that is computerized, stored, and used in e-commerce (for example, PayPal). Most people use credit cards instead of electronic cash for online purchases.

Credit, charge, debit, and smart cards

With a credit card, you charge purchases and pay later, with interest accumulating on unpaid balances. A charge card has no preset spending limit and doesn't charge interest. When you use a debit card, you pay at the time of purchase, since the amount is automatically taken from your account. A smart card has the appearance of a credit card but has a microchip embedded that contains information, codes, and other information that is encrypted, as well the credit limit.
8.8 Transaction processing systems

Learning objective

- Identify the basic activities and business objectives common to all transaction processing systems. (Level 1)

Required reading

- Chapter 9, pages 364-374

LEVEL 1

Businesses turn to information systems to speed up and integrate their daily transaction activities. Due to the high volume of daily transactions, they were the first candidates for computerization. The volume of input and output data is high, with relatively simple and clearly understood processing requirements. Transaction processing systems (TPS) are the basis for the decision support systems such as Management Information Systems (MIS), Decision Support Systems (DSS), and Executive Support Systems (ESS). (These topics are covered in Module 9.)

Overview of transaction processing systems (TPS)

Every business has both manual and automated transaction processing systems. TPSs assist in performing and maintaining detailed records, and support business operations such as order entry, payroll, inventory control, and sales. They also assist in adding value to the organization's goods and services.

Traditional transaction processing methods and objectives

There are several methods to process transactions. Transactions can be grouped in batches for future batch processing. Certain applications are more cost-effective processed in batches, particularly high-volume periodic processes such as payroll and billing. With online transaction processing (OLTP), transactions are handled more effectively with processing occurring immediately after each transaction is input. OLTP enables a manager to have access to up to-date information immediately.

TPS objectives

Because transaction processing is so important for daily operations and the data are so important for decision support systems, a TPS should accomplish specific objectives, outlined on page 369 of the textbook.

By meeting the above objectives, TPSs can support corporate goals such as cost reduction, improving productivity, quality and customer satisfaction, and more efficient and effective operations.

The traditional TPS systems support three main business processes — order processing, purchasing, and accounting.

LEVEL 2

Order processing systems

Order processing systems and subsystems are vital to businesses because without sales there can be no profit. Even not-for-profit organizations need to be able to fill orders for products or services. A systems-level flowchart can be used to show the subsystems and information flows.

Order entry system captures data needed to process a customer order. There are many forms of ordering,
including mail, over-the-counter, door-to-door sales, telephone, and over the Internet. Orders are generally initiated by a customer but may be initiated by the company using software developed for that purpose.

**Sales configuration** checks the customer’s order to ensure that products and services deliver what is expected and will work well together. An example is the system telling the sales representative (or the customer) that a particular printer needs a specific cable and a specific LAN card if connected to the network, so that the customer can order these products if not already on hand. The system also tells the customer whether products they wish to buy are compatible with specific products from other manufacturers.

**Shipment planning** manages the selection of items ordered from particular locations, produces picking lists to tell warehouse employees where to find items, and schedules shipments. This can be a complex process and can be linked to production scheduling.

**Shipment execution** is the application that coordinates the flow of products to the consumer (including executing company policy concerning out-of-stock items), passes information to the inventory control system, and produces packing slips for the customer as well as data for invoicing.

**Inventory control** is important not just for products and materials but also for services and reservation applications. The inventory control system minimizes the costs of holding inventory and maximizes delivery to the customer when needed.

**Invoicing** is essential so that the company gets paid for what it sells. The invoicing system ensures that all data relevant to an order is accumulated and that all orders specific to a customer are billed to that customer. It performs all necessary calculations. The invoicing system produces an automatic entry to the accounts receivable system.

**Customer relationship management (CRM)** is a system that keeps track of all contacts with a customer or prospective customer and provides valuable data that can be used to attract or retain customers.

**Routing and scheduling systems** work together to provide cost-effective service. Routing systems use sophisticated calculations to determine the best way to move goods and materials from one location to another in the most cost-effective manner. Scheduling systems determine the best times to deliver goods and services in terms of seasonal costs, and the use of the delivery mechanism to pick up other items on the return trip.

