Application Models for E-Commerce

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www.cognella.com

ISBN-13: 978-1-63157-209-8 (e-book)
Collection ISSN: 2156-8200 (electronic)

www.businessexpertpress.com

A publication in the Business Expert Press Supply and Operations Management collection

Cover and interior design by S4Carlisle Publishing Services Private Ltd., Chennai, India

Contents

Preface

E-commerce is mushrooming in both business-to-business and business-to-consumer sectors. It shakes the foundation of most industries, leads to entirely new kinds of businesses, and directly affects both our careers and the way we live. One of the most significant changes is the manner in which companies conduct business. Specifically, how they manage their resources, connect and communicate with customers, and negotiate and outsource from suppliers.

In many cases, the management of enterprise resources is based on e-commerce systems and applications. E-commerce may be defined in a variety of ways: as a technological tool for web development, as an online transaction between a buyer and a seller, or as an activity that adds value to business customers and consumers. The main goal of this book is to explain in a systematic way the managerial aspects of various e-commerce models and applications, as well as to demonstrate their value-added capabilities.

Application Models for E-Commerce provides a detailed description and analysis of e-commerce business models, including their components, classification, and performance results. This book also presents managerial aspects of various up-to-date e-commerce models. Among them are:

- Demand-side e-commerce models associated with selling goods, services, and information to business customers and consumers.
- Supply-side e-commerce models used for purchasing and outsourcing from suppliers.
- Collaborative commerce models involved in sharing information and business data, and also providing collaborative decisions for new product design and development.
- Mobile commerce models that employ wireless devices and wireless communication for buying, selling, and collaborating online.

- Electronic payment models used for making payment transactions via the Internet.
- Electronic services employed for supporting and facilitating e-commerce.

Application Models for E-Commerce provides methodology and practical examples of selecting and implementing e-commerce business models and associated online applications. It also emphasizes managerial aspects of enterprise resources planning (ERP) systems, which are considered an integral part of e-commerce management today.

I hope that after reading this book you will not only gain knowledge but also develop essential skills required for managing e-commerce models and applications. You will obtain a clear understanding of the current development and future trends in e-commerce. All this will better prepare you to take on responsibilities in managing and improving e-commerce models and applications.

Sincerely,
Zinovy Radovilsky

CHAPTER 1

What is E-Commerce?

1.1 The Internet ERA

In 2005, the CNN channel conducted a survey of the most important global innovations in the past quarter century. What do you think was the top-rated innovation? What would you rate as innovation #1? You are correct—the ***Internet*** was voted as the most important innovation in the past quarter century along with other important inventions like the cell phone, the personal computer, fiber optics, e-mail, and others[1].

The Internet's infrastructure is networked computing that connects computers and other electronic devices by telecommunication networks. In the recent years, the Internet has become a global phenomenon that has profoundly changed the nature of communication between people and businesses. It has also become a major distribution channel, where transactions to purchase goods and services are made. The Internet has profoundly changed economics, markets, and even industry structures in many countries[2].

The ***World Wide Web,*** commonly abbreviated as ***WWW*** or the ***Web,*** is one of the main ways of accessing and utilizing information over the Internet. It is an information-sharing model that is built on top of the Internet [3]. The Web employs the Hyper-Text Transmission Protocol (HTTP), the main tools used in the Internet, to transmit Internet-based documents (data). It also uses browsers like Internet Explorer and Firefox to access and view documents called web pages (web sites) that are linked to each other via hyperlinks. Web documents also contain graphics, sounds, text, and video. The Internet, not the Web, is also used for e-mail, instant messaging, and file transferring (using file transfer protocol or FTP)[3].

The growth of Internet-related activities has been tremendous from the last decade of the 20th century to the modern time (see Figure 1.1) [4]. The number of Internet domain hosts (companies and consumers that have

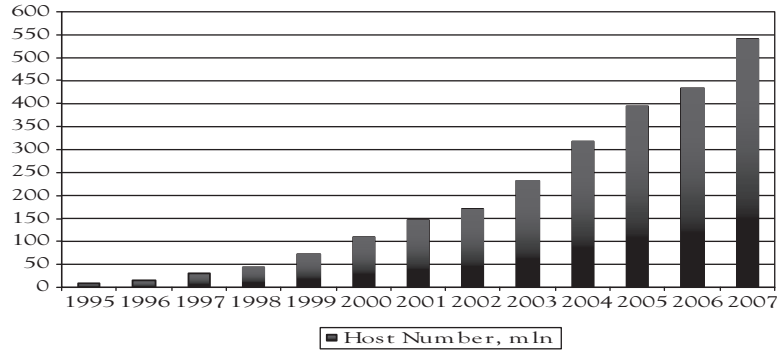

Figure 1.1 Internet Hosts' Growth

their own web pages and provide web site service to others) has grown, at an accelerated rate, from less than 10 million hosts in 1995 to near 550 million hosts in 2007[3]. This number will certainly continue to grow in the future.

What drives people and organizations to increase their utilization of the Internet and World Wide Web? Why is it so popular today? The answers to these questions can be quite clear if we consider the Internet as an incredible medium that provides:

- Rich sources of information and news for different subjects that may not be available in other media.
- Quick access to this information and news at any time and at any place in the world, provided Internet access may be established.
- Easy search, selection, and retrieval of information and news.
- Easy communication and information sharing.
- Extensive business opportunities in terms of selling, buying, transacting, and communicating on the Internet.

The last point is in the core of developing commercial solutions on the Internet called "e-commerce."

1.2 E-Commerce and E-Business Definitions

E-commerce has become a significant element in the modern global economic environment. "E-commerce" is defined as the use of a computer

network, primarily the Internet, to buy and sell products, services, information, and communication. However, e-commerce may also be considered as an application of technology using the Internet. It may also represent another aspect of being a tool for increasing efficiency and lowering costs in organizations. The three definitions of e-commerce are summarized in Table 1.1.

All aspects of e-commerce are important and deserve in-depth explanation. In this chapter and other chapters of this book, we will concentrate on the business side of e-commerce, considering e-commerce as a business phenomenon (second definition), and as a tool that adds value to business and customers (third definition).

As we mentioned before, e-commerce communication and transactions are predominantly done through Internet-based web sites. These online web sites may be used to sell products through electronic storefronts, provide customer service, disseminate information, provide business intelligence (for example, create recommendations of what products to purchase), and many other possible value-added offerings or activities (see Figure 1.2). Sometimes, the e-commerce web sites are available only to internal customers or employees of an organization, and are not to anyone outside the organization. ***Enterprise Intranet*** is usually an organization's internet, which is accessible to employees of this organization and other responsible parties using the secure login environment. This is done to protect the organization's sensitive information, and not allow

Table 1.1 Definitions of E-commerce

E-Commerce Aspects	***E-Commerce Definitions***
Technology	E-commerce is the ***application of technology*** used to automate and improve business transactions utilizing predominantly Internet-based web sites.
Business	E-commerce is used to provide the ***capability of buying and selling*** products, services, and information on predominantly Internet-based web sites.
Value	E-commerce is a ***tool*** that may be used by business customers and consumers to create value in the Internet-based transactions by increasing efficiency and cutting costs while improving the quality of goods and services.

Figure 1.2 E-commerce Networking

all kinds of online "intruders" to access this information (see Figure 1.2). Companies are also required, in many cases, to have protected and safe connections between their web sites and those of their suppliers, distributors, logistics and financial services, and many others. ***Enterprise Extranet*** uses internet technology to establish a private network connection between a company's e-commerce web site and its external suppliers, service, and information providers (see Figure 1.2). In some cases, an extranet may be regarded as a part of the company's intranet that is expanded to users outside the company.

In many cases, instead of "e-commerce" the term "***e-business***" is used. Are these terms different or the same? In general, these terms are, in fact, different. "E-business" is a broader concept than "e-commerce," in that it does not only represent commercial applications of buying and selling. It is also associated with servicing customers and collaborating between business partners, as well as conducting Internet-related business transactions within or outside an organization. However, in modern practice, these two terms are used interchangeably, and become almost like synonyms. Most e-business web sites contain e-commerce-related activities like selling or buying online. At the same time, many e-commerce web sites have elements of collaboration with customers or business partners, as well as online service and support. In this book, we will be using the term "e-commerce" to designate both commercial and business activities, i.e., e-business and e-commerce on the Internet.

1.3 History and Current Development of E-Commerce

The "life" of e-commerce as a business system is relatively short as compared with many other existing business and management systems.

E-commerce started around 1995, and since then has had an interesting and sometimes turbulent history.

The proliferation of Internet-based computer technology in the last five years of the 20th century triggered extensive development of different kinds of e-commerce tools and applications. Many new e-commerce companies were born at that time. Their intention was to sell products to business and individual consumers, outsource/buy products from businesses, or provide a virtual environment to facilitate the exchange of products and services between the companies. It was a time of "irrational exuberance," when every day several Internet-based companies started their e-commerce business online with great expectations of soon becoming a publicly traded company and earning a tremendous amount of cash after its initial public offerings (IPO) in the stock market. The notion behind this was that the stock market would quickly appreciate almost any new e-commerce development. This was the era of the so called ***"dot-com bubble"*** of e-commerce. The term evidently came from the point that most of these companies had an Internet name of their web site ending with ".com."

By the year 2000, the dot-com bubble reached its peak, from which started an almost freefall of the dot-com stock prices, overall customer excitement and expectation, and venture investments in e-commerce. Between 2000 and 2003, a significant number of dot-com companies closed, were acquired, or merged with other businesses. The many reasons for this crash of the dot-com bubble have been well documented in various literature sources. However, the main reason for the disappearance of these companies was their inability to be profitable and to provide value to their customers. "If it does not make cents, it does not make sense." Many companies were created by bright computer professionals who knew how to design and start a technologically advanced e-commerce solution. However, these professionals had little to no ability to provide an efficient and effective business-related model for their solutions.

At the end of the crash in 2001–2002, a new trend appeared evident within e-commerce—a trend of developing and implementing e-commerce solutions that were not only more business-oriented and targeted the need to provide significant value to the customers but also by doing that, be more financially sound, i.e., profitable. This designated

a new era of e-commerce that had some major differences with the previously used "dot-com" approach in e-commerce (see Table 1.2).

The table clearly depicts the main differences between the old and new approaches to e-commerce. Instead of old e-commerce decisions being based on technology innovations and revenue emphasis, the new e-commerce development is mostly based on the need to develop a solid business model that would emphasize value-added offerings for the customers and profits for the company. According to some literature sources [5], more than 60% of all e-commerce companies were profitable in 2004 as opposed to only 10% of them being profitable in 2001. Instead of the entrepreneurial nature of most dot-com companies and pure online strategies (doing all business online), the new e-commerce development is mostly associated with traditional firms. These firms range from large companies like IBM and GE to a myriad of small and mid-size enterprises (SME) who embrace an e-commerce strategy as a part of the overall business strategy. In this case, it may be called a ***mixed*** or ***"click-and-brick" strategy.*** Finally, during the e-commerce evolution, many special standards regulating its activities and communication through e-commerce have been developed or improved. For example, XML (eXtensible Markup Language) and XBML (business XML) computer languages were developed to improve communication between different e-commerce web sites. The Electronic Product Code (EPC) was created to recognize the product being sold or delivered using mobile commerce equipment.

A new changing trend in e-commerce is associated with utilization of the Internet-related technology and software for improving

Table 1.2 Dot-Com and new E-Commerce compared

"DOT-COM" E-Commerce	New E-Commerce
Technology-driven	Business-driven
Revenue growth emphasis	Earning and profits emphasis
Venture capital financing	Traditional financing
Pure online strategies	Mixed "click-and-brick" strategies
Entrepreneurial	Traditional firms
Lack of standards	Stronger regulation/standards

communication, information sharing, collaboration, and functionality of the Web, which is commonly defined as ***Web 2.0.*** Web 2.0 means proliferation of connectivity and interactivity of web-delivered content that allows users to—besides obtaining information from a web site—own the data on the Internet, gain control over this data, and add value to the web site as they use it. The key Web 2.0 applications and services include[6]:

- ***Blog (web-log)–a*** webpage consisting of brief user opinions, views, and information, or links (also called posts), arranged chronologically within a menu-driven format.
- ***Wiki–a*** webpage or set of web pages that can be easily edited by anyone who is allowed access. A well-known example is Wikipedia, the free Internet encyclopedia.
- ***Podcast–audio*** recordings, usually in MP3 format, of talks, interviews and lectures, which can be played either on a desktop computer or on a wide range of handheld MP3 devices.
- ***Multimedia sharing–***services that facilitate the storage and sharing of multimedia content such as video (YouTube), photos (Flickr), and podcasts (Odeo).
- ***Social*** networking–professional and social networking sites like facebook.com and myspace. com that facilitate meeting people, finding like minds, and sharing content.
- ***RSS–a*** family of formats which allow users to find out about updates to the content of RSS-enabled websites, blogs or podcasts without actually having to go and visit the site. Information from the website (typically, a new story's title and synopsis, along with the originating website's name) is collected within a feed (which uses the RSS format) and 'piped' to the user in a process known as syndication.

