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

Overview

Electronic commerce (e-commerce) is a rapidly expanding use of the Internet. Businesses are using Internet tools to expand their markets and to help their operations run more efficiently. Even more business is conducted on the Internet between businesses than between businesses and their customers. A key component of e-commerce is electronic payment. It is essential that every accounting professional understands e-commerce. This module 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. Transaction processing systems are often integrated into an overall enterprise resource planning system, which ranges from a single-site business to a multi-site global environment.

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

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

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

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

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

8.9 Traditional transaction processing applications
   Describe inputs, processing, and outputs for transaction processing systems associated with order processing, purchasing, and accounting business processes. (Level 2)

8.10 Enterprise resource
   Define enterprise resource planning and describe the advantages and
planning disadvantages of ERP. (Level 1)
Module 8: Test your knowledge

1. a. What is the biggest class of e-commerce by dollar volume of business?

   2. C2C (consumer-to-consumer)
   4. e-government

b. 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. Low risks of working with one vendor

Solution

2. Chapter 8, Review question 4, page 336 (Note: There are only five stages, not six.)

Solution

3. Chapter 8, Review question 14, page 336

Solution

4. Chapter 9, Review question 2, page 377

Solution
8.1 Introduction to e-commerce

Learning objective

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

Required reading

- Chapter 8, pages 304-311

LEVEL 1

In your career and personal life, you will be using e-commerce more and more. Many organizations, particularly financial institutions, encourage clients to use electronic processing for faster service to the client and reduced costs to the organization. Businesses turn to e-commerce to do business with each other cost effectively. 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 currently 10 to 20 times the dollar volume of B2C, and is expected to grow exponentially over the next decade. Two major features of e-commerce are reduction of paperwork and increase in speed, including response time. The cost savings that result from eliminating paperwork and related transactions can be substantial. When dealing with the public such as retailers, companies can not only serve a larger market (thus increasing sales), but also reduce the need for retail stores and sales personnel (thus reducing costs).

Some financial institutions, such as ING Direct, based in Holland, operate in Canada without any tellers or branches. Business is conducted electronically with a service and support group reached by telephone.

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** involve getting the price quotations and choosing which items to order from whom, then setting delivery and price terms.

- **Purchasing** includes sending 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** may be done in the normal manner for most products and services. However, items such as software, texts, documents, music, and other material can be delivered electronically over the Internet. As a CGA student, you receive course material online using the Internet.

- **After-sales service** is a growing aspect of e-commerce. Since information about the customer and the order exists in electronic form, it can be stored on a database and retrieved to answer customer inquiries or provide warranty service.
E-commerce challenges

There are three major challenges for companies moving to e-commerce. The first is to define an effective model and strategy. The components of the most successful model are community (building a group of customers), content (identifying what you are offering in an attractive way), and commerce (offering desirable methods of acquiring and paying for offerings).

Another challenge is the physical delivery of units to individual customers, which often requires changing distribution systems and processes, because there is no retail store with goods on display for customers to select and purchase.

A third major challenge is integrating the electronic ordering over the Internet through a website with the inventory control and production planning systems.

E-commerce supply chain

All businesses have various value-added processes. The supply chain is one such process that has the potential for significant benefits if converted to e-commerce. Supply chain management has three sub-processes: demand planning, supply planning, and demand fulfilment. The benefits include increased revenues and decreased costs, improved customer satisfaction, and inventory reduction across the supply chain. You should understand these benefits and the impact not just on the individual organization but also on the entire industry.

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. This is known as the just-in-time (JIT) approach. Not only are the carrying costs of inventory reduced, so are storage facility requirements and handling costs. 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.

On a smaller scale are retailers who deal with merchandise suppliers on a B2B basis, whether the suppliers are manufacturers of goods or growers of produce, regardless of where they are located.

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

Business-to-consumer (B2C)

So far, some consumers are still reluctant to shop on the Internet, so there is a large untapped market. As more people work for organizations that use B2B, and most companies that have catalogues encourage customers to order online, the volume of business in B2C will increase dramatically.

The Ethics and Societal Issues case on page 313 raises a number of questions. A question that Canadians may consider is "What are the privacy and security issues of using a cell phone for commerce and marketing purposes?"