**Purchasing systems**

**Purchasing transaction processing systems** consist of the following:

- **Inventory control** is already covered under order processing, but here, it pertains to materials related to the manufacture and sale of products.

- **Purchase order processing** includes the use of the Internet to purchase goods or services.

- **Receiving system** is used in addition to the traditional manual forms in traditional systems, when companies send advance shipment notices electronically, against which the receiver can check actual shipments. Bar code scanners can speed up the checking process when the goods are received. However, containers still need to be inspected to ensure that goods are in good condition and match the identification on the container.

- **Accounts payable** has been made less costly by automating the process and transferring data from the purchase order processing and receiving systems to the accounts payable system. The primary output is cheques or electronic payment, paying the right supplier the correct amount at the best time for the goods and services received. The accounts payable system is designed to improve the cash flow, control purchasing, increase profitability, and provide more effective management of current liabilities. The accounts payable system feeds other systems by identifying costs by type of expenditure and by department.
Accounting systems

Accounting systems have traditionally been early candidates for automation because they deal with details and volumes, use data created by other systems, and produce a multitude of outputs from that data.

At this point in your program of studies, you should be familiar with the concepts, purposes, processes, and relationships between accounting systems.

- **Budget** — Budgeting is a time-consuming, reiterative process for most organizations. The budgeting system uses historic data from the general ledger system to begin the budget process, applies current rules and policies, and produces a preliminary budget from which individual departments or other organizational units can develop their budgets and forecast. Each department uses automated techniques that help in estimating and forecasting budgets for calendar and fiscal periods. The budgeting system then consolidates individual budgets according to the organizational structure, by line item or however it is needed. Most budgeting systems allow users to “drill down” from consolidated figures to various levels of detail. The budgeting system assists development of the final budget by rapidly producing a variety of scenarios based on the assumptions and policies of decision makers.

- **Accounts receivable** — The major outputs of the accounts receivable system are invoices or statements sent to customers. Inputs to the accounts receivable system are invoice and credit note data from the invoicing system, and payment information from the payment system. (The payment system is not identified as an accounting system in the text, but includes systems to handle and provide receipts for payments of cash, cheques, credit cards, or electronic payment systems.) The primary output of the accounts receivable system is periodic (usually monthly) statements to customers. There are a number of other outputs, including the important aged analysis of accounts receivable, which is used to assist in making credit decisions and to collect outstanding accounts. The accounts receivable system helps the organization manage and improve cash flow and assess customer credit risks.

- **Payroll** — A good payroll system will be able to take input data (such as hours worked, category of work, and employee information) that is processed against pay rate information, contract information, and deduction information to calculate gross pay, deductions, and net pay. The outputs include cheques (or direct deposit through EDI), cheque stubs with details of deductions, labour distribution to departments, and accounts payable data in respect to deductions. Other outputs include a payroll journal (often known as a payroll register), and a variety of reports. The payroll system also outputs information to other systems such as that which calculates pension contributions by the employer. The payroll system is quite complex and is a good candidate for outsourcing. On the other hand, payroll software packages are available that serve the needs of many small to medium-sized companies.

- **Asset management** — The asset management transaction processing system has the primary function of managing capital assets, including calculating depreciation of assets under a variety of rules. Some systems are linked to, or incorporate, data pertaining to the use and maintenance cost of assets and can be used to determine if or when an asset should be replaced. The asset management TPS may also be linked to maintenance management systems and costs systems that charge the cost of assets to projects.

- **General ledger** — You should be completely familiar with the general ledger system and the use of the chart of accounts to record data and report results in many ways. The general ledger is the central accounting system and all other money systems are reflected in the accounts of the general ledger. The general ledger normally carries the summaries generated by other systems such as payroll and accounts payable, but because accounting systems are generally fully integrated, details can be found by accessing the other systems through the general ledger.
TPS cycle

All TPSs perform the basic data processing activities of capturing data from internal and external sources, updating the databases, and producing documents and reports. The data goes through a transaction processing cycle that consists of the following activities:

- **Data collection** — the first step in the cycle, which may take many forms. Wherever possible, source data automation (SDA) is preferred such as the use of scanners, UPC codes, and RFID tags.

