Fundamentals of Information Systems, Seventh Edition

Chapter 5

Electronic and Mobile Commerce and Enterprise Systems
Principles and Learning Objectives

• Electronic and mobile commerce are evolving, providing new ways of conducting business that present both potential benefits and problems
  – Describe the current status of various forms of e-commerce, including B2B, B2C, C2C, and m-commerce
  – Identify several e-commerce and m-commerce applications
  – Identify several advantages associated with the use of e-commerce and m-commerce
Principles and Learning Objectives (continued)

• E-commerce and m-commerce require the careful planning and integration of a number of technology infrastructure components
  – Identify the key components of technology infrastructure that must be in place for e-commerce and m-commerce to work
  – Discuss the key features of the electronic payment systems needed to support e-commerce and m-commerce
Principles and Learning Objectives (continued)

- An organization must have information systems that support the routine, day-to-day activities that occur in the normal course of business and help a company add value to its products and services
  - Identify the basic activities and business objectives common to all transaction processing systems
Principles and Learning Objectives
(continued)

• An organization that implements an enterprise system is creating a highly integrated set of systems, which can lead to many business benefits
  – Define the term enterprise resource planning system, identify its functions, and list its benefits.
  – Define the term customer resource management system, identify its functions, and list its benefits.
  – Define the term product lifecycle management system, identify its functions, and list its benefits.
Why Learn About Electronic and Mobile Commerce and Enterprise Systems?

• Electronic and mobile commerce and enterprise systems:
  – Have transformed many areas of our lives and careers

• One fundamental change has been:
  – The manner in which companies interact with their suppliers, customers, government agencies, and other business partners
An Introduction to Electronic Commerce

• Electronic commerce:
  – Conducting business activities electronically over computer networks

• Business activities that are strong candidates for conversion to e-commerce:
  – Paper-based
  – Time-consuming
  – Inconvenient for customers
Business-to-Business (B2B) E-Commerce

- Subset of e-commerce
- All the participants are organizations
- B2B market considerably larger and growing faster than B2C e-commerce
- B2B revenue about 13 times larger than B2C
Business-to-Consumer (B2C) E-Commerce

• B2C e-commerce organizations sell their products directly to consumers
• Amounts to about 4.6% of total U.S. retail sales
• Disintermediation:
  – The elimination of intermediate organizations between the producer and the consumer
• Web-influenced sales are sales in local stores that are stimulated through online marketing
Consumer-to-Consumer (C2C) E-Commerce

• Subset of e-commerce that involves consumers selling directly to other consumers

• Popular sites:
  – e-Bay, Bidzcom, Craigslist, eBid, Kijiji
  – ePier, Ibidfree, Ubid, and Tradus

• Companies and individuals engaging in e-commerce must be careful that their sales do not violate rules of various, county, state, or country jurisdictions
## Consumer-to-Consumer (C2C) E-Commerce (continued)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of sale</td>
<td>Thousands or millions of dollars</td>
<td>Tens or hundreds of dollars</td>
<td>Tens of dollars</td>
</tr>
<tr>
<td>Length of sales process</td>
<td>Days to months</td>
<td>Days to weeks</td>
<td>Hours to days</td>
</tr>
<tr>
<td>Number of decision makers involved</td>
<td>Several people to a dozen or more</td>
<td>One or two</td>
<td>One or two</td>
</tr>
<tr>
<td>Uniformity of offer</td>
<td>Typically a uniform product offering</td>
<td>More customized product offering</td>
<td>Single product offering, one of a kind</td>
</tr>
<tr>
<td>Complexity of buying process</td>
<td>Extremely complex, much room for</td>
<td>Relatively simple, limited discussion over</td>
<td>Relatively simple, limited discussion over</td>
</tr>
<tr>
<td></td>
<td>negotiation on price, payment and</td>
<td>price and payment and delivery options</td>
<td>payment and delivery options; negotiation</td>
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<tr>
<td></td>
<td>delivery options, quantity, quality,</td>
<td></td>
<td>over price</td>
</tr>
<tr>
<td></td>
<td>options, and features</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motivation for sale</td>
<td>Driven by a business decision or need</td>
<td>Driven by an individual consumer’s need or</td>
<td>Driven by an individual consumer’s need or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>emotion</td>
<td>emotion</td>
</tr>
</tbody>
</table>

*Table 5.1 Differences Between B2B, B2C, and C2C*
e-Government

• Use of information and communications technology to:
  – Simplify the sharing of information
  – Speed formerly paper-based processes
  – Improve the relationship between citizen and government