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

The Internet facilitates international e-commerce, but there are challenges to this aspect such as local culture,
cross-border taxation issues, and restrictions on information transfer, which you should understand.
8.2 Mobile commerce

Learning objective

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

Required reading

- Chapter 8, pages 312-314

LEVEL 1

Mobile commerce (m-commerce) is rapidly growing. It entails the use of wireless handheld devices and is directed at individuals. An essential part of the infrastructure is the wireless application protocol (WAP) explained in Module 7.
8.3 E-commerce applications

Learning objective

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

Required reading

- Chapter 8, pages 314-322

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, which is 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. The concept and implementation of an electronic exchange is where companies can join with competitors and suppliers to sell goods. However, there are obstacles to this form of e-commerce, including the natural distrust of competitors, the unwillingness to share expertise, and the possibility of government scrutiny in respect to collusion or antitrust legislation. E-commerce can also be used to reduce the costs of distribution and sales.

Marketing

E-commerce is widely used for marketing. Information obtained from customers to target a particular group with e-mails and other advertising messages is known as market segmentation. Technology-enabled relationship management is the gathering of a customer profile that includes buying patterns, behaviours, preferences, and other characteristics, which is then used by a company to tailor its offering and promotions to a specific customer. A leading Internet company, DoubleClick, uses the Internet to build customer relationships. If you have Bell Canada as your ISP, you will have noticed that BellZinc uses DoubleClick.

Some small businesses and proprietorships do not actually sell goods or services over the Internet. They simply want a web presence so that their name will be recognized. Their websites may contain information about their business, provide catalogues or descriptions of goods and services, testimonials, and marketing material, with information on how to contact them. This is indeed a form of marketing and a growing application.

Investment and finance

One reason the Internet has revolutionized the investment and finance industry may be because the industry has so many built-in inefficiencies. However, it is more likely that the huge volume of transactions in the industry makes it easier to recover the costs of developing and implementing e-commerce for the organizations concerned. Although some institutions offer their services at no cost, others charge a small fee per transaction. Many achieve savings through reducing personnel and branch locations.

Stock trading online allows the investor to review many sites with information about stocks, including
profiles and recommendations from a variety of sources. It also allows contact with the broker to buy and sell at a substantially lower commission than the old way, and to track portfolios. Most financial institution sites and the larger ISPs have links to financial and investment sites.

**Online banking** is a growing segment of e-commerce, which is a natural evolution from tellers, to off-hour banking via instant teller machines, to telephone banking. Bill presentment, available from some banks, involves no paper because you are notified by e-mail that you have a bill, you can see the image, and you can direct your bank to pay the bill.
8.4 Technology infrastructure

Learning objective

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

Required reading

- Chapter 8, pages 327-331

LEVEL 1

For e-commerce to be successful, an organization must have a site that attracts customers and is easy to use, but it is imperative that the service must 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 and 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, with the e-commerce software working in conjunction with the server software and the server 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 estimation in how much traffic will be handled by the site, in-house or 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 using user name or URL
- retrieving and sending web pages using HTTP and HTML
- website tracking, including logging visitor information and the URL, and what action has taken place
- 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. A server that handles dynamic content must have ODBC.
Some of the more popular web server programs include ASP and Apache, which are available at no cost from the Internet.

**E-commerce software**

When you have built a site on a host server or selected a service provider, appropriate e-commerce software must be selected. 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.

The five tasks that e-commerce software must handle are

1. **Catalogue management**, which is best done in a real-time environment using catalogue management software.

2. **Product configuration**, which uses product configuration software to help buyers build the product that they want, such as a computer system.

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

4. **E-commerce transaction processing**, software that 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**. It takes website traffic analysis software to turn data that is captured by a website into useful information.
8.5 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 331-333

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. For web software to identify users, a digital certificate is used. It 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.

Secure sockets layer

One reason many people are reluctant to shop on the Web is the fear that credit card and banking information will 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 HTTP sit on top of it. The text describes the SSL on page 331, and offers some tips on what to look for on your screen with the two main browsers, Netscape Navigator or Microsoft Explorer. Notice also that the newest version of the browser will usually have the best security.

Electronic cash

Electronic cash is an amount of money that is computerized, stored, and used in e-commerce.

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 as amounts available for spending.