- **Data editing** — checks the data for validity and completeness.

- **Data correction** — after an error is found, the data are corrected so that they can be re-entered and the set of transactions will be complete.

- **Data manipulation** — performs arithmetic and logical operations according to the programming. The initial data may be used in many ways for different purposes to produce many outputs.

- **Data storage** — updates the database for use in management decision making.

- **Document production and reports** — produced on hard copy or displayed on-screen.

TPS control and management issues

Because TPSs are vital both to operations and to other information systems, management must ensure that TPSs do not fail.

TPS audit

A TPS audit is no different than any other systems audit. Its objectives are to ensure that the system meets the need for which it was designed and developed, that controls and procedures are adequate and reasonable, and that these controls and procedures are being followed and used properly. The audit may be conducted by internal auditors or external auditors, and will be as detailed as is deemed necessary under the terms of reference. Some audits include an audit of the programs themselves to ensure they are all in the best interest of the company and perform according to program specifications. Audits include a review of all systems documentation, checking or testing output against input, and reviewing all procedures.

In order to ensure the propriety and integrity of data processing whereby all outputs can be traced back to source documents, an audit trail is used wherever possible. In the old batch systems, this was generated automatically and was easy to follow. In the modern online systems, an audit trail may be difficult to establish or follow and may not exist due to the real-time nature of many online systems.
8.9 Enterprise resource planning

Learning objective

- Define enterprise resource planning and describe the advantages and disadvantages of an ERP. (Level 1)

Required reading

- Chapter 9, pages 374-389

LEVEL 1

Overview of enterprise resource planning

An enterprise resource planning (ERP) fully integrates all information systems across an organization with total communications, so that an action anywhere in the system is transmitted to the subsystem or person where an appropriate response should occur. In an ERP, the corporation’s strategic objectives are most important, and the ERP system is implemented to match the corporation’s management style. The objectives are to maximize performance of the corporation as a whole by achieving corporate objectives and maximizing the cost-effectiveness of operations within the corporate framework.

ERP recognizes that every organization is different and also that there are common functions and processes. ERP requires the complete integration of systems, including physical devices and the flow of data and information. Because organizations are different, two approaches have been developed by ERP systems suppliers:

- Provide a very sophisticated system that has so many features and so much functionality that no single business could possibly need them all, so the organization simply uses the tools and features that it needs.

- Provide ERP software that includes customization tools that an organization can use to tailor the system to its own specific use.

The business environment is becoming more competitive, particularly on a global basis. The growth of B2B and B2C e-commerce and communication systems, both locally and internationally, has created a demand for access to information on a real-time basis across the entire organization. Business executives need to manage activity and control costs throughout the enterprise. To respond to these needs, ERP software from a single vendor is offered as a solution.

Because no single vendor could produce custom packages for every possible need in every industry or business, major ERP vendors are encouraging other software vendors to develop software packages that tie in directly to the ERP system.

Advantages of ERP

The benefits of ERP include increased access to data for operational decision making, cost savings in eliminating old, inefficient systems, improvement of work processes, and upgrade of technology infrastructure.

Increase in access to data for operational decision making

The key to good operational decision making is access to current and reliable data. A company that implements an ERP integrates its systems and therefore its data as well. Decision makers have up-to-date reliable data.

Elimination of costly, inflexible legacy systems
Legacy systems are older systems developed in the past. They are still operational, but are inefficient, costly to maintain, and may be impossible to fix when they break down. An ERP brings new systems to the organization so that its business needs can be met more appropriately and so that new demands can be met. What’s more, an ERP makes integration of systems necessary, which was usually impossible with the old and cumbersome legacy systems.