1.4 E-Commerce Growth

Since its creation, e-commerce has experienced steady growth with an increasing rate of growth in the first decade of the 21st century. Survey after survey conducted by a variety of companies has indicated an accelerating

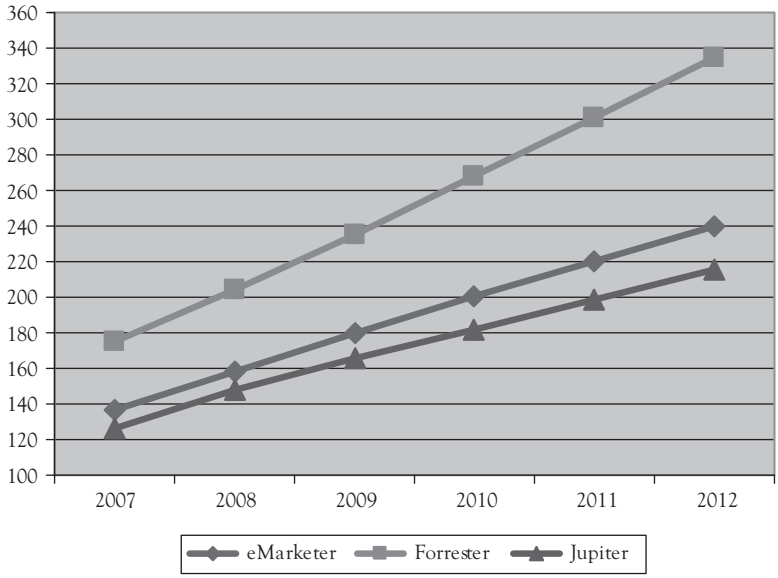

Figure 1.3 Comparative Estimates: U.S. Retail E-commerce Sales, (billions)[10]

volume of transactions in business-to-consumer (B2C) and particularly in business-to-business (B2B) e-commerce. In 2003–2005, more than 70% of companies in the United States have experimented with purchasing online; and around 15–20% of their total spending was being channeled via the Internet[7, 8]. According to the U.S. Census Bureau, B2B e-commerce covers more than 20% of all business transactions in the U.S.A[9].

Although B2B sales continue to dwarf B2C sales, many retailers now see online sales as their best opportunity for new growth. The estimates made by different consulting firms[10] show that by the end of 2012, the sales through e-commerce will be between 210 and 340 billion dollars (see Figure 1.3). The average growth of retail e-commerce is estimated to be from 12% to 14% annually[11]. In addition, the proportion of retail e-commerce in the total U.S. retail sales is predicted to grow from approximately 4% in 2006 to 13% in 2010[11].

The implementation of e-commerce also varies across the globe. The highest level of e-commerce sales as a proportion of the total sales is in Australia, South Korea, and France—with more than 16% of the total sales in 2004, United States—more than 13%, and Japan—around 9%[12].

The projected e-commerce growth raises the interest of researchers to understand how effective and efficient this e-commerce implementation has been, and what influences e-commerce results in manufacturing and service organizations. Despite the evident increase in importance of e-commerce and effectiveness of its implementation, until recently little research has been undertaken to investigate factors that influence the results of e-commerce solutions. This knowledge not only has potential benefits for organizations considering e-commerce implementation but also for those organizations that have already engaged in such implementations, because it can provide them with an understanding of how to facilitate and improve their implementation processes.

1.5 Main Characteristics, Dimensions, and Types of E-Commerce

The main characteristics of e-commerce are its pervasiveness and inexorability. ***Pervasiveness of e- commerce*** means its persistent development and proliferation in business and non-profit organizations of various sizes. ***Inexorability of e-commerce*** represents its inevitable and unstoppable nature in terms of the high rates of growth that were described in the previous section. Inexorability also means that e-commerce tends to transcend geographical, cultural, and political differences of nations and countries and enables common business information and web sites for the entire world. Finally, inexorability represents the ability of e-commerce to change the business environment, and create completely new business relations. E-commerce development has completely revitalized different industries including jewelry, banking, telecommunications, hotels, real estate, software, and many others[13].

If you ask yourself why e-commerce development is so pervasive and inexorable, the answer should come from the simple fact that e-commerce can be a rich source of value for organizations that employ it. This value comes from ***e-commerce disintermediation***, which means an act of taking out an intermediary organization used for channel delivery of products and services. For example, direct sales of computers through the Internet by Dell or Hewlett-Packard (HP) eliminates any intermediate organizations like distributors and retailers. This leads to reduced cost

of product delivery to the customers and increased profits. At the same time, ***e-commerce re-intermediation*** facilitates creation of third party organizations that provide virtual environments for connecting buyers and sellers or, generally, business partners for transactions on the Internet. The creation of companies like eBay or Amazon is a typical example of e-commerce re-intermediation.

Organizations may have various levels of e-commerce implementation. The differentiation between these organizations is based upon three dimensions[14]:

- ***Products and services*** produced and sold by an organization that can range from traditional physical to fully digitized products (services).
- ***Processes*** established in the organization that can also vary from physical to fully digitized (online) processes.
- ***Agent***, which is an organization itself, ranging from a traditional "brick-and-mortar" firm to a virtual online organization.

Pure e-commerce organizations are characterized by their products/services and processes being completely digitized, as well as the whole organization being a digital agent company. These organizations are also known as ***virtual or pure-play e-commerce*** companies. An example of such an organization is www.YouTube.com, a famous online site for uploading, storing, and sharing videos worldwide. It is a pure e-commerce company, because all its products/services, like video play lists or subscriptions, are digitized; its processes like video search, creating video play lists, etc. are also digitized; and, finally, this organization is a virtual (completely online) digital agent.

Partial e-commerce organizations are those organizations that may have some physical e-commerce dimensions like physical products or processes. For example, Amazon purchases and stores books (physical products) that it then sells online. The company also organizes a logistics (physical) process of book delivery to the customers. However, Amazon also sells many digital products (like videos and music) and provides a variety of digitized processes. In this case, Amazon is a typical partial e-commerce organization.

"Click-and-mortar" organizations are companies that conduct some e-commerce activities, for example, selling computers, printers, or software through e-commerce channels like HP or Gateway, but provide their primary business in the physical world. Contrary to that, ***"brick-and- mortar" organizations*** perform all their business without the Internet by selling their physical products in stores or conducting processes by means of physical agents only. The number of "brick- and-mortar" companies have significantly shrunk over the years as e-commerce proliferation has grown in a variety of traditional companies.

E-commerce organizations are also differentiated by the transactions and interactions they make. One of the common types are the ***Business-to-Business (B2B) e-commerce*** organizations that provide transactions, communication, and interactions between business partners. ***B2B transactions*** may include selling products and services to businesses, outsourcing from suppliers, logistics, and distribution of products to companies, financial transactions, and others. B2B transactions may be done on the downstream of the organization's supply chain, i.e., from raw materials, to manufacturing organizations, and then to distribution and retail (see Figure 1.4). B2B can also be done on the upstream of the company supply chain, for example purchasing materials from suppliers, or outsourcing a logistics provider for a manufacturing organization (see Figure 1.4).

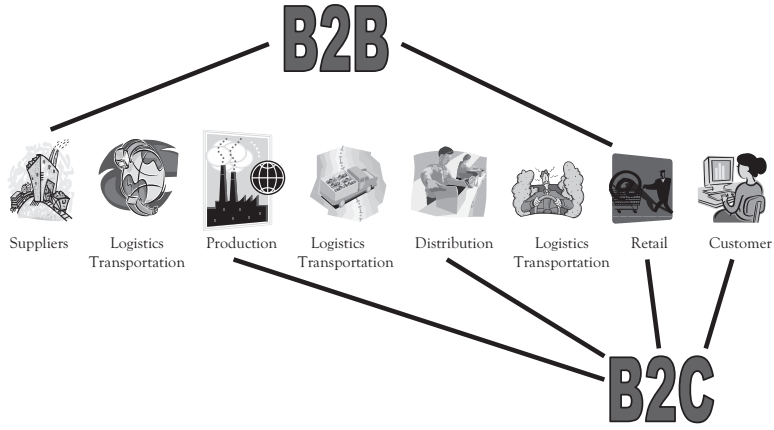

Figure 1.4 B2B and B2C E-commerce

Another very common type is ***Business-to-Consumer (B2C) e-commerce*** organizations which provide transactions, communication, and interactions with consumers (end users). These organizations can be manufacturing, distribution, retail, or other companies that sell their products or services to consumers online. B2C transactions and interactions are done on the downstream of the organization's supply chain (see Figure 1.4).

Since the beginning of the e-commerce era, both B2B and B2C transactions have experienced consistent growth in revenues. These revenues are derived from selling products and services online to business customers or end consumers. They also include revenues from financial transactions via the Internet.

The volume of transaction revenues in B2B e-commerce is substantially larger than that of B2C. For example, in 2004 the B2B transaction revenues in U.S.A were around $1,812 billion or 93% of all e-commerce revenues. At the same time, the revenues from B2C e-commerce transactions were $130 billion, which was just 7% of the total business-related e-commerce transactions[9].

Besides B2B and B2C transactions, e-commerce transactions and interactions may have other types:

- ***Consumer-to-Consumer (C2C)*** e-commerce is used in organizations that provide private sales and auctions between individual consumers.
- ***Peer-to-Peer (P2P)*** e-commerce allows networked peer computers to share data and processing with each other directly; can be used in C2C, B2B, and B2C e-commerce.
- ***Government-to-Business (G2B)*** and ***Government-to-Consumer (G2C)*** e-commerce enable government organizations to provide information, interaction, business, and services to companies and consumers respectively.
- ***Business-to-Business-to-Consumer (B2B2C)*** e-commerce organizations provide some products or services to client businesses that maintain their own customers. eBay, for example, provides a virtual marketplace to its customers

(business and individuals) that sell products through eBay to their own customers.

- ***Mobile Commerce (M-commerce)*** makes possible e-commerce transactions and activities to be conducted in a wireless environment, for example, buying products and services from a web site on a cell phone.
- ***Location-based Commerce (L-commerce)*** provides m-commerce transactions targeted at individuals in specific locations and at specific times, like navigation systems in cars.
- ***Intra-business e-commerce*** includes all internal organizational activities that involve the exchange of goods, services, or information.
- ***Collaborative Commerce (C-commerce)*** creates an environment where individuals or groups communicate or collaborate online.

Many of these transactions types, including mobile and location-based commerce, collaborative commerce, and business-to-business-to-consumer commerce will be discussed in this book.

1.6 Value Creation in E-Commerce

As previously mentioned, the main reason for the growth and proliferation of e-commerce (pervasiveness and inexorability) is its ability to create value for an organization that implemented the e-commerce solutions, for the customers of this organization, and for its partners and suppliers. ***Value creation*** represents the potential or expected and actual ***monetary and non-monetary results*** of utilizing an e-commerce business model. The main monetary results of value creation include ***revenue enhancement*** through sales growth and price differentiation, and ***cost reduction*** related to cost of goods sold, operating costs, and asset intensity reduction (see Figure 1.5).

Revenue enhancement is the first aspect of value creation. E-commerce develops a new online channel for selling a company's products and services along with existing traditional channels. This potentially generates additional sales volume through this channel, and, at the same time, can

facilitate product sales through the existing channels. For example, a consumer may use Walmart's web site to purchase a variety of products that can be then sent to a nearby store for customer pickup. At the same time, while coming to the store for the pickup, the consumer may potentially end up buying some more products from the company. In this case, the channels do not cannibalize, but rather complement each other and provide higher sales volumes and revenues. The revenue increase may be also associated with the ability to quickly adjust prices depending on customer segments (for example, repeat customers will pay a higher price than new customers will) or by increasing prices through building the company's brand name recognition on the Internet. In addition, e-commerce can enable quick matching of customer demand with existing supply of products, and, thus, provide better knowledge of what prices need to be established and promoted.