• Forms of e-Government
  – Government-to-consumer (G2C)
  – Government-to-business (G2B)
  – Government-to-government (G2G)
Mobile Commerce

- Mobile commerce (m-commerce) relies on the use of mobile, wireless devices to place orders and conduct business
- The Internet Corporation for Assigned Names and Numbers (ICANN):
  - Created a .mobi domain to help attract mobile users to the Web
Mobile Commerce in Perspective

- The market for m-commerce in North America:
  - Maturing much later than in Western Europe and Japan
- M-commerce spending in the United States:
  - Forecast to grow to $31 billion by 2016 representing about 7% of total B2C e-commerce sales
- M-commerce will succeed only if it provides services that truly meet customers’ needs
Electronic and Mobile Commerce Applications

• Many B2B, B2C, C2C, and m-commerce applications are being used in:
  – Retail and wholesale
  – Manufacturing
  – Marketing and advertising
  – Bartering and retargeting
  – Price comparison
  – Couponing
  – Investment and finance
  – Banking and e-boutiques
Retail and Wholesale

• Electronic retailing (e-tailing):
  – Direct sale from business to consumer through electronic storefronts

• Cybermall:
  – Single Web site that offers many products and services at one Internet location

• Manufacturing, repair, and operations (MRO):
  – Purchases often approach 40 percent of a manufacturing company’s total revenues
Manufacturing

• Electronic exchange:
  – Electronic forum where manufacturers, suppliers, and competitors buy and sell goods, trade market information, and run back-office operations
  – Private exchanges:
    • Owned and operated by a single company
  – Consortium-operated exchanges
    • Operated by a group of traditionally competing companies with common procurement needs
  – Independent exchanges:
    • Open to any set of buyers and sellers within a given market
Figure 5.1

Model of an Electronic Exchange

- Manufacturers
- Shoppers
- Suppliers
- Manufacturer's bank
- Shopper's bank
- Supplier's bank

Information about raw material needs, purchase orders, shipment notices, payment requests

Manufacturer's orders, information about raw material needs, shipment notices for manufacturers, payment requests

Payment approval, electronic transfer of funds, payment request

Payment request, electronic transfer of funds, payment approval
Marketing

• Market segmentation:
  – Identification of specific markets to target them with advertising messages

• Nielsen, the marketing and media information company:
  – Has developed its Business-Facts database that provides information for more than 12 million businesses
Advertising

- Mobile ad impressions are generally bought at:
  - Cost per thousand (CPM), cost per click (CPC), or cost per action (CPA)
  - Main measures of success: number of users reached, click through rate, and the number of actions users take
Bartering

- Many people and businesses have turned to bartering as a means to gain goods and services
- Number of Web sites have been created to support this activity
- Bartering transactions have tax-reporting, accounting, and other record-keeping responsibilities associated with them
Retargeting

- Over 95% of Web site visitors leave a shopping site without making a purchase
- Retargeting used by advertisers to recapture these shoppers by using targeted and personalized ads to direct shoppers back to a retailer’s site.
Price Comparison

• Price comparison:
  – Mobile phone services enable shoppers to compare prices and products on the Web
Couponing

• Over 300 billion coupons distributed each year in North America, only 1.1% of these coupons are redeemed.
• Many manufacturers and retailers now send mobile coupons directly to consumers’ smartphones.
• Standard red scanners used at checkout stands have difficulty reading information displayed on smartphones.
• Consumer must print out coupon, have it scanned and present to the clerk for scanning.
Investment and Finance

• The Internet:
  – Has revolutionized the world of investment and finance

• The brokerage business:
  – Adapted to the Internet faster than any other arm of finance
Banking

• Online banking customers:
  – Can check balances of their savings, checking, and loan accounts
  – Transfer money among accounts
  – Pay their bills

• Many banks support bill payment via cell phone
E-Boutiques

• Offer personalized shopping consultations for shoppers
• Operate on a philosophy of high customer service and strong, personal client relationships
## Advantages of Electronic and Mobile Commerce

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provides global reach</td>
<td>Allows manufacturers to buy at a low cost worldwide and offers enterprises the chance to sell to a global market right from the very start-up of their business.</td>
</tr>
<tr>
<td>Reduces costs</td>
<td>Eliminates time-consuming and labor-intensive steps throughout the order and delivery process so that more sales can be completed in the same period and with increased accuracy.</td>
</tr>
<tr>
<td>Speeds flow of goods and information</td>
<td>The flow of information is accelerated because of the established electronic connections and communications processes.</td>
</tr>
<tr>
<td>Increased accuracy</td>
<td>Enables buyers to enter their own product specifications and order information directly so that human data-entry error is eliminated.</td>
</tr>
<tr>
<td>Improves customer service</td>
<td>Increased and more detailed information about delivery dates and current status increases customer loyalty.</td>
</tr>
</tbody>
</table>