**Improvement of work processes**

To implement an ERP, the company must review its business processes. The review of how things are done in order to eliminate non-value-added steps and to improve both manual and automated processes is known as **process reengineering**. Part of the implementation of an ERP is to conduct this review, and many ERP vendors bring with them application modules that build in best practices, which are the most cost-effective way to complete a particular business process.

**Increase in access to data for operational decision making**

The key to good operational decision making is access to current and reliable data. A company that implements an ERP integrates its systems and therefore its data as well. Decision makers automatically have up-to-date reliable data.

**Upgrade of technology infrastructure**

In most organizations, the technology infrastructure is a mixture acquired by various departments to meet departmental needs over a period of time. Thus, there is no corporate standard, and the technology is expensive to maintain and support, as well as difficult to integrate. By moving to an ERP, an organization can determine which databases and systems it needs, upgrade those that need to be upgraded, implement organization standards, and as a consequence, reduce operational and support costs while simplifying integration problems.

**Disadvantages of ERP**

Implementation of an ERP can be costly and difficult and has the following disadvantages:

**Expense and time in implementation**

Implementation of an ERP is no easy task. It involves restructuring of the technology structure, replacement of many existing systems, reengineering of business processes, and integration of systems. It requires a large commitment of staff and management time and may be expensive to implement. While all this is going on, the organization must continue to do business and operate in a state of change.

**Difficulty of implementing change**

There is always a resistance to change of any kind. An ERP entails a long period of continual change, including change to how business processes are handled. This can be traumatic for employees. As a result, businesses may find that employees leave, especially long-term employees who have the most experience. This can create operational problems and leave the ERP projects short of knowledgeable staff.

**Difficulty of integrating with other systems**

It may be difficult for the ERP system to meet all of the business’ needs. Thus, other information systems may need to be integrated with the ERP software. This integration can be time consuming, costly, and maybe difficult to accomplish.

**Risks in using one vendor**

When a company invests large amounts of money to acquire and implement an ERP system, it makes a commitment to the vendor of that system. The vendor knows that once committed, management is unlikely to make a costly change and write off the costs expended to date. The vendor therefore has less motivation to respond to customer issues and complaints. The company is also gambling that the ERP vendor will keep the
ERP products up-to-date and will stay in business.

**Risk of implementation failure**

Implementation failure is the most serious disadvantage of ERP. The problem is that a huge amount of resources must be committed to implementing the ERP by both the organization and the vendor. The organization commits time, people, and money. An ERP is complex and time-consuming.

**Who should use an ERP**

ERP is not for everyone. While the potential gains can be very high, the risks are also high. The decision should be made by with the organization based on risk analysis, understanding of the organizational environment, willingness to commit the necessary resources and to manage the change process, among other factors. Small and medium-size organizations have also been able to achieve benefits from implementing ERP systems.

**Components of an ERP System**

**LEVEL 2**

**Supply chain management (SCM)**

All businesses have various value-added processes. Supply chain management covers the planning and control of inventory. The goal of SCM is to reduce the overall investment in inventory in the supply chain and improve customer service. It has three main sub-processes: demand planning, supply planning, and demand fulfilment.

SCM consists of the following activities:

- sale forecasting to develop estimate of customer demand
- sales and operations plan to determine production requirements
- demand management results in the master production schedule for all products
- detailed production plan for each product
- materials requirement planning (MRP) determines the amount and timing of purchases
- purchasing of raw materials from suppliers
- production and scheduling of machines and labour
- sales ordering

**Financial and managerial accounting and ERP**

To assist management in managing daily activities and prepare reports for decision-making purposes ERP tracks and records the business transactions within the accounting module of the ERP system.