Besides the opportunity of increased revenue, e-commerce is also an important source of ***cost reduction.*** This is the second aspect of value creation through e-commerce (see Figure 1.5). The cost of goods sold through online web sites may be reduced by providing a direct selling channel to the customers and reducing the need for intermediaries like wholesalers and retailers. Taking out the intermediaries can reduce the cost of sales up to 25–30%. At the same time, by using e-commerce for outsourcing materials, components, and services, companies can reduce process and transaction costs associated with outsourcing. E-commerce enables companies to simplify outsourcing processes and reduce related

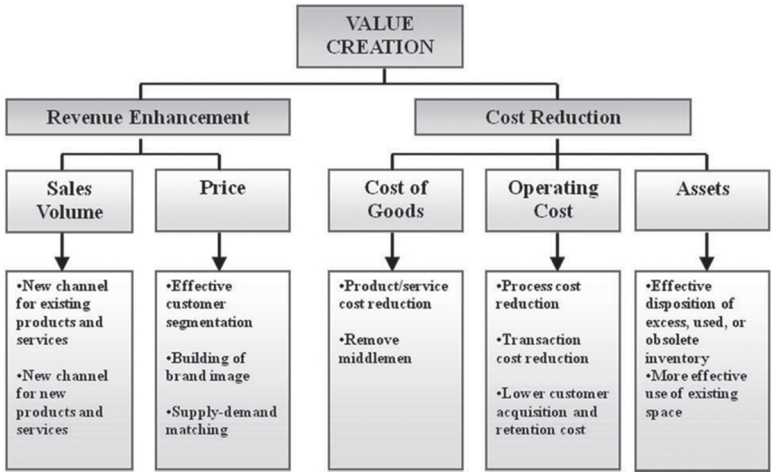

Figure 1.5 Creating Monetary Value in E-commerce

costs. Finally, e-commerce creates opportunities for *asset intensity reduction,* which means (a) reducing capital costs by effective, speedy disposition (selling) of unnecessary or old equipment as well as excess or obsolete inventory, and (b) more effectively using existing space by reducing inventory clutters with e-commerce.

The results of the survey conducted among the companies that implemented e-commerce solutions[15] revealed that more than 61% of respondents stated that implemented e-commerce solutions increased or significantly increased revenues. At the same time, 58% of those responding achieved a decrease or significant decrease in costs through the implementation of e-commerce solutions. According to the survey results, the most important cost categories that were reduced appeared to be transactional cost specifically in terms of paperless transactions, administrative cost associated with reduction of purchasing procurement personnel, inventory cost, and reduction of prices of materials and services. All this represents typical cost savings results associated with e-commerce implementation.

The ***non-monetary value creation*** may incorporate a variety of tangible and intangible results relevant to e-commerce development:

Improved customer satisfaction through providing more choices of products, services, and information.

Customization and personalization of product and service offering.

Improved quality of products and services.

Faster delivery schedules.

Extended hours of work (24 hours, 7 days a week).

Global outreach of products, services, and information.

Permanent access to information.

According to the survey [15], organizations that implemented e-commerce presented relatively evenly distributed answers about the benefits of e-commerce implementation, which are shown in Table 1.3.

However, responses to the question of drawbacks and problems in implementing e-commerce solutions demonstrated that the three most critical problems in e-commerce implementation were high costs of implementation, data security, and low liquidity (not enough buyers and sellers), which covered 66.7% of responses (see Table 1.4).

Table 1.3 Benefits of implementing E-Commerce solutions

Main benefits of implementing E-Commerce solutions in organizations	Number of responses (%)
Shorter procurement cycle	13.3%
Improve communication and relationships with suppliers	13.3%
Improve communication and relationships with customers	12.6%
Better reliability and control of purchase orders	11.9%
New channel of marketing and sale with global outreach	10.4%
Reduce inventory level and cost	8.9%
Eliminate or reduce the number of middlemen	8.9%
Reduce purchase prices	7.4%

Table 1.4 Drawbacks and problems in E-Commerce implementation

Main drawbacks and problems in implementing E-Commerce solutions in organizations	Number of responses (%)
High costs of implementing e-commerce solutions	26.7%
Data security	26.7%
Not enough buyers and/or sellers online	13.3%
Poor integration with internal "back-office" systems	8.9%
Low return on investment and/or long payback period	6.7%
Not enough speed of connection/bandwidth problems	6.7%

1.7 Chapter Summary: Managerial Aspects of E-Commerce

1. ***E-commerce*** has become a significant element in the modern global economic environment. It represents the use of a computer network, primarily the Internet, to buy and sell products, services, information, and communication. E-commerce is also an application of technology using the Internet. In addition, it is a tool for increasing efficiency and lowering costs in organizations.
2. The main characteristics of e-commerce are its ***pervasiveness*** and ***inexorability.*** Pervasiveness of e-commerce means its persistent development and proliferation in business and nonprofit organizations of various sizes. Inexorability of e-commerce represents its inevitable and unstoppable nature in terms of the high rates of growth that were described in the previous section.
3. e-commerce can be a rich source of value for organizations that employ it. E-commerce ***disintermediation*** means an act of taking

out intermediary organizations used for channel delivery of products and services though e-commerce supply chain. At the same time, e-commerce ***re-intermediation*** facilitates creation of third party organizations that provide virtual environments for connecting buyers and sellers or generally, business partners for transactions on the Internet.

4. Organizations may have various levels of e-commerce implementation. ***Pure e-commerce*** organizations are characterized by their products/services and processes being completely digitized. ***Partial e-commerce*** organizations are those organizations that, besides digital products and processes, may have some physical e-commerce dimensions like physical products or processes. ***"Click-and-mortar"*** organizations are companies that conduct some e-commerce activities, but provide their primary business in the physical world.
5. E-commerce organizations are also differentiated by the transactions and interactions they make. The most common types are Business-to-Business (B2B) and Business-to-Consumer (B2C) e-commerce transactions. Besides B2B and B2C transactions, e-commerce transactions and interactions may have other types: consumer-to-consumer (C2C), business-to-business to-consumer (B2B2C), government-to-business (G2B), mobile commerce (M-commerce), Location-based Commerce (L-commerce), and some others.
6. Value creation in e-commerce represents the potential or expected and actual monetary and non-monetary results of utilizing an e-commerce business model. The ***main monetary results*** of value creation include revenue enhancement through sales growth and price differentiation, and cost reduction related to cost of goods sold, operating costs, and assets intensity reduction. The ***non-monetary value creation*** may incorporate a variety of tangible and intangible results relevant to e-commerce development like improved customer satisfaction and quality, faster delivery schedules, extended hours of work, global outreach, and permanent access to information.

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CHAPTER 2

Mobile Applications

Mobile commerce has gained much attention recently, not only as part of consumer-oriented services and products, but also as a tool to augment business strategies and support organizational processes using internet-based wireless models. Major surveys in this area conducted in recent times clearly demonstrated a continuous growth and proliferation of mobile commerce applications in various areas of business. For example, according to a Telecom Trends International study, the number of mobile commerce users will grow to 1.67 billion by 2008[1]. The interest in mobile commerce is also triggered by recent development of new mobile technologies like Wi-Max and wireless voice over IP (VoIP) (see explanation in Table 2.1), and the need to identify their future areas of implementation. Besides that, the growing attention to mobile commerce is facilitated by several recent business wireless initiatives, specifically the implementation of radio frequency identification (RFID) applications in Wal-Mart and the U.S. Department of Defense.

Although wireless technologies have primarily been applied in consumer-oriented areas, there is a growing interest in increasing the usage of wireless technology in the enterprise environment. Some recent researches have shown that mobile commerce can enhance business efficiency by distributing information to the workforce remotely and by offering new channels on which to interact with customers[2]. Organizations that are capable of leveraging the power of mobile technologies to automate and streamline business processes may improve productivity, lower operational cost, increase customer satisfaction, and improve decision-making.

While the business trends of e-commerce have been studied in detail, its mobile extension has not gotten similar attention. Instead, current literature sources on mobile commerce mainly focus on technological

concepts, specific mobile services, or high-level business model analysis [3]. At the same time, new questions and problems arise. Are mobile commerce models independent from existing e-commerce models or they are complimentary to already established e-commerce models? Is mobile commerce relatively expensive to the customers? What is the proportion of mobile commerce models among overall e-commerce implementation? What are value-added offerings, value creation, and return on investments of mobile commerce models?

In this Chapter, you will find answers to these and some other questions about mobile commerce.

2.1 Define Mobile Commerce

Mobile commerce or ***m-commerce*** refers to commercial (buying and selling) business models and applications carried out via a mobile devices such as cell phones or smartphones (personal data assistants). These applications, for example mobile banking or mobile shopping, may vary significantly depending on the device and mobile service provider. M-commerce is a natural extension of e-commerce, although in reality wireless communication may also have non-commercial elements like downloading information or media files. Thus, the term "m-business," in addition to "m-commerce," may be a valid term for describing business applications carried out over a mobile device.

Technology Behind M-commerce

The m-commerce development is highly associated with technological advances in telecommunications and wireless technology. The technological elements that affected in the past and continue to affect m-commerce development and proliferation are listed in Table 2.1.

2.5G and 3G are the most commonly used technologies today for wireless communication through cell phones and PDAs. Wi-Fi communication is often employed in computers and laptops for wireless access to the Internet. In the near future, the new technological breakthroughs in terms of using more sophisticated and speedy wireless systems like 4G, Wi-Max, and Wireless VoIP are expected.

Table 2.1 M-commerce technology terms

Terms	Description
1G	***First generation*** of mobile wireless that utilizes analog air interface technology. These analog cell phone standards were introduced in the 1980s and continued until being replaced by 2G digital cell phones in mid-1990s.
2G	***Second generation*** of mobile wireless, which utilizes various digital protocols including GSM (Global System for Mobile communication), CDMA (Code Division Multiple Access), TDMA (Time Division Multiple Access) instead of analog air interface. The data transmission is predominantly in a text format; and the speed of transmission is relatively low. Existed from mid- 1990s until current time.
2.5G	***Interim 2.5 generation*** of mobile wireless that was an interim step building up to 3G involving the overlay of higher-capacity data transmission capability to existing 2G digital wireless networks. The speed of transmission is about 115 Kbits/sec; can accommodate limited graphics. The main digital protocol is GPRS (General Package Radio Service) Extensively used from late 1990s until modern time.
3G	***Third generation*** of mobile wireless that provides the ability to transfer simultaneously both voice data (a telephone call) and non-voice data with rich media such as music, video clips. The speed of transmission is up to 384 Kbits/sec. The main digital protocol is EDGE (Enhanced Data GSM Environment). Extensively used since 2005–2006.
4G	***Fourth generation*** of mobile wireless is not just one defined technology or standard, but rather a collection of technologies and protocols that enable the highest transmission speed and lowest cost of wireless network."
Bluetooth	***Bluetooth*** is a short-range wireless specification that allows for radio connections between devices (cell phones, computers, etc.) within a 30-foot range of each other. The name comes from the 10th-century Danish King Blåtand (Bluetooth), who unified Denmark and Norway.
GPS	***Global Positioning System*** is a satellite-based tracking system that enables the determination of a GPS device's location.
Mobile-Fi	***Mobile-Fi*** is a high-frequency wireless network that provides wireless access in a moving object (train, car) at a range of up to 30 miles.
PDA	***Personal Digital Assistant*** is a mobile, handheld device—such as the Palm Treo and RIM BlackBerry—that gives users access to text-based information. Users can synchronize their PDAs with a PC or network; some models support wireless communication to retrieve and send e-mail and get information from the web.
RFID	***Radio Frequency Identification*** represents devices that use radio frequencies to transmit data. One typical use: a bar code scanner gathers information about products in stock or ready for shipment in a warehouse or distribution center and sends them to a database or Enterprise Resource Planning (ERP) system.