Digital certificates

Note that digital certificates are included in Internet Explorer. Go to Tools, Internet Options, then click the Content tab. A section is identified as "Certificates." You can use this to learn more about this topic.
8.6 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 322-325

LEVEL 1

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

Security

The importance of security cannot be overemphasized. This module has dealt with the need for identification. 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. Biometrics is a technology used to identify individuals by unique physical characteristics such as fingerprints and retina scanning. Biometrics can also be used in the context of security for e-commerce. Fingerprint technology has the widest interest among corporate users because it provides a cost-effective solution.

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, of which the most well known is probably Napster's original model of making music freely available to anyone. Other industries have concerns about the electronic transmission of copyrighted material. One area of lawsuits is that against companies whose sites have the "look and feel" of another company's site.

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 in respect to copyrights. Whatever the outcome, there have always been "bootleg" copies of popular material, regardless of copyright. You should be aware that these versions are illegal and their use is unethical. In the United States, for example, individuals have been actively prosecuted by music recording companies.

Fraud

Internet users need to be assured that they are dealing with legitimate businesses. Better Business Bureau's BBBOnLine Reliability seal is one way to identify legitimate businesses. However, the seal is not infallible, and some legitimate businesses do not necessarily have the seal. Despite the security measures, you must be vigilant against swindlers who use the Internet to reach a huge number of people in many countries. They need only to fool a small percentage of their audience to pocket large sums of money.

Following is a description of some Internet fraud, including advice to protect you:

- **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 you very large amounts of money for allowing a so-called foreign official to use your bank account to, in effect, launder money. The best advice is never to give out financial or personal information and to report attempts to obtain this information. This type of activity may be part of organized crime, where the information is used to create documents and credit cards that give a false identity to criminals.

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

• **Stock 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. One piece of advice is to use the free search for opinions offered by several sites, obtain at least three or four opinions, and also look at the price performance of the stock. The best advice is to learn how to use financial and other information to make wise investments. In Canada, the [Canadian Shareowner](https://www.csc.com) 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 two independent nonprofit private initiatives designed to promote trust and consumer confidence when using accredited websites — the [Better Business Bureau OnLine](https://www.bbb.org) and [TRUSTe](https://www.truste.org). Look for their seals on websites. These two organizations promote consumer trust by reviewing the business’s privacy and securities practices and customer policies prior to allowing the use of the seals on the business’s website. There is also a set of **safe harbour principles** established to address the issues of notice, choice, and access related to privacy. It appears that the European Union countries believe in 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. This is used to contact the person with e-mails and other material. The unsuspecting user should use the capabilities of his software to delete these sites using the cookie manager feature or a similar tool. Organizations should ensure that their website is identified in such a way that it will not be similar to a pornographic site.

### Viruses

A major threat to e-commerce is attacks by viruses, spyware, and other criminal activities. These will be covered in Topic 10.11.
8.7 Strategies for successful e-commerce

Learning objective

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

Required reading

- Chapter 8, pages 325-327

LEVEL 2

E-commerce is a highly competitive market, with companies setting up websites daily. The issues and threats were addressed in Topic 8.6. The collapse of many dot-coms in 2001 may have affected how users and companies view e-commerce. In order 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.

Developing an effective web presence

Near the beginning of this decade, 60% of U.S. companies had in-house websites but only 20% sold anything over the Web. These percentages are probably much higher today. It is vital that any company setting up a website starts by deciding what objectives its site is designed to achieve.

Putting up a website

Any size of company can build a website. Previously, a company had to recruit experts for in-house development or contract professionals to design, develop, maintain, and support websites, but now there are other alternatives. Some companies offer website hosting 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 your company and the merchants who actually have the merchandise. You use the broker’s website but need to create your own web pages.

Building traffic to your website

The first step in building a website is to obtain and register a domain name, preferably one that represents the kinds of products or services you offer. You now have a website but so have thousands of other companies. You need to attract customers to your website by making it easy for search engines to find your site. This is done by including relevant keywords that can be picked up and indexed by search engines.

Maintaining your website

If your website is well designed and offers what people want, business should grow. With more transactions, you must ensure that response time does not go down. You may want to personalize transactions to encourage repeat business and market special offerings geared to an individual's taste. It is also important to ensure that your website content is kept up to date.
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 343-356

LEVEL 1

Businesses turn to information systems to speed up and integrate their daily transaction activities. Daily transactions are what the business does every day, and because of their high volume, they were the first candidates for computerization. The volume of input and output data is high, with relatively simple and clearly understood processing. Transaction processing systems (TPS) are the basis for the more sophisticated, higher-level systems.