**Customer relationship management (CRM)**

The CRM system integrates the sales, marketing and customer service functions within a company to improve customer satisfaction and communication. Following are the key features of a CRM:

- contact and sales management
- customer support
- marketing and customer analysis

**International issues**

Key international issues resulting from the increasing number of international corporations and partnerships include

- different languages and cultures
- differences in information systems infrastructures
- varying customs, information privacy rules and taxation issues, and
- multiple currencies.
Module 8: Self-test

1. Chapter 8, Review question 5, page 358
   Solution

2. Chapter 8, Review question 7, page 358
   Solution

3. Chapter 8, Review question 12, page 358
   Solution

4. Chapter 8, Review question 15, page 358
   Solution

5. Chapter 8, Discussion question 4, page 358
   Solution

6. Chapter 8, Discussion question 9, page 358
   Solution

7. Chapter 9, Review question 2, page 389
   Solution

8. What specific objectives do organizations hope to accomplish through the use of transaction processing systems?
   Solution

9. Chapter 9, Discussion question 8, page 390
   Solution
Solution 1

(Topic 8.1)

The challenges are: 1) defining an effective e-commerce model and strategy, 2) dealing with consumer privacy concerns, and 3) overcoming consumers’ lack of trust.
Solution 2

(Topic 8.1)

Trust-building strategies:

- Demonstrate a strong desire to build an ongoing relationship with customers by giving first-time price incentives, offering loyalty programs, or eliciting and sharing customer feedback.
- Demonstrate that the company has been in business for a long time.
- Make it clear that considerable investment has been made in the Web site.
- Provide brand endorsements from well-known experts or well-respected individuals.
- Demonstrate participation in appropriate regulatory programs or industry associations.
- Display Web site accreditation by the Better Business Bureau, TRUSTe, or VeriSign programs.
Solution 3

(Topic 8.5)

Website operators must constantly monitor the traffic to their site and the response times experienced by visitors. Nothing will drive potential customers away faster than if they experience unbearable delays in trying to view or order your products or services. It may be necessary over time to modify the software, databases, or hardware on which the website runs to ensure good response times.
Numerous challenges arise that multinational corporations must address in planning, building, and operating their ERPs. Different languages and cultures, disparities in information system infrastructure, varying laws and customs rules, and multiple currencies are among the challenges of linking all the business partners, customers, and subsidiaries of a multinational company.
Solution 5

(Topic 8.6)

Barriers include the limitations of the handheld devices, such as small screen, limited input capabilities, less processing power and less bandwidth than desktops, and limited-life batteries; insufficient security, limited choices of handheld devices, high costs, lack of interoperability between products and services, and lack of customer awareness.

The limitations of the handheld devices make it impossible to access many websites. To address the limitations of wireless devices, the m-commerce industry has undertaken a standardization effort for their Internet communications. The Wireless Application Protocol (WAP) is a standard set of specifications for Internet applications that run on handheld, wireless devices. Solutions could include developing more choices of products, each with different features to suit the needs of diverse customers; lowering the costs of the devices to a more affordable price; regulating standards to allow for interoperability; and providing more customer awareness, such as by television commercials and advertisements.
Solution 6

(Topic 8.5)

The first step in developing a global e-commerce strategy is to determine which global markets make the most sense for selling products or services online. Once a company decides which global markets it wants to reach, it must adapt an existing Canada-centric Web site to another language and culture — a process called localization.
Solution 7

(Topic 8.8)

All TPSs perform the following basic activities: data collection, which involves the capture of source data to complete a set of transactions; data editing, which checks for data validity and completeness; data correction, which involves providing feedback of a potential problem and enabling users to change the data; data manipulation, which is the performance of calculations, sorting, categorizing, summarizing, and storing data for further processing; data storage, which involves placing transaction data into one or more databases; and document production, which involves outputting records and reports.
Solution 8

(Topic 8.8 and Table 9.1 on text page 370)

The following table lists objectives organizations hope to accomplish through use of transaction processing systems:

<table>
<thead>
<tr>
<th>Objective</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer loyalty increased</td>
<td>Use of customer interaction system to monitor and track each customer interaction with the company</td>
</tr>
<tr>
<td>Superior service provided to customers</td>
<td>Use of tracking systems that are accessible by customers to determine shipping status</td>
</tr>
<tr>
<td>Better relationship with suppliers</td>
<td>Use of an Internet marketplace to allow the company to purchase products from suppliers at discounted prices</td>
</tr>
<tr>
<td>Superior information gathering</td>
<td>Use of order configuration system to ensure that products ordered will meet customer’s objectives</td>
</tr>
<tr>
<td>Costs dramatically reduced</td>
<td>Use of warehouse management system employing RFID technology to reduce labour hours and improve inventory accuracy</td>
</tr>
<tr>
<td>Inventory levels reduced</td>
<td>Use of collaborative planning, forecasting, and replenishment to ensure the right amount of inventory is in stores</td>
</tr>
</tbody>
</table>
Solution 9