(continued)

Table 2.1 M-Commerce Technology Termsn (continued)

Terms	Description
SMS	***Short Messaging Service*** is a service through which users can send text-based messages from one device to another. The message—up to 160 characters—appears on the screen of the receiving device. SMS works with GSM networks.
Smartphone	A combination of a mobile phone and a PDA, smartphones allow users to converse as well as perform tasks, such as accessing the internet wirelessly and storing contacts in databases. Smart phones have a PDA-like screen.
WAP	***Wireless Application Protocol*** is a set of protocols that lets users of mobile phones and other digital wireless devices access internet content, check voice mail and e-mail, receive text of faxes, and conduct transactions. WAP works with multiple standards, including CDMA and GSM.
Wi-Fi	***Wireless Fidelity*** is the common term for a high-frequency wireless local- area network (WLAN). The term is used generically when referring of any type of 802.11 network including 802.11b, 802.11a, 802.11g or 802.11a/g. Wi-Fi operates in the unlicensed 2.4 GHz range offering data speeds up to 54 Mbps with a range of up to 300 feet.
Wi-Max	***Wi-Max*** is similar to Wi-Fi, but with a substantially larger range of up to 25–30 miles. It is based on a separate standard, 802.16.
Wireless VoIP	***Wireless Voice over Internet Protocol (VoIP)*** is used to transmit voice with internet wireless networks like Wi-Fi and Wi-Max.
ZigBee	***ZigBee*** is a wireless technology that coordinates communication among thousands of tiny sensors These sensors can be scattered throughout offices, farms, or factories, picking up bits of information about temperature, chemicals, water, or even motion.

M-commerce Growth and Share

Starting from the early years of the 21st century, m-commerce has experienced significant growth. The revenues from m-commerce transactions have increased worldwide from $3.4 billion in 2002 to $22.2 billion in 2005[4]. The m-commerce revenues are projected to reach $88 billion in 2009[4] (see Figure 2.1).

The growth of m-commerce worldwide is directly associated with the global growth and proliferation of wireless devices including cell phones and modern wireless PDAs called ***smartphones.*** M-commerce growth is also associated with advantages in wireless technology, for example, a switch from 2G to 3G wireless communication and implementation

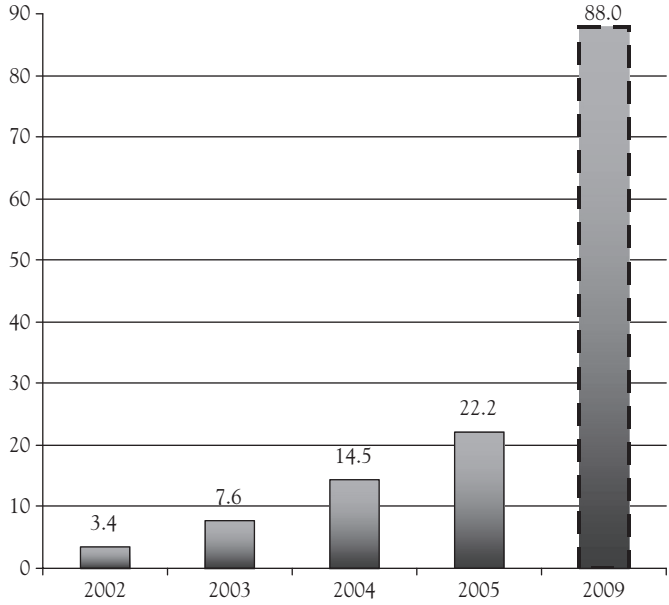


Figure 2.1 Global M-commerce revenues, $billion

of Wi-Max technology. Companies find more opportunities to employ wireless technology and develop m-commerce applications that provide value-added offerings and create monetary and non-monetary value for the customers.

However, compared with overall e-commerce revenues, m-commerce still represents a small portion of these revenues. The revenues generated through e-commerce are measured in trillions of dollars (see Chapter 1), which dwarfs the level of revenues in the m-commerce industry. According to a survey conducted in 2005–2006, the share of m-commerce applications in overall e-commerce implementation is relatively small[5]. Almost 71% of respondents identified m-commerce market share as being less than 5% of the overall e-commerce volume of transactions. About 21% of those that responded to the survey consider the m-commerce share between 5–10%, and only 8% of respondents indicated that the level of m-commerce is about 10–30%[5]. The explanation of these results may be related to the fact that m-commerce is a relatively recent extension of the traditional e-commerce, and, thus, did not gain a larger share in organizations. In addition, m-commerce limitations that will be presented later in

this chapter preclude the organizations from further implementation of m-commerce applications.

On a global scale, m-commerce applications are most commonly used in the Western European countries, Japan and the U.S. The U.S. market of m-commerce, which has lagged those in Japan and Europe, is now growing at a high rate catching up with the other competitors.

M-commerce Value-added Offerings and Benefits

Besides the proliferation of wireless devices and improvements in wireless technology, the growth of m-commerce is driven by value-added offerings that the wireless models and applications may provide to the customers. The main value-added offerings, also called ***m-commerce characteristics***[6], are Mobility and Broad Reach (see Figure 2.2). ***Mobility*** is the main value-added characteristic directly imbedded in this application. In comparison with general e-commerce, a mobile device can be carried around, and the access to the Internet is not dependent upon the device's location. Especially, it is independent from the wired Internet access points (locations). ***Broad Reach*** is another critical value-added characteristic of m-commerce that enables m-commerce applications to reach customers (through their wireless devices) at any point in time in distributed locations.

Based on Mobility and Broad Reach, m-commerce provides more value-added offerings (see Figure 2.2)[6]:

- ***Product/Service localization*** enables identification of user location at any point in time, and provides services associated with driving directions (navigations system), location of nearby facilities (restaurants, hotels, entertainment, etc.), and emergency service (On-Star system for GM vehicles).
- ***Personalization*** is a feature of m-commerce that allows preparation of selling and service information for individual and business customers associated with their location, cell phone number, or other parameters. For example, Google's personalized information for mobile customers (www.google.com/mobile) may include a preview of the latest e-mail account messages; headlines from Google News and other top

news sources; weather forecasts, stock quotes, and movie show times; and a variety of other popular feeds.

- ***Ubiquity*** is a value-added offering of m-commerce that enables access to the Internet or a customer through m-commerce at any location and at any given time regardless of wired Internet access points. This feature is directly derived from m-commerce mobility and broad reach.
- ***Instant connectivity*** provides easy and quick connection of a customer to m-commerce applications. As long as the wireless device is on, it is instantly connected to the available internet-based applications.
- ***Convenience*** as a value-added offering of m-commerce, is directly associated with the ability to easily carry a wireless device, and its ability to connect instantly to the internet and m-commerce environment.

The results of a survey conducted in 2005–2006[5] revealed some important principles of implementing m-commerce. Almost 61% of respondents identified that the most important principle is providing value-added offerings to the m-commerce users. Additionally, almost 55% of the respondents consider free of charge mobile commerce service to be

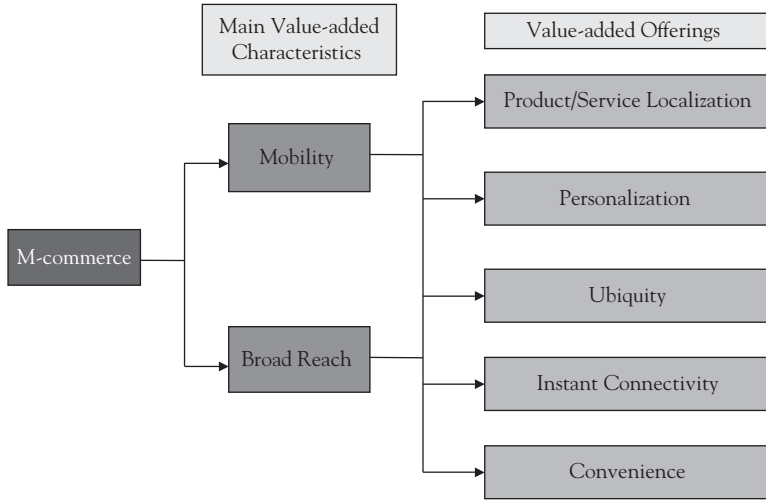


Figure 2.2 Value-added offerings

the second important principle of implementing m-commerce solutions. Other common principles of m-commerce implementation (in descending order) include m-commerce as a complement to the e-commerce channel of marketing and sales; utilization of innovative mobile technology in m-commerce; and utilization of existing e-commerce resources in developing m-commerce solutions.

When asked about the main benefits of implementing e-commerce and m-commerce applications, the respondents have presented different results[5]. The e-commerce benefits are predominantly associated with monetary value creation. Approximately 84% of the respondents identified the benefits of revenue growth by adding a new online channel of sales; cost reduction by reducing inventory level and cost; and shortening procurement cycle (procure-to-pay cycle), which leads to cost reduction. At the same time, benefits of m-commerce are predominantly related to non-monetary value creation including improved communication and relationships with customers, faster delivery of products and/or services, and better reliability and control of customer orders (76% of the respondents).

Limitations and Problems of M-commerce

The results of the survey[5] also revealed substantial differences in most critical drawbacks and problems in implementing e-commerce and m-commerce applications. The most common drawbacks and problems in implementing e-commerce applications are (in descending order): high cost, data security, poor integration with internal systems (like ERP), low ROI, and lack of universal standards. In contrast, the most common drawbacks in implementing m-commerce applications are associated with design of mobile devices (small screens that cannot provide reach Internet contents and multimedia) and wireless technology (insufficient speed of connection, poor reception/signal interferences, etc.). The only common drawback between the two groups of applications is the high cost of implementation.

The main limitations and associated problems of m-commerce are summarized in Table 2.2.

Table 2.2 Limitations/Problems of M-commerce

Limitations/Problems	Description
Insufficient bandwidth	Low in comparison with wired e-commerce bandwidth and speed of connection. Long time or difficult to download multimedia files. Sufficient bandwidth is necessary for widespread use and it must be inexpensive.
Transmission interferences	Weather and terrain problems as well as distance-limited connection affect the quality of wireless transmission and may lead to poor reception.
Security standards	Universal standards for using wireless communications are still not available. Switching from one wireless provider to another may change standards needed to use m-commerce applications.
Human interface with device	Screen and keyboards are usually small, uncomfortable, and tedious for many people to use.
Power consumption	Batteries with long life are needed for mobile computing; color screens and Wi-Fi consume more electricity.
Wireless Applications Protocol (WAP) limitations	WAP sites are still cumbersome in comparison with Web sites They cannot provide rich media format due to small screen size of most cell phones and PDAs, and relatively low speed of connection.
Potential health hazards	Potential health damage from cellular radio frequency emission. More car accidents are possibly related to drivers talking on cell phones while driving.

2.2 M-Commerce Models and Applications

Groups of Models

M-commerce models can be clustered into two main groups: active and passive models. The ***active m-commerce model*** relates to wireless applications, in which the user has to take the initiative on his or her wireless device to start these applications. For example, a customer opens a web site on a wireless PDA to download a song, news, or weather information. In contrast, the ***passive m-commerce model*** is activated by an external source of wireless communication for accomplishing the assigned jobs. An example of such model is stock market alerts delivered on a user's wireless device.

Depending on the performed functions, m-commerce models can be further subdivided into commercial transactions, content delivery and telemetry services (see Figure 2.3).

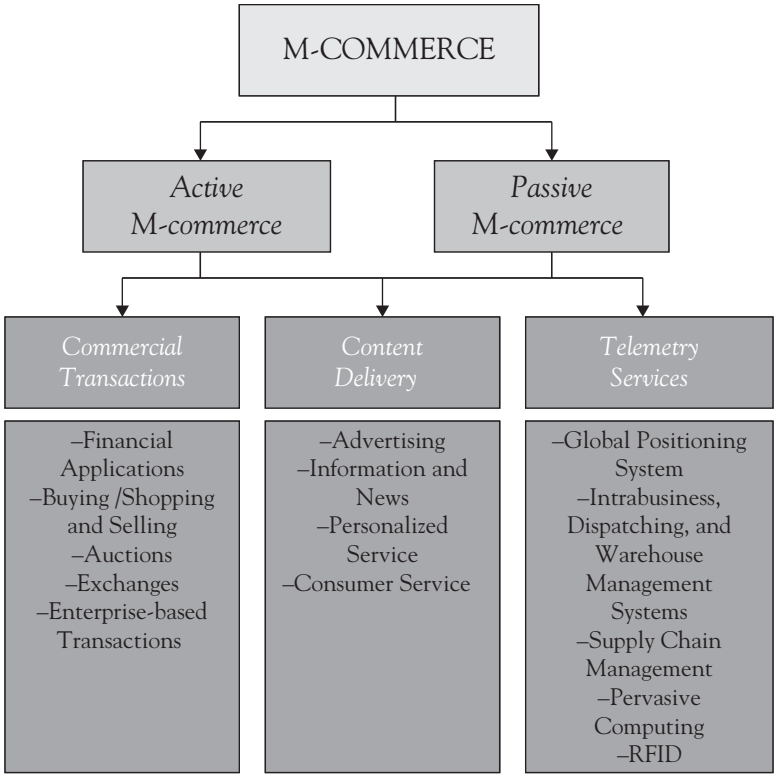


Figure 2.3 Classification of M-commerce applications

The m-commerce ***Commercial Transactions*** group includes a variety of online selling and buying activities tailored to mobile phones and PDAs. These devices are being equipped with the internet-based capabilities of browsing, selection, purchase of item or service, and payment. One of the largest groups of active m-commerce applications within this category is wireless online financial applications including bank and credit card payments, and stock trading. Another important m-commerce transaction is to initiate and pay for purchases and services in real time while shopping in stores. Passive m-commerce applications in this category may be associated with using wireless devices that include digital cash cards for paying and recording payments of toll, mass-transit, fast food, and other transactions.