**Table 5.3**

Advantages of Electronic and Mobile Commerce
E-Commerce and M-Commerce Technology Infrastructure

Figure 5.2
Key Technology Infrastructure Components
Hardware

• Key e-commerce infrastructure ingredient:
  – Web server hardware platform complete with the appropriate software

• Key decision facing new e-commerce companies:
  – Whether to host their own Web site or to let someone else do it
  – Important to have adequate hardware backup to avoid a major disruption in case of a hardware failure
Web Server Software

• Each e-commerce Web site must have Web server software to perform fundamental services:
  – Security and identification
  – Retrieval and sending of Web pages
  – Web site tracking
  – Web site development
  – Web page development
E-Commerce Software

• Investigate and install e-commerce software to support five core tasks:
  – Catalog management to create and update the product catalog
  – Product configuration to help customers select the necessary components and options
  – Shopping cart facilities to track the items selected for purchase
  – E-commerce transaction processing
  – Web traffic data analysis to provide details to adjust the operations of the Web site
Mobile Commerce Hardware and Software

• For m-commerce to work effectively:
  – The interface between the wireless, handheld device and its user must improve

• Encryption can provide secure transmission

• Wireless Application Protocol (WAP):
  – Standard set of specifications for Internet applications that run on handheld, wireless devices
Electronic Payment Systems

- Digital certificate:
  - Attachment to an e-mail message or data embedded in a Web site that verifies the identity of a sender or Web Site
- Certificate authority (CA):
  - Trusted third-party organization or company that issues digital certificates
  - Responsible for guaranteeing that the people or organizations granted these unique certificates are, in fact, who they claim to be
Electronic Payment Systems (continued)

• Secure Sockets Layer (SSL):
  – Used to secure sensitive data

• Electronic cash:
  – An amount of money that is computerized, stored, and used as cash for e-commerce transactions

• Credit, charge, debit, p-, and smart cards:
  – Smart card:
    • Credit card-sized device with an embedded microchip to provide electronic memory and processing capability
## Table 5.5 Comparison of payment systems

<table>
<thead>
<tr>
<th>Payment System</th>
<th>Description</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credit card</td>
<td>Carries preset spending limit based on the user’s credit history</td>
<td>Each month the user can pay all or part of the amount owed</td>
<td>Unpaid balance accumulates interest charges—often at a high rate of interest</td>
</tr>
<tr>
<td>Charge card</td>
<td>Looks like a credit card but carries no preset spending limit</td>
<td>Does not involve lines of credit and does not accumulate interest charges</td>
<td>The entire amount charged to the card is due at the end of the billing period</td>
</tr>
<tr>
<td>Debit card</td>
<td>Looks like a credit card or automated teller machine (ATM) card</td>
<td>Operates like cash or a personal check</td>
<td>Money is immediately deducted from user’s account balance</td>
</tr>
<tr>
<td>Smart card</td>
<td>Is a credit card device with embedded microchip capable of storing facts about card holder</td>
<td>Better protected from misuse than conventional credit, charge, and debit cards because the smart-card information is encrypted</td>
<td>Not widely used in the U.S.</td>
</tr>
</tbody>
</table>
Electronic Payment Systems (continued)

- **P-Card:**
  - Credit card used to streamline the traditional purchase order and invoice payment processes
  - Issued to selected employees who must follow company rules and guidelines for its use
- **Payments using cell phones:**
  - Available options:
    - Payments linked to your bank account
    - Payments added to your phone bill
An Overview of Transaction Processing Systems

• Transaction processing systems (TPSs):
  – Capture and process detailed data necessary to update records about fundamental business operations
  – Include order entry, inventory control, payroll, accounts payable, accounts receivable, general ledger, etc.
  – Provide employees with data to help them achieve their goals
An Overview of Transaction Processing Systems (continued)

Figure 5.4

TPS, MIS/DSS, and Special Information Systems in Perspective
Traditional Transaction Processing
Methods and Objectives

• Batch processing system:
  – Data processing in which business transactions are:
    • Accumulated over a period of time
    • Prepared for processing as a single unit or batch