(Topic 8.9)

The following advice would be given to avoid many common causes of ERP failure:

- Assign a full-time executive to manage the project.
- Appoint an experienced, independent resource to provide project oversight and to verify and validate system performance.
- Allow sufficient time for transition from the old way of doing things to the new system and new processes.
- Plan to spend a lot of time and money training people; many project managers recommend that $10,000 to $20,000 per employee be budgeted for training of personnel.
- Define metrics to assess project progress and to identify project-related risks.
- Keep the scope of the project well defined and contained to essential business processes.
- Be wary of modifying the ERP software to conform to your firm's business practices.
Module 8 summary

E-commerce, transaction processing, and enterprise resource processing

Electronic commerce (e-commerce) is a rapidly expanding use of the Internet. The first part of this module deals with the e-commerce model, technology infrastructure, strategies, applications, electronic payment systems, and threats to successful e-commerce. Given that transaction processing is the core of business operations, the second part of this module deals with transaction processing systems, including enterprise resource planning.

Identify the advantages of e-commerce and outline a multistage model of how e-commerce works

- Electronic commerce (e-commerce) is growing rapidly, as businesses use Internet tools to expand their markets and to help their operations run more efficiently.

- Business-to-consumer (B2C): Organizations that deal with the public, such as retailers, can not only serve a larger market (thus increasing sales), but also reduce the need for retail stores and sales personnel (thus reducing costs).

- Business-to-business (B2B) is currently 10 to 20 times the dollar volume of B2C. It is a natural expansion of EDI. Two major features of e-commerce are reduction of paper and increase in speed, including response time.

- A major feature of e-commerce is the reduction or elimination of paperwork and human intervention.

E-commerce model

- E-commerce is based on the sales model with multiple stages:
  1. Search and identification of the items that are wanted and who sells them.
  2. Selection and negotiation involve getting the price quotations and choosing which items to order from whom, then setting delivery and price terms.
  3. Purchasing includes sending an electronic purchase order and payment.
  4. Product and service delivery may be done in the normal manner for most products and services, but over the Internet for others.
  5. After-sales service such as customer inquiries or warranty service can be based on information stored on a database.

E-commerce challenges

- Businesses face three challenges when moving to e-commerce:
  - defining an effective model and strategy
  - the physical delivery of units to individual customers
  - integrating the electronic ordering over the Internet through a website with inventory control and production planning systems

Describe mobile commerce and the technology required to support it

Mobile commerce:

- handheld devices
Identify several e-commerce applications

- The most common current uses of e-commerce are:
  - retail and wholesale
  - manufacturing
  - marketing
  - investment and finance

Outline the key components of the technology infrastructure required for successful e-commerce

- The key component of e-commerce is web server hardware with appropriate software:
  - may be internal or outsourced
  - in-house solution must be scalable
  - high-speed Internet connections
  - specialist staff to develop and maintain the site
  - web server hardware and software working smoothly with communications software integrated with internal networks

- Web server software works with the server operating system to perform several functions:
  - security and identification
  - retrieving and sending web pages
  - website development with website development tools
  - web page construction software that uses editors and extensions to produce a static or dynamic web page

- E-commerce software must handle a number of tasks:
  - catalogue management
  - product configuration
  - shopping cart
  - e-commerce transaction processing
  - web traffic data analysis

Describe key features of the electronic payment systems needed to support e-commerce

- Electronic payment systems necessary for e-commerce must be able to identify users.
  - A digital certificate is an attachment to an e-mail message or data embedded in a website that verifies identity.
  - A certificate authority (CA) is a third party that issues digital certificates.