The m-commerce ***Content Delivery*** group of applications is based on the wireless devices' ability to retrieve information, such as weather, transit

schedules, flash news, and market prices, from the providers of information and directory services. With 3G transmission technology, digital products, such as MP3 music, software, high-resolution images, and full-motion advertising messages, can be easily downloaded to and used in wireless devices. Passive m-commerce applications may include all kinds of mail, such as e-mail, fax documents and digitized voice mail that can be received passively to the wireless devices. In addition, users may be tempted by some services free of cost for viewing audio or video advertisements delivered to their wireless devices. Any kind of security breach, illegal intrusion, unusual event, or unacceptable condition will trigger automatic notification to users regardless of location. Airline companies are testing this technology to alert frequent air passengers regarding seat availability and upgrades, and to notify them about the changes through wireless devices.

The last group of m-commerce applications is ***Telemetry Services.*** This group includes the monitoring of objects (products, people, equipment, trucks, etc.) using Global Positioning System (GPS) or Radio Frequency Identification (RFID). These devices are used for the purpose of locating objects, scanning, tracking, and dispatching them. Specifically, this is useful in Supply Chain Management applications. The telemetry services may also be used in homes for contacting and activating remote systems like home appliances, TVs, etc. For example, delivery drivers will ping intelligent dispensing machines or users can transmit messages to activate remote recording devices or service systems. Passive m-commerce telemetry is the foundation of still another form of interactive marketing. Stores will be able to market their products and services by constantly transmitting promotional and inducing messages and doling out something that gets the attention of both passers-by and remote mobile users.

The results of the survey[5] that considered implementation of m-commerce applications showed that the most common applications of m-commerce (in descending order) were mobile banking, mobile dispatching, RFID, mobile investments, and mobile auctions. These results are not surprising. Mobile banking applications, including account maintenance, bill payments, and account transactions, are relatively standardized. In addition, they do not require a high speed of connection, and are easy to display on the small screen of a mobile device. Mobile dispatching is also popular applications in intra-organization enterprise management,

and RFID applications are associated with supply-chain tracking and shipping/receiving of orders.

Financial Applications

A typical financial m-commerce application is ***Wireless Banking.*** A variety of banks offers a customer mobile access to financial and account information for purposes of making inquiries and financial transactions. For example, the HDRC Bank (www.hdfcbank.com) enables its customers to use a variety of mobile financial services using SMS (see Table 2.1). Among the services are:

- Balance inquiry of all accounts linked to customer identification number
- Other transactions provide that information on the primary account
- Checking the last three transactions in a customer's account
- Placing a stop payment on a check
- Requesting a check book
- Requesting an account statement
- Check status inquiry
- Bill presentation
- Bill payment
- Fixed deposit inquiry
- A help menu, which gives the transaction codes for the various transactions.

SMS allows a customer to send a short text message with a designated code number from his/ her mobile device instead of making a phone call. The response is sent as an SMS message, all in the matter of a few seconds. This message travels from the mobile phone to an SMS center of the cellular service provider (like Verizon or T-Mobile), and from there it travels to the Bank's systems. The information is retrieved and sent back to the mobile phone via the SMS Center, all in a matter of a few seconds.

The applications of ***Wireless Trading and Portfolio Management*** enable customers to use wireless devices for managing, controlling, and monitoring

stock, bond, and mutual fund investments. For example, Charles Schwab, a discount stockbroker company, provides wireless access to customer accounts for a variety of trade-related activities. These include getting real-time quotes and order status, placing Buy, Sell and Short orders. The activities may also involve monitoring all pending orders and transactions, providing account statistics, and accessing news, account details, watch lists, and others.

Financial organizations that provide wireless services to their customers usually make these services complementary to the existing web-based wired services, and free of charge. The complementation and free use of m-commerce applications in this case is an important way to attract more customers to use these and other financial services. In addition, making the wireless service a complimentary one requires fewer investments for developing, implementing, and maintaining this service.

Overall, the usage of wireless applications in financial/banking institutions is still relatively small as compared with traditional web-based wired applications. Surveys indicate there is strong latent demand for these offerings that is waiting for the technology and transmission speeds to improve.

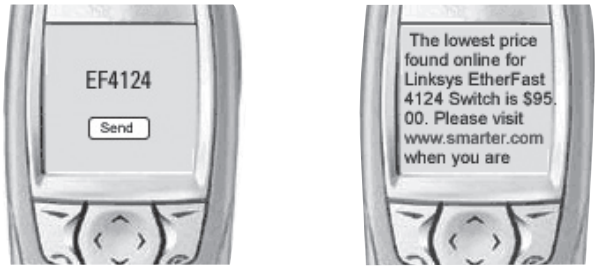
Shopping and Auction Applications

The number of web sites with wireless shopping opportunities continues to grow. In practice, m-commerce shopping is done in several major ways.

Many popular shopping sites, like Amazon, Yahoo Shopping, and eBay offer ***mobile shopping and auctioning*** complementary to their online shopping and auction tools. These include wireless shopping carts, checkout process, bidding, payments, and others. For example, eBay's mobile capabilities involve viewing items with pictures, getting auction details, placing bids, checking the auction status, and receiving text-messaging alerts (see Figure 2.4).

SMS-based shopping represents the use of SMS for identifying the best prices for specific products. For example, *Smarter.com* offers the 'Smarter SMS.' A customer, who found an item in a store, can text a Manufacturer Part Number (MPN) or product SKU specified on that product to a designated phone number (Figure 2.5). *Smarter.com* will send back a text message with the lowest price using the search of the product prices from popular shopping sites.

Figure 2.4 eBay Wireless Auction



A. Sending Product SKU **B. Receiving Information on Lowest Price**

Figure 2.5 SMS-based Shopping

Google offers the same type of service through its shortcodes (shortcodes can be used in place of phone numbers). In addition to the price, *Google's SMS* service (www.google.com/sms) also returns the store, which offers the lowest price. Frucall (www. frucall.com) provides a similar service but by voice message. According to this service, a customer calls a free number (1-888-DO-FRUCALL) and types in the MPN (Manufacturer's Product Number) of the item. The *Frucall* service uses Amazon, Google, Yahoo, Street Prices, and Shopping.com to get results. Within seconds, an automated voice will tell the customer price ranges for a new item, noting in a separate range the prices for used items, if available.

Location-based Shopping (telemetry shopping services) provides shopping directions in the area where a customer shops based on GPS. Sometimes this application is also called ***Location Commerce (L-commerce).***

One of the companies that provide l-commerce service is *Slifter* (www .slifter.com). Through *Slifter*, a customer can find out where a product is

sold in the local area. By entering a zip code along with the MPN/SKU (Stock Keeping Unit), the service returns distances to local shops, which sell the product.

Finally, ***Wireless In-store Shopping*** is another opportunity to employ mobile devices for quickly identifying product prices right in a store and eliminating waiting time at checkout. For example, *Fujitsu* Transaction Solutions[7] has introduced a self-service retail scanner, *U-Scan Shopper* (see Figure 2.6), which essentially is a wireless computer with an integral bar code scanner mounted on a shopping cart.

According to Fujitsu Transaction Solutions[7], the U-Scan Shopper offers the following advantages to customers:

- ***Self-scanning in aisle***–costumers can scan and bag items while shopping to get a running basket total and eliminate waiting time at checkout
- ***Mobile price-checker***–provides immediate price lookups for shoppers if shelf labels are missing or not clearly visible
- ***Pick-up notification***–place in-store orders, such as deli or pharmacy requests; U-Scan Shopper will alert the customer when the order is ready for pickup
- ***Store directory***–provides detailed item location and availability.

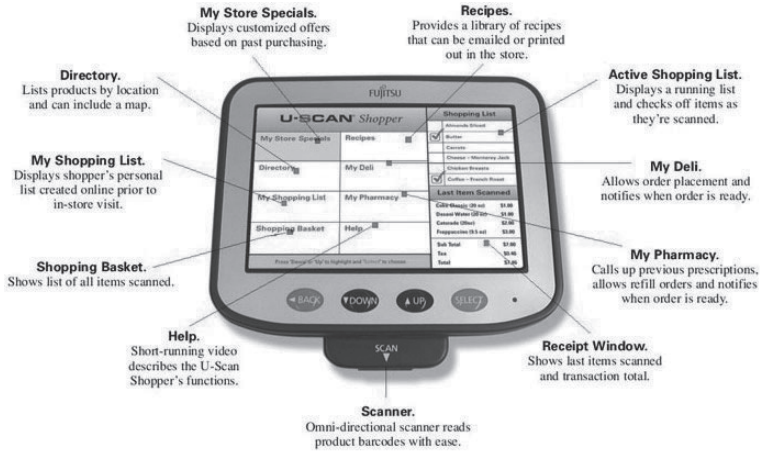


Figure 2.6 Fujitsu U-Scan Shopper

The company even suggests that customers might upload a shopping list to the store's web site before leaving home, and then download the list to the shopping cart upon arriving at the store. For retailers, the U-Scan offers what Fujitsu calls "true 1:1 marketing" that enables customized, personalized in-store ad campaigns that are relevant both to shoppers' preferences and to their location in the store. The shopper's location is determined by shelf-mounted, battery-powered infrared transmitters with programmable ID.

Intrabusiness and Enterprise Applications

The most common m-commerce intrabusiness application is ***Wireless Job Dispatching*** allowing voice and non-voice communication with mobile employees. These include using mobile devices to make task assignments, providing scheduling and other details of employee jobs. Wireless job dispatching can be used effectively in such areas as transportation, taxis, rent-a-car, utilities, field services, health care, and security. Dispatching solutions enable the improvement of response time to accept required tasks or promptly changing them with reduced resources. In addition, wireless dispatching can provide real-time tracking of work centers and mobile employees, increase dispatched efficiency, and reduce administrative work.

Another popular m-commerce intrabusiness application is the ***Wireless Warehouse Management System (WWMS),*** which enables a company to manage, collect, monitor, and update warehouse data directly from the warehouse or other part of an organization. Using wireless devices, employees can enter the warehouse/material transaction right where it happens on the plant floor, on the forklift, at receiving, at shipping, and anywhere in between (see Figure 2.7).

According to *IQMS* (www.iqms.com), one of the leading companies in WWMS, the main benefits of this system are:

- Collecting inventory data from the plant floor using either a dedicated hand-held scanner or radio frequency-enabled PDA.
- Using a single database with all inventory transactions.
- Providing real-time integration with scheduling, production, and sales.

Figure 2.7 Wireless Warehouse Management System

- Supporting packaging and distribution requirements for EDI-based shipments.
- Improving customer service with 100% real-time updates to inventory information, available to all departments—customer service, accounting, manufacturing, shipping, and receiving.
- Potential to drastically reduce the reliance on keyboard and mouse-based computer interaction when recording plant floor activity.
- Reducing time spent at dedicated workstations and dramatically improved accuracy of data input.

Pervasive Computing

Technology is gradually moving from personal computers to handheld intelligent devices with imbedded technology and connectivity. ***Pervasive Computing*** provides convenient access to relevant information and applications through a new class of ubiquitous, intelligent appliances that have the ability to function when and where needed.