• Online transaction processing (OLTP):
  – Data processing in which each transaction is processed immediately
Figure 5.5
Batch versus Online Transaction Processing
(a) Batch processing inputs and processes data in groups. (b) In online processing, transactions are completed as they occur.
Figure 5.6
Integration of a Firm’s TPS
Transaction Processing Activities

• TPSs:
  – Capture and process data that describes fundamental business transactions
  – Update databases
  – Produce a variety of reports

• Transaction processing cycle:
  – The process of data collection, data editing, data correction, data manipulation, data storage, and document production
Figure 5.7
Data Processing Activities Common to Transaction Processing Systems
Data Collection

• Capturing and gathering all data necessary to complete the processing of transactions

• Data collection can be:
  – Manual
  – Automated via special input devices

• Data should be:
  – Collected at source
  – Recorded accurately, in a timely fashion
Data Collection (continued)

Figure 5.8

Point-of-Sale Transaction Processing System
The purchase of items at the checkout stand updates a store’s inventory database and its database of purchases.
Data Editing

• Checking data for validity and completeness to detect any problems
• Examples:
  – Quantity and cost data must be numeric
  – Names must be alphabetic
Data Correction

• Reentering data that was not typed or scanned properly
• Error messages must specify the problem so proper corrections can be made
Data Manipulation

• Performing calculations and other data transformations related to business transactions
• Can include:
  – Classifying data
  – Sorting data into categories
  – Performing calculations
  – Summarizing results
  – Storing data in the organization’s database for further processing
Data Storage

• Updating one or more databases with new transactions
• After being updated, this data can be further processed and manipulated by other systems
Document Production and Reports

• Generating output records, documents, and reports:
  – Hard-copy paper reports
  – Displays on computer screens
• Results from one TPS can be inputs to another system
Traditional Transaction Processing Applications

• A TPS typically includes the following types of systems:
  – Order processing systems
  – Accounting systems
  – Purchasing systems
## Table 5.6 Sample of integrated TPS solutions for SMEs

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Software</th>
<th>Type of TPS Offered</th>
<th>Target Customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>AccuFund</td>
<td>AccuFund</td>
<td>Financial reporting and accounting</td>
<td>Non-profit, municipal and government organizations</td>
</tr>
<tr>
<td>OpenPro</td>
<td>OpenPro</td>
<td>Complete ERP solution including financials, supply chain management, e-commerce,</td>
<td>Manufacturers, distributors, and retailers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>customer relationship management, and retail POS system</td>
<td></td>
</tr>
<tr>
<td>Intuit</td>
<td>QuickBooks</td>
<td>Financial reporting and accounting</td>
<td>Manufacturers, professional services, contractors, nonprofits, and retailers</td>
</tr>
<tr>
<td>Sage</td>
<td>Timberline</td>
<td>Financial reporting, accounting, and operations</td>
<td>Contractors, real estate developers, and residential builders</td>
</tr>
<tr>
<td>Redwing</td>
<td>TurningPoint</td>
<td>Financial reporting and accounting</td>
<td>Professional services, banks, and retailers</td>
</tr>
</tbody>
</table>
Enterprise Resource Planning

• An enterprise system:
  – Central to the organization
  – Ensures information can be shared across all business functions and all levels of management
  – Employs a database of key operational and planning data that can be shared by all
Enterprise Resource Planning (continued)

Figure 5.9

Enterprise Resource Planning System
An ERP integrates business processes and the ERP database.
An Overview of Enterprise Resource Planning

• ERP systems:
  – Evolved from materials requirement planning systems (MRP)

• Large organizations:
  – The first to take on the challenge of implementing ERP
Advantages of ERP

• Improved access to data for operational decision making
• Elimination of costly, inflexible legacy systems
• Improvement of work processes
• Upgrade of technology infrastructure
## Challenges to Successful ERP

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost and disruption of upgrades</td>
<td>Most companies have other systems that must be integrated with the ERP system, such as financial analysis programs, e-commerce operations, and other applications that communicate with suppliers, customers, distributors, and other business partners. This integration takes even more effort and time.</td>
</tr>
<tr>
<td>Difficulty in managing change</td>
<td>Companies often must radically change how they operate to conform to the ERP’s work processes. These changes can be so drastic to long-time employees that they depart rather than adapt to the change, leaving the firm short of experienced workers.</td>
</tr>
<tr>
<td>Cost and long implementation lead time</td>
<td>The average ERP implementation cost is $5.5 million with an average project duration just over 14 months.</td>
</tr>
<tr>
<td>Management of software customization</td>
<td>The base ERP system may need to be modified to meet mandatory business requirements. This modification can become extremely expensive and further delay implementation.</td>
</tr>
<tr>
<td>User frustration with the new system</td>
<td>Effective use of an ERP system requires changes in work processes and in the details of how work gets done. Many users initially balk at these changes and require much training and encouragement.</td>
</tr>
</tbody>
</table>
Leading ERP Systems