- Electronic payment systems involve the following:
  - The secure sockets layer (SSL) sits above the TCP layer of the OSI model.
  - Electronic cash is money that is computerized, stored, and used in e-commerce.
  - The smart card looks like a credit card but has a microchip embedded that contains encrypted information, codes, and amounts available for spending.

Identify the major issues that pose significant threats to the continued growth of e-commerce

- E-commerce must ensure that transactions are safe and customers are protected.

- Issues/threats include the following:
  - Security is provided by proper identification, for example, using biometrics.
Intellectual property (rights to materials, including the look and feel of a website) needs to be protected. Fraud is a continuing concern. The Internet offers criminals opportunities to reach multitudes of people internationally. Safe harbour principles have been established to address the issues of notice, choice, and access related to privacy. Viruses

Outline the key components of a successful e-commerce strategy

- E-commerce is highly competitive, with companies setting up websites daily. Strategies for success include
  - developing an effective web presence
  - setting up a website, either as host or through a broker
  - marketing the website using an appropriate domain name and making it easy for search engines to find.
  - Identify the basic activities and business objectives common to all transaction processing systems.

TPS activities

- Transactions are what the business does every day, and have high volumes of input data and high output.

- Transaction processing systems (TPS) assist in the performance and maintenance of detailed records, and support business operations.

- Traditional systems use input devices that group transactions in batches for future batch processing. With online transaction processing, processing occurs immediately after each transaction is input online.

TPS objectives

- TPS-specific objectives include the following:
  - Process data generated by and about transactions — the prime function.
  - Maintain a high degree of accuracy and integrity, including the avoidance of fraudulent transactions.
  - Produce timely documents and reports.
  - Increase labour efficiency.
  - Help provide increased service.
  - Help build and maintain customer loyalty.
  - Achieve competitive advantage — this provides a significant and long-term benefit to the organization.

TPS cycle

- A transactional processing cycle consists of the following activities:
  - data collection, preferably using SDA
  - data editing to check against predetermined parameters
  - data correction after an error is found
  - data manipulation by performing arithmetical and logical operations
  - data storage
  - document production and reports on-screen or on hard copy

Describe inputs, processing, and outputs for transaction processing systems associated with order processing, purchasing, and accounting business processes
The traditional TPS systems support three main business processes: order processing, purchasing, and accounting.

Order processing systems and subsystems are vital to businesses. They consist of

- order entry system
- sales configuration
- shipment planning
- shipment execution
- inventory control
- invoicing
- customer relationship management (CRM)
- routing and scheduling

Purchasing systems consist of

- inventory control
- purchase order processing
- receiving system
- accounts payable

Accounting systems consist of

- budget
- accounts receivable
- payroll
- asset management
- general ledger

**Define enterprise resource planning, and describe the advantages and disadvantages of an ERP**

- An ERP fully integrates all information systems across an organization, with total communications, so that an action anywhere in the system will be transmitted to the subsystem or person where an appropriate response should occur.

- ERP recognizes that every organization is different, but there are common functions and processes as well as a need for complete integration of systems, including the physical devices and the flow of data and information.

- ERP takes two approaches:
  - provide very complex ERP software loaded with features and functions
  - provide ERP software that includes customization tools that an organization can use to tailor the system to its own specific use

- ERP advantages include
  - elimination of costly and inefficient legacy systems
  - improvement of work processes
  - increase in access to data for operational decision making
  - upgrade of technology infrastructure

- ERP disadvantages include
  - expense and time in implementation
  - difficulty of implementing change
  - difficulty integrating with other systems
  - risks in using one vendor
Components of an ERP System

Supply chain management (SCM) covers the planning and control of inventory. The goal of SCM is to reduce the overall investment in inventory in the supply chain and improve customer service.

Financial and Managerial Accounting and ERP tracks and records the business transactions.

Customer Relationship Management (CRM) system integrates the sales, marketing and customer service functions with an ERP.

International issues

- different languages and cultures
- differences in information systems infrastructures
- varying customs, information privacy rules and taxation issues
- multiple currencies