Andover Controls Corp., which has 100,000 building-control systems installed worldwide, is working with Goodman Manufacturing Co. to cut energy consumption an expected 10% with *ZigBee* wireless sensors[8]. In a test, Andover has installed four matchbox-size sensors in about 25 hotel rooms in Texas. One sensor is placed on the air conditioner, while the others are placed on the walls to monitor motion and

temperature in the room. The sensors track whether the air conditioner is on, if someone is in the room, and the temperature. The data moves through the bucket brigade of sensors to the front desk, which monitors the temperature and the equipment. A clerk, or even a computer, can shut off an air conditioner if one room is getting too cold. Andover expects the system to be more energy efficient than relying on customers to fiddle with the controls.

The term ***"Pervasive Computing"*** means that technology moves beyond personal computing to everyday devices and objects that surround us for the purposes of providing intelligent information and communication. Pervasive computing is also known as ***Ubiquitous Computing*** and ***Embedded Computing.*** The goal of pervasive computing is to create an environment where the connectivity of devices is embedded in such a way that the connectivity is unobtrusive and always available. Thus, the value-added offerings for pervasive computing may be as following:

- Always on and connected computing devices in the environment that is brought about by a convergence of advanced electronic, and particularly, wireless technologies and the internet.
- Using devices that are not personal computers but very tiny—even invisible—devices, either mobile or embedded in almost any type of object imaginable.
- Creating a ubiquitous network of devices that can communicate and share information with each other.

Pervasive computing may be used for consumer-centric solutions including mobile or imbedded devices in vehicles, tools, home appliances, hotel equipment, clothing and various consumer goods—all communicating through interconnected networks. There are numerous examples of these solutions provided today and planned for near future: an exercise machine maker may equip its products with free web service; a convection microwave oven downloads recipes and automatically sets the time, adjusts the power, and does the roasting, baking, and broiling.

Pervasive computing may also be employed in business-centric solutions. For example, elevators in commercial buildings may be equipped

with internet-based display screens that continually deliver news, financial data, and advertising customized for each captive audience. Another example is a retailer that utilizes radio frequency identification (RFID) for monitoring, tracking, and finding packages in its warehouse.

The elements of value creation (benefits) of pervasive computing are also related to whether these are consumer or business-centric applications. For consumers, pervasive computing provides life-enhancing applications that improve quality of life, increase productivity of consumer-associated activities, and improve security of life. For business-centric applications, the benefits are also related to increased productivity of operations, but may be also associated with reducing cost of inventories and labor resources, increasing accuracy of transactions, and providing on time delivery of products and services.

2.3 RFID M-Commerce

RFID History

One of the most popular applications of pervasive computing is ***Radio Frequency Identification (RFID) tags*** used in the area of supply chain management. According to the AMR Research, "Ultimately, RFID will be a core technology deployed across the Supply Chain in most industries." David Luttenberger, Director of Packaging Strategies, Inc. recognized that RFID ". . . will be used to radically transform the entire distribution chain and retail environment tomorrow"[8].

The history of RFID goes back more than four decades. In the 1960's an RFID precursor, called electronic article surveillance, grew into widespread commercial use. Simplistic in nature, surveillance allowed a remote sensor to be able to detect the presence or absence of its corresponding tags. One of the first commercial applications was undertaken in 1977, following the release of RFID technologies by Los Alamos Scientific Laboratories. Identronix Research explored the use of RFID tags embedded into livestock, usually on the ear, in order to be able to track their movement, manage their care, and identify them without ruining the cowhide with branding. Other early RFID applications were geared towards the tracking of vehicles and for internal inventory tracking within the boundaries of the organization. The logistics companies and carriers industry

have become frontrunners in deploying RFID technology. The 1990s saw improved technology allowing greater functionality and the slow spread of RFID applications and implementation of ***Electronic Product Code (EPC)*** standards.

However, as correctly mentioned by Ethan Harris, Sr. Economist, Lehman Brothers, referring to RFID, "One of the great lessons of U.S. economic history is that you get benefits from new technology long after the innovation. That comes from businesses figuring out how to use it right."[8] This happened in 2003 when Wal-Mart announced that the mega retailer's top 100 suppliers must put RFID tags carrying EPC on pallets and cases by January 2005. Wal-Mart later informed the world that all company's suppliers would fall under this directive by the end of 2006. Reinforcing this supply chain revolution were other major retailers: Target, Best Buy and Home Depot of the U.S.; Marks & Spencer, Tesco and Woolworths of the U.K.; the Metro Group of Germany; and Carrefour of France, along with the U.S. Department of Defense, issuing the same requirement to their suppliers.

Packaging Strategies and Cap Gemini Ernst & Young conducted a survey to evaluate interest and actual adoption of RFID applications[9]. The general survey results showed that 54% of those surveyed believed that Wal-Mart's 2005 supplier mandate would be a "catalyst" for the evolution of RFID adoption in the industry; 15% of respondents feel it is "overrated"; and 31% of those surveyed had no opinion. Almost 60% of respondents agreed that retail would be mostly impacted from the first wave of RFID adoption; and 31% of respondents believe that the health and pharmaceutical industries will be also affected.

RFID Goal and Underlying Technology

RFID is a technology that uses radio-frequency waves to transfer data between a reader and a movable item for its identification, location, and tracking. The main goal of using RFID tags in supply chain management is to enable a continuous 100% visibility of all assets within an enterprise or supply chain with no human intervention. RFID tags are miniature transponders comprised of a unique 64 or 96-bit microprocessor EPC identifier with a tiny radio antenna (see in Figure 2.8 an example of RFID tag used

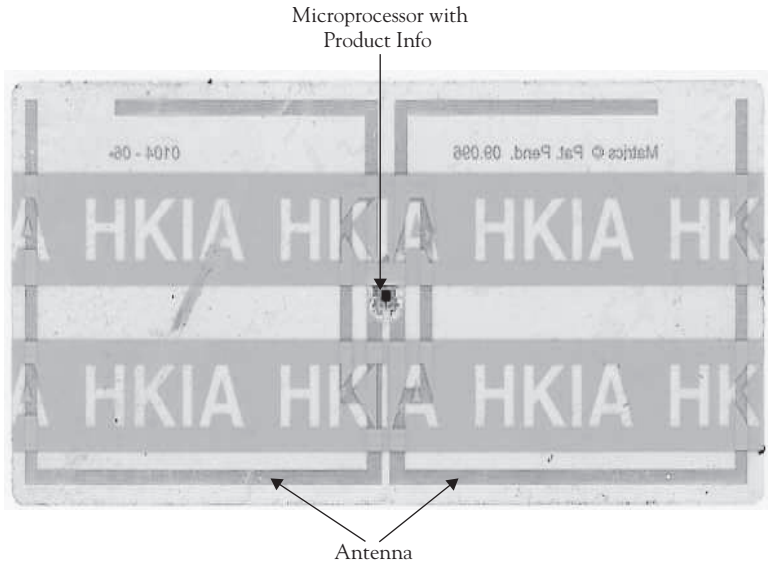


Figure 2.8 RFID Tag

for baggage in Hong Kong International Airport). Electronic data encoded in RFID tag contains SKU number, number of items in shipment, supplier identification, date of shipping, and item cost. RFID tags are usually a small object, such as an adhesive sticker that can be attached to or incorporated into a product during the manufacturing or packaging process.

RFID tags may be produced as passive and active tags. ***Passive RFID tags*** do not have their own power supply: the minute electrical current induced in the antenna by the incoming radio-frequency scan provides enough power for the tag to send a response of its ID number. ***Active RFID tags***, on the other hand, must have a power source, and may have longer ranges and larger memories than passive tags, as well as the ability to store additional information sent by the transceiver (see Table 2.3). In addition, the active tags send product information out without being induced.

The passive and active tags can also be ***writable tags*** (multiple read and re-write tags), meaning that they can be used a number of times with different products and information, and ***non-writable tags*** (write once, read many times tags)—for multiple use with a specific product. As passive *non-writable tags* are much cheaper to manufacture, the vast majority of RFID tags in existence are of the passive non-writable variety.

Table 2.3 Active and Passive RFID Tags

	Active Tag	Passive Tag
Tag power Source	Internal to tag (battery)	Radio frequency (RF) energy transferred from reader
Radio signal	Transmits radio signal without activation from reader	Reflects radio signal from reader
Range	Up to 100m (300 ft)	Up to 5 m (15 ft)
Multi-tag reading	1000's of tags recognized with high speed	200–600 within 3–5 m (10–15 ft) of reader
Data storage	Up to 128 Kb of read/write	128 bytes of read/write
Price	Between $15 to $40	Approximately $0.10–0.75 By 2007–08, may come down to $0.05

In addition to a microprocessor (chip) with product information, RFID tags also contain an ***Antennae*** and ***RFID Reader,*** which converts an analog radio signal into a digitized data format (see Figure 2.9). The Reader sends this data to a computer/server that uses special RFID software for manipulating RFID data (store, retrieve, update, and analyze). RFID is fast, reliable, and does not require physical sight or contact between reader/scanner and the tagged item. Besides, RFID tags, Antennae, Reader, and computer with RFID software, the system may also need a special equipment/printer for printing additional RFID tags.

Where RFID is Used in Supply Chain Management

RFID tags and associated wireless equipment may be used in various steps of a supply chain process inside and outside an organization. In the Receiving step, RFID may be used to validate cases and pallets automatically as a forklift drives through the dock door (see Figure 2.10).

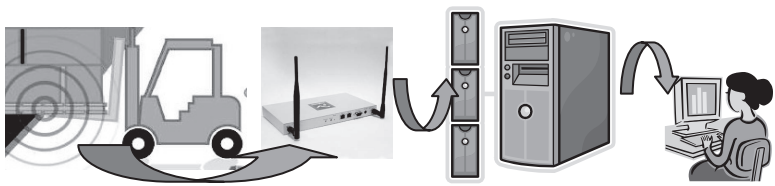


Figure 2.9 General Process of Reading RFID Tag

Figure 2.10 Examples of RFID Usage in Supply Chain Management[10]

Automated reading enables cases and pallets to be sorted quickly. RFID can support cross-docking operations where the system directs a forklift operator to deliver the items directly to an assembly line or to a particular dock for immediate shipment. ***Put-away and Picking*** is another application for RFID in the warehouse. RFID can identify the location of the pallet, and thus the inventory items will not be lost.

In the ***Shipping*** step, an RFID system can tell the user when a customer's order is being put on the wrong truck. RFID may also be employed for ***Order Tracking*** to enable the system to know where the customer's order is and that it has been filled correctly. Finally, RFID may be used for ***Equipment Tracking,*** when it keeps track of the company's assets. It can tell where all of the pallets, dollies, and forklifts are located. Rewriteable RFID tags can administer a maintenance program, telling the last time a piece of equipment was serviced and who did the work. The technician looks at the service menu on the handheld display, checks the maintenance items performed, aims the device at the RFID tag, and pulls the trigger. The information on the tag is updated.

RFID Value-added Offerings and Value Creation

RFID provides a variety of value-added offerings to the organizations, their customers, and suppliers. These value-added offerings can be summarized as following:

- ***No "line of sight" requirements:*** Bar code reads can sometimes be limited or problematic due to the need to have a direct

"line of sight" between a scanner and a bar code. RFID tags can be read through materials without line of sight.

- ***Automated reading:*** RFID tags can be read automatically when a tagged product comes past or near a reader, reducing the labor required to scan product and allowing more proactive, real-time tracking.
- ***High read rates:*** RFID tags ultimately offer higher read rates than bar codes, especially in high-speed operations such as carton sort.
- ***Data capacity:*** RFID tags can be easily encoded with item details such as lot, batch, weight, etc.
- ***"Write" capabilities:*** Because RFID tags can be rewritten with new data as supply chain activities are completed, tagged products carry updated information as they move throughout the supply chain.
- The value creation (benefits) of RFID is usually associated with more efficient utilization of resources (labor, materials, etc.) and improvement in production and delivery processes. Main benefits include:
- ***Reduced inventory with real-time visibility:*** RFID enables real-time visibility to assets and goods across the supply chain.
- ***Reduced labor costs:*** RFID enables more automated reading, reduces labor in manufacturing and distribution while ensuring highly accurate processes (seven seconds for a single bar code scan).
- ***Improved control and financial settlement:*** RFID can be used to improve processes now plagued by inaccuracy, such as deliveries to customers where there are discrepancies about what was actually delivered and received.
- ***Increase efficiency and product flow:*** RFID eliminates many manual and paper-based operations, such as paper "travelers" that follow an item through the manufacturing and distributions process. RFID reduces the number of manual activities associated with information flow and product hand-offs between steps, as well as processes and functions (i.e., automating receiving activities).