• ERP systems used in wide variety of organizations
• Business needs of these various organizations varies widely, thus no one ERP solution from a single vendor is “best” for all organizations
<table>
<thead>
<tr>
<th>ERP Systems for Large Organizations</th>
<th>ERP Systems for Mid-sized Organizations</th>
<th>ERP Systems for Small Organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microsoft Dynamics</td>
<td>Epicor</td>
<td>ABAS</td>
</tr>
<tr>
<td>Oracle</td>
<td>Industrial and Financial Systems</td>
<td>Activant Solutions, Inc.</td>
</tr>
<tr>
<td>Oracle eBusiness Suite</td>
<td>Infor</td>
<td>Baan</td>
</tr>
<tr>
<td>Oracle JD Edwards</td>
<td>Lawson</td>
<td>Compiere</td>
</tr>
<tr>
<td>Oracle Peoplesoft</td>
<td>Plex</td>
<td>Netsuite</td>
</tr>
<tr>
<td>SAP</td>
<td>Sage</td>
<td>Syspro</td>
</tr>
</tbody>
</table>

Supply Chain Management (SCM)

• A system that includes:
  – Planning, executing, and controlling all activities involved in raw material sourcing and procurement
  – Converting raw materials to finished products and warehousing and delivering finished product to customers
Supply Chain Management (SCM) (continued)

• Process for developing a production plan:
  – Sales forecasting
  – Sales and operations plan (S&OP)
  – Demand management
  – Detailed scheduling
  – Materials requirement planning (MRP)
  – Purchasing
  – Production
Financial and Managerial Accounting

• General ledger:
  – Main accounting record of a business

• ERP system:
  – Captures transactions entered by workers in all functional areas of the business
  – Creates associated general ledger record to track the financial impact of the transaction
Financial and Managerial Accounting (continued)

• Financial accounting
  • Captures and records all transactions that affect a company’s financial state and reports
  • Must be prepared in strict accordance to SEC, IRS, and FASB

– Managerial accounting
  • Uses both actual and forecasted data to provide information to conduct daily operations, plan future operations, and develop overall business strategies
Customer Relationship Management

- Key features of a CRM system:
  - Contact management
  - Sales management
  - Customer support
  - Marketing automation
  - Analysis
  - Social networking
  - Access by smartphones
  - Import contact data
Product Lifecycle Management (PLM)

• PLM software provides means for managing all data associated with product development, engineering design, production, support, and disposal of manufactured goods
• Data gathered and distributed to various groups as product advances through above stages
• Data includes design and process documents, bill of materials definitions, product attributes, and documents needed for FDA and environmental compliance
Hosted Software Model for Enterprise Software

• Many business application software vendors:
  – Are pushing the use of the hosted software model for SMEs

• Using the hosted software model:
  – Means the small business firm does not need to employ a full-time IT person to maintain key business applications
**Table 5.10** Advantages and disadvantages of hosted software model

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decreased total cost of ownership</td>
<td>Potential availability and reliability issues</td>
</tr>
<tr>
<td>Faster system startup</td>
<td>Potential data security issues</td>
</tr>
<tr>
<td>Lower implementation risk</td>
<td>Potential problems integrating the hosted products of different vendors</td>
</tr>
<tr>
<td>Management of systems outsourced to experts</td>
<td>Savings anticipated from outsourcing may be offset by increased effort to manage vendor</td>
</tr>
</tbody>
</table>
Summary

• Electronic commerce:
  – Conducting business activities electronically over computer networks

• Mobile commerce:
  – The use of wireless devices such as cell phones and smartphones to facilitate the sale of goods or services—anytime, anywhere

• Electronic payment systems:
  – Key component of the e-commerce infrastructure
Summary (continued)

• Transaction processing system:
  – An organized collection of people, procedures, software, databases, and devices

• Enterprise resource planning (ERP) software
  – Supports the efficient operation of business processes

• Production and supply chain management process starts with sales forecasting
Summary (continued)

• A CRM:
  – Helps an organization build a database about its customers

• A PLM:
  – Provides means for managing all data associated with product development, engineering design, production, support, and disposal of manufactured goods