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

When traditional TPSs were automated, they began as file-based systems. These traditional systems used input devices that grouped transactions in **batches** for future **batch processing**. The next step was **online input**, but processing was delayed and transactions were still processed as batches. With **online transaction processing**, applications are handled more effectively with processing occurring immediately after each transaction was input online. However, certain applications are more cost-effective processed in batches, particularly high-volume periodic processes such as payroll and billing.

Even under the file-based system, firms attempted to integrate their TPS applications.

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, as follows:

- process data generated by and about transactions (this is 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

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 and 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.
- **data editing** — checks the data against predetermined parameters
- **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 Traditional transaction processing applications

**Learning objective**

- Describe inputs, processing, and outputs for transaction processing systems associated with order processing, purchasing, and accounting business processes. (Level 2)

**Required reading**

- Chapter 9, pages 357-374

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. Ordering can be direct, company-to-company using EDI, or via a third-party clearinghouse.

**Sales configuration** is a relatively new system that not only checks the customer's order but ensures that products and services give the client 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. CRM is becoming increasingly important to businesses.

Routing and scheduling. 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. Routing and scheduling systems work together to provide cost-effective service.

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 form strategic partnerships.

- **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 output of the accounts receivable system is 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. (Various notices are produced automatically by the system.) The accounts receivable system helps the organization manage and improve cash flow and protect its assets by assessing 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 tax rules in different jurisdictions. 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.

**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 and rules
- multiple currencies

You should understand these issues thoroughly as you may well encounter them in your career.
8.10 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 362-374

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 will be 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, 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. Because organizations are different, two approaches have been developed by ERP systems suppliers. The first approach is to 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. The second approach is to provide ERP software that includes customization tools that an organization can use to tailor the system to its own specific use.

Advantages and disadvantages of ERP

The business environment is becoming more competitive, particularly on a global basis, because companies do not require a plant located in a particular country or location to do business in that location. The growth of e-commerce in both B2B and B2C, and of communication systems locally and internationally due to the Internet, has created a demand for access to information on a real-time basis across the entire organization. Business executives have new needs for control over the total cost and product flow through the entire enterprise. To respond to these needs, ERP software from a single vendor has been 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 packages that tie in directly to the ERP system.

Advantages of ERP

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

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**

In order to implement an ERP properly, a company is forced to review its business processes. It is quite possible to do this without implementing an ERP. 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 massive restructuring of the technology structure, replacement of many existing systems, reengineering of business processes, and integration of systems. It requires multiple project teams that have both staff and consultants as members, and commitment of staff and management. It also takes many years and is usually 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, especially since it happens slowly and continues for some years. 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 an ERP vendor to provide all the software for the business with the ERP software. Thus, the other systems must be integrated with the ERP software. This integration can be time consuming, costly, and 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. Some CEOs have nothing but praise for the results, while others have resorted to suing the vendors if implementation fails.

Who should use an ERP

An ERP is not for everyone. While the potential gains can be very high, the risks are also high. The decision must rest with senior management, based on their risk analysis, their understanding of the organizational environment, their willingness to commit the necessary resources and to manage the change process, among other factors. A small business is unlikely to need or afford an ERP because many can simply use off-the-shelf application software or can undertake business or process reengineering with some assistance.
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
- wireless application protocol (WAP)
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.
  - Shipping and payment information is stored in an electronic wallet that the buyer accesses and transfers to the check-out area of an e-commerce site.
  - The smart card looks like a credit card but has a microchip embedded that contains encrypted information, codes, and amounts available for spending.

Identify 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, by including a meta tag (a special HTML tag not visible on the web page, containing keywords)

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
- risk of implementation failure
Solution 1

a. 1) Topic 8.1
b. 3) Topic 8.10
Solution 2

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

1. search and identification — of items that are wanted and who sells them
2. selection and negotiation — involves getting quotes on price
3. purchasing — sending purchase orders and choosing payment method
4. product and service delivery — done in same manner as other products
5. after-sales service — answer customer inquiries and provide warranty service
Solution 3

Technology-enabled relationship management is the use of detailed information about a customer's behaviour, preferences, needs, and buying patterns to set prices, negotiate terms, tailor promotions, add product features, and customize the entire relationship with that customer.
Solution 4

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>