- ***Improved decision-making:*** RFID provides real-time visibility to supply chain assets and gives operators (such as repair technicians) detailed product information right from the tag; improves decision-making and often speeds processing.
- ***Goods authentication:*** With accurate product tracking, RFID can reduce losses from shrinkage and counterfeit goods.
- ***Improved supply chain integration:*** RFID tag data can be the "information glue" that enables multiple parties in the supply chain to connect regarding the flow of goods.

Return on Investments

As mentioned before, the implementation of RFID may lead to reduction of inventory cost. According to some research, this cost reduction can be up to 5% of the total cost of inventory[11]. A reduction of labor cost through automated RFID inventory reading can be up to 7.5% of the total warehouse labor cost. In addition, improvements due to RFID efficiency and inventory tracking may increase sales by about 7% of the total sales in a company[11]. These quantitative results may be used to identify and analyze RFID return on investments. In Table 2.4, you can find ROI analysis based on the described sale increase and cost reduction.

RFID Problems and Issues

Implementation of RFID is not free from major issues and problems. Even Wal-Mart's next leap forward in the ultra-efficient RFID environment is showing some signs of fizzling. A pioneer in low-cost practices widely copied by competitors like Target, Best Buy and many others, Wal-Mart has pushed its suppliers to use RFID tags to chop labor and inventory costs anew. However, tests and pilot projects using the tags for many of these suppliers do not show any savings, and suppliers forced to invest in the relatively expensive technology are grumbling. In many of these suppliers, the ROI from RFID is uncertain, and payback may potentially take a number of years.

Table 2.4 ROI Analysis of RFID

ROI Analysis: RFID					
	Parameter used in calculations	2007	2008	2009	2010
Revenue, COGS, and gross income, $					
Total revenue from sales (forecast)			330,500,000	396,600,000	475,920,000
Total cost of goods sold (COGS)			247,875,000	297,450,000	356,940,000
including:					
Inventory cost (50% of COSG)	0.5		123,937,500	148,725,000	178,470,000
Warehouse labor cost (2% of COSG)	0.02		4,957,500	5,949,000	7,138,800
Gross income			82,625,000	99,150,000	118,980,000
Gross income margin (% of sales)			25%	25%	25%
Investment and costs, $					
Total initial set-up (investment) cost		24,500,000			
Recurring cost of components and infrastructure (15–20% of investment)	0.20		4,900,000	4,900,000	4,900,000
Total cost		24,500,000	4,900,000	4,900,000	4,900,000

ROI Analysis: RFID					
	Parameter used in calculations	2007	2008	2009	2010
Income and savings, $					
Income through increased sale (up to 7% of total sale)	0.07		5,783,750	6,940,500	8,328,600
Reduce inventory (up to 5% of total inventory cost)	0.05		6,196,875	7,436,250	8,923,500
Reduce warehouse cost (up to 7.5% of labor cost in warehouse)	0.075		371,813	446,175	535,410
Total income and savings		0	12,352,438	14,822,925	17,787,510
Annual profit, $		−24,500,000	7,452,438	9,922,925	12,887,510
Period, years		3			
Required rate of return, %		5%			
Average income per year, $					10,087,624
Average income as a % of gross income					10.1%
Payback, years					2.4
ROI, %					41%

The modern generation of RFID tags cost about 10–15 cents apiece while bar codes cost a fraction of a cent. Thus, the usage of RFID tags may be cost-inefficient for many low-cost products and pallets. Beyond the tags, suppliers have to bear the cost of buying hardware—readers, transponders, antennas—and computer software to track and analyze the data. Suppliers have to pay additional fees to integrate that software with their current inventory and manufacturing applications. For a consumer goods supplier, the initial investment cost may reach, according to estimates, $9–25 million, and annual recurring costs of RFID components (tags, readers, etc.) and infrastructure maintenance may reach 15–20% of the initial investment cost[11]. On top of that, suppliers say that instead of saving labor, RFID tagging actually takes more: While bar codes are printed on cases at the factory, because most manufacturers have yet to adopt RFID, those tags have to be put on by hand at the warehouse.

Originally, RFID implementation lacked globally accepted standards, particularly the electronic product code (EPC). However, the recently developed EPC Global Standards Generation 2 (EPC Gen 2) can overcome this problem. Another issue is the reading accuracy of RFID tags. The reading accuracy variations depend on a supplier's quality of printing tags, the tag's mounting position, passing speed, and influence by metal/moisture, etc. In general, the reading accuracy is just around 90%. This may be lower than the bar code accuracy that can reach 99%.

2.4 Chapter 2 Summary: Managerial Aspects of Mobile Commerce

1. ***Mobile commerce*** or ***m-commerce*** refers to commercial (buying and selling) business models and applications carried out via a mobile devices such as cell phone or and smartphones (personal data assistants). M-commerce is a natural extension of e-commerce, although in reality wireless communication may also have non-commercial elements like downloading information or media files.
2. The growth of m-commerce worldwide is directly associated with the global growth and proliferation of wireless devices including cell phones and modern ***smartphones.*** M-commerce growth is also associated with advantages in wireless technology, for example, a switch

from 2G to 3G wireless communication and implementation of W i-Max technology. The growth of m-commerce is also driven by value-added offerings that the wireless models provide to the customers including m-commerce mobility, broad reach, personalization, ubiquity, instant connectivity, and convenience.

3. Despite the extensive growth pattern, m-commerce represents a tiny market share in the overall e-commerce. M-commerce revenues still correspond with a very small portion of the total e-commerce revenues.
4. ***Common limitations*** of using m-commerce applications are associated with design of mobile devices (small screens that lacks reach internet contents and multimedia), wireless technology (insufficient speed of connection, poor reception/signal interferences, etc.), and relatively high cost of implementation.
5. The m-commerce ***Commercial Transactions*** include a variety of online selling and buying activities tailored to mobile phones and PDAs. These devices are being equipped with the internet-based capabilities of browsing, selection, purchase of item or service, and payment. The m-commerce ***Content Delivery*** is based on the wireless devices' ability to retrieve information, such as weather, transit schedules, flash news, and market prices, from the providers of information and directory services. The m-commerce ***Telemetry Services*** include monitoring of objects (products, people, equipment, trucks, etc.) using Global Positioning System (GPS) or Radio Frequency Identification (RFID). These devices are used for the purpose of locating objects, scanning, tracking, and dispatching them.
6. Financial organizations that provide wireless services to their customers usually make these services complementary to the existing web-based wired services, and free of charge. The complementation and free use of m-commerce applications in this case is an important way to attract more customers to use these and other financial services. In addition, making the wireless service a complimentary one requires fewer investments for developing, implementing, and maintaining this service. Overall, the usage of wireless applications in financial/ banking institutions is still relatively small as compared with traditional web-based wired applications. Surveys indicate there

is strong latent demand for these offerings that is waiting for the technology and transmission speeds to improve.

7. Many popular shopping sites, like Amazon, Yahoo Shopping, and eBay offer ***mobile shopping and auctioning*** complementary to their online shopping and auction tools. These include wireless shopping carts, checkout process, bidding, payments, and other elements on demand-side e-commerce.
8. The most common m-commerce intrabusiness application is ***Wireless Job Dispatching*** allowing voice and non-voice communication with mobile employees (in taxis, rent-a-car, utilities, field services, health care, and security). Dispatching solutions enable the improvement of response time to accept required tasks or promptly changing them with reduced resources. In addition, wireless dispatching can provide real-time tracking of work centers and mobile employees, increase dispatched efficiency, and reduce administrative work. ***Wireless Warehouse Management System (WWMS)*** allows a company to manage, collect, monitor, and update warehouse data directly from the warehouse or other part of an organization.
9. The goal of ***pervasive computing*** is to create an environment where the connectivity of devices is embedded in such a way that the connectivity is unobtrusive and always available. Pervasive computing may be used for consumer-centric solutions including mobile or imbedded devices in vehicles, tools, home appliances, hotel equipment, clothing and various consumer goods—all communicating through interconnected networks. Pervasive computing may also be employed in business-centric solutions including utilization of ***radio frequency identification (RFID)*** for monitoring, tracking, and finding inventory.
10. RFID is a technology that uses radio-frequency waves to transfer data between a reader and a movable item for its identification, location, and tracking. The main goal of using RFID tags in supply chain management is to enable a continuous 100% visibility of all assets within an enterprise or supply chain with no human intervention. RFID tags and associated wireless equipment may be used in various steps of a supply chain process inside and outside an organization

including: order receiving, putting away and picking inventory in a warehouse, shipping, order tracking, and equipment tracking.

11. RFID provides a variety of value-added offerings like automated reading of products/inventory with high read rate, radio tags that do not require "line of sight" for scanning, can be encoded with detailed information on the product, and may also be rewritable. The value creation (benefits) of RFID is usually associated with more efficient utilization of resources (labor, materials, and inventory), and improvement in production and delivery processes.
12. Implementation of RFID is not free from major issues and problems. The modern generation of RFID tags cost about 10–15 cents apiece while bar codes cost a fraction of a cent. Thus, the usage of RFID tags may be cost-inefficient for many low-cost products and pallets. Beyond the tags, suppliers have to bear the cost of buying hardware—readers, transponders, antennas—and computer software to track and analyze the data. The suppliers should pay additional fees to integrate that software with their current inventory and manufacturing applications. Originally, RFID implementation lacked globally accepted standards, particularly the electronic product code (EPC). However, the recently developed EPC Global Standards Generation 2 (EPC Gen 2) will overcome this problem.

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CHAPTER 3

Electronic Payment Applications

The growth and proliferation of e-commerce required an adequate payment system that could provide quick and secure payment capabilities while conducting business online. This facilitated the development of a completely new industry of e-commerce payments or simply e-payments, which are experiencing, along with other e-commerce models, significant growth. According to the industry statistics[1], the percentage of U.S. consumer bill payments that are made online will rise from 14% in 2006 to 28% by 2010. In addition, between 2006 and 2010 the percentage of U.S. consumer bill payments that are made by check will fall from 54% to 37%[1].

Credit card payments remain the main payment option in the B2C e-commerce environment with 59% of the total online payments[2] (see Figure 3.1). However, e-payment today is increasingly based on other options including payment intermediaries like PayPal, e-checks and e-cash, and other options (see Figure 3.1). In fact, the e-payment intermediary service is the second largest option among online payments with 18% of the total payments online.

Attracted by the prospect of better cash management, U.S. businesses are turning from checks to cards, according to a survey from Visa U.S.A. The survey found that 68% of U.S. businesses intend to reduce their reliance on checks for commercial payments and 63% plan to increase their use of corporate payment cards for online and offline payments[3]. One of these cards is a procurement or purchasing card. Its utilization online has increased dramatically, with companies using this card for making larger payments for B2B online outsourcing. Besides purchasing cards, companies employ other methods of online payments like credit cards, intermediary payment services like PayPal, electronic currency payments, and others.

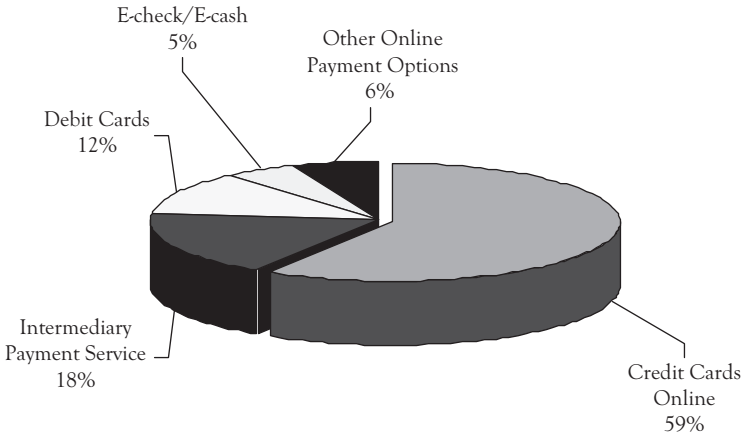

Figure 3.1 Online payment options

Due to a variety of different e-payments methods and their continuous growth, it is important to understand what e-payment models need to be applied in various B2C and B2B e-commerce models. We also need to understand the value-added offerings and value creation in e-payment models. These and other topics will be covered in this chapter.

3.1 Characteristics and Classification of E-Payment Models

When business and individual consumers use a payment system online, they seek a payment environment that enables a quick, easy, and secure transaction. They also want to be sure that the payment system is inexpensive and may be used for different types of payments. In order to be successful, the ***value-added offerings (characteristics) of an e-payment system*** need to be the following:[4]

1. ***Applicability*** represents the availability of an e-payment system at the online point of sale (POS) for various payment sizes including large sums or micropayments, and for different destinations like merchants or private persons.
2. ***Ease to obtain*** defines the ability to register quickly to an e-payment system, and ease of the navigation in this system.

3. ***Reliability/ease of use*** necessitates simplicity, ease of making payments, and transparency of use by customers and merchants.
4. ***Cost of transaction*** should be based on a fixed transaction fee or proportion/percentage of the sales value. In either case, the transaction cost should be relatively small to allow payments of any size (large and micropayments).
5. ***Security*** represents a transmission mechanism from customer (buyer) to merchant (seller) with minimum risk; it also defines customer confidence in storing proprietary information online.
6. ***Liability*** should be based on protecting customers from potential monetary losses.
7. ***Anonymity*** requires protection of personal information by an e-payment system.

Among the characteristics, the security of transactions and customer information in an e-payment system places a crucial role. Customers would like to make sure that in an e-payment system, their financial data, including bank account and card information, will be securely transacted, and would not get into the hands of internet hackers. The two main systems used for the payment transaction security are Secure Socket Layer and Secure Electronic Transaction.

Secure Socket Layer (SSL) is the widely used secure service system and is an important measure to establish trust between an online merchant (seller) and customer (buyer). Encryption and decryption allow secure transfer of information between an Internet browser and server. SSL also permits merchant identification through SSL server certificates. The SSL standard has been widely adopted because it is relatively simple and easy to use. SSL has an approximately 90% share of security transactions used in both wired e-commerce and wireless (m-commerce) markets.

Secure Electronic Transaction (SET) is a more complex security system based on digital certificates and signatures. SET needs specific software and is more difficult for cardholders to obtain and use, and despite the high level of security offered it has not gained widespread use.

A wide range of models has been developed for online payments. However, they may be divided into two main groups: account-based and

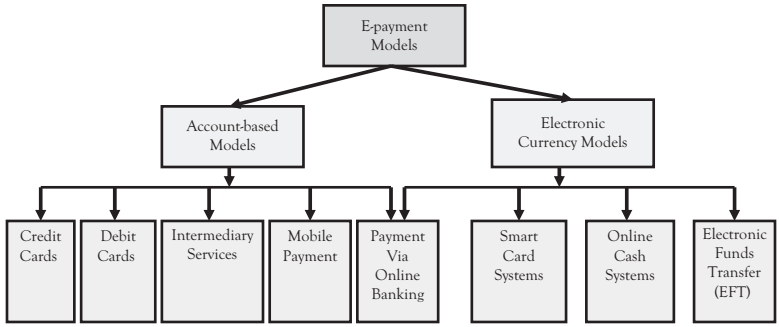

Figure 3.2 E-Payment models

electronic currency models (see Figure 3.2)[4]. ***Account-based Models*** allow for payments via an existing personalized account, which is usually a bank account or intermediary account. The account-based models are based on online utilization of credit and debit cards, intermediary services, mobile/wireless payments, and payment via online banking. ***Electronic Currency Models*** allow for payments if the payer has an appropriate amount of electronic currency. These systems can be divided into three main categories of payments based on smart cards, online cash systems, and electronic transfer of funds.

In the next sections of this chapter we will discuss these e-payment models in more details, identify their value-added offerings and value creation, and describe the situations where these systems may be used in various e-commerce models.

3.2 Credit and Debit Cards' E-Payments Models

Credit cards are widely used to pay for online e-commerce transactions. A major difference, however, between online and offline payments is that in online purchases a physical copy of the card is not provided, and the merchant does not obtain a signed confirmation from the customer. In addition, all offline transactions are authorized at the point of sale, whereas this is not the case for all online purchases (especially with small businesses). The improvements in authentication and verification technologies have increased the ability of accurately authorizing transactions.

Credit Card Processing

The credit card processing system is rather complex involving a number of participants, organizations, and process steps. A typical process of using a credit card in an online payment is presented in Figure 3.3[5].

The chart in Figure 3.3 shows seven participants that normally interact in the credit card e- payment process. ***Customer*** is a buyer (payer) representing a consumer or organization making e-payment in exchange for products and services. ***Merchant*** is a seller (payee) receiving the e- payment in exchange for selling products and services. ***Payment Gateway*** is an online connection that ties a merchant's web site to the back-end processing systems of the credit card issuer. It ensures that the connection between the merchant's web site and the merchant bank's processor is secure. Some commonly used vendors offering credit card gateway are VeriSign.com, Authorizenet.com, and FirstData.com.

Merchant Bank's Processor is an online organization that actually processes the credit card transaction from the merchant to the credit card issuer through the ***Credit Card Interchange***—the online network, by which credit

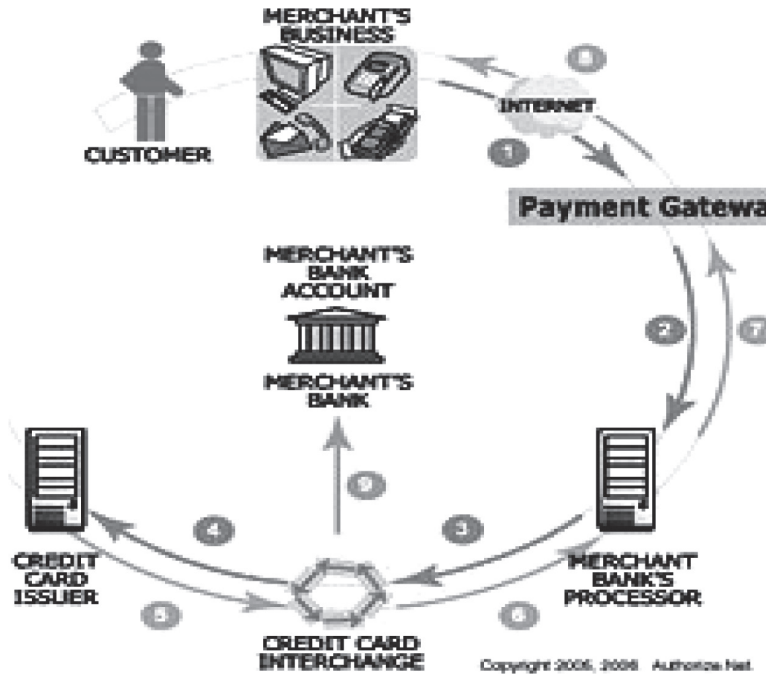

Figure 3.3 Credit card processing

card participants manage the processing, clearing, and settlement of credit card transactions. ***Credit Card Issuer*** is a bank or non-banking institution (credit union, for example) that issues the customer credit card, used to make the purchase. ***Merchant's Bank*** is a financial organization (for example, a bank) that helps the merchant to set up the merchant account, and provides the software and equipment for performing credit card transactions.

The credit card online processing consists of nine steps[7]:

- ***Step 1:*** The merchant submits a credit card transaction to the Payment Gateway on behalf of a customer via a secure connection from a web site or a wireless device.
- ***Step 2:*** The Payment Gateway receives the secure transaction information and passes it via a secure connection to the Merchant Bank's Processor.
- ***Step 3:*** The Merchant Bank's Processor submits the transaction to the Credit Card Interchange.
- ***Step 4:*** The Credit Card Interchange routes the transaction to the customer's Credit Card Issuer.
- ***Step 5:*** The Credit Card Issuer approves or declines the transaction based on the customer's available funds and passes the transaction results, and if approved, the appropriate funds, back through the Credit Card Interchange.
- ***Step 6:*** The Credit Card Interchange relays the transaction results to the Merchant Bank's Processor.
- ***Step 7:*** The Merchant Bank's Processor relays the transaction results to the Payment Gateway.
- ***Step 8:*** The Payment Gateway stores the transaction results and sends them to the customer and/or the merchant. This communication process averages three seconds or less!
- ***Step 9:*** The Credit Card Interchange passes the appropriate funds for the transaction to the Merchant's Bank, which then deposits funds into the merchant's bank account.

In general, the online credit card payments are processed quite rapidly. The whole transaction process from *Step 1* through *Step 8* averages

2–3 seconds or less. The cost of credit card transactions is relatively low and represents from 2% to 6% of the transaction amount[8]. This cost depends on a geographical location of the merchant, issuing bank, merchant and sales characteristics including transaction size, and the importance of national and international sales. In addition, there is usually a certain fixed fee for opening and maintaining a credit card account. An example of transaction cost distribution between participants of the credit card's e-payment is presented in Figure 3.4[9]. As can be seen from the chart, out of $100 that a customer pays for a product or service, a merchant (seller) will get $97.15. The difference of $2.85 (2.85% in this case) will be paid to the transaction participants, i.e., Payment Gateway, Merchant Bank's Processor, Credit Card Interchange, Credit Card Issuer, and Merchant Bank.

Credit Card Value-added Offerings and Limitations

E-payments through credit cards provide a number of value-added offerings to the customers. These value-added offerings should reflect, as discussed in the previous section, availability of credit cards, ease of obtaining and using them, credit card security, and others. The main value-added offerings for online payments with credit cards are presented in Table 3.1.

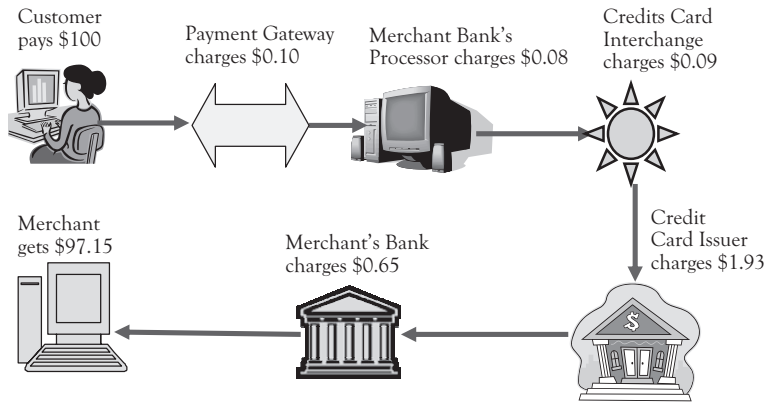

Figure 3.4 Online credit card transaction cost

Table 3.1 Value-added offerings and limitations

Value-Added offerings	Explanation
Credit Card Applicability	Has a long-established network of users and merchants ensuring widespread applicability and a large user base for most kinds of transactions.
Ease to Obtain	Customers do not need to obtain any additional hardware or software and there is no need for further registration with third parties.
Ease of Use	Payment systems are relatively easy to use, provided users have experience with online transactions.
Cost	Cardholders do not pay a transaction fee; low transaction fee for a merchant.
Security	Cardholders' authentication has usually been handled through the provision of name, credit card number, and expiration date.
Anonymity	Secure socket layer (SSL) is usually used to prevent information interception during the transmission of credit card information. SSL also allows verification of merchant identity via the SSL server certificate (see description of SSL below).

Besides the evident value-added capabilities of online payments through credit cards, there are major limitations in using credit cards online, such as:

- Fees for credit card operations for small payments are relatively high; credit cards are less suitable for micropayments ($10 or less). May not be feasible for occasional transactions or small businesses.
- Some segments of potential buyers may not be eligible for this payment method. For example, in the rapidly growing online games market, one third of game players are less than 18 years old. They may not have a credit card because minimum financial conditions have to be fulfilled.
- In emerging economies, where credit cards are not widespread (for example, China, Russia, and many other countries), the credit card system may not be most suitable for online payments.
- About one third of transactions did not end in payments predominantly due to rejection by the credit card issuer. Another related problem is chargeback, or refusal of a

customer to pay claiming that the purchase was done by someone else. The chargeback happens substantially more frequently in online transactions than that offline in brick-and-mortar sales.

- As non-completion of credit card payments appears to be relatively high, there may be additional costs (perhaps up to one third higher) for online stores. Even when the credit card transaction is authorized and concluded, the merchant may have to cover costs for payment reversals. Merchants generally bear the cost of chargeback if they do not have a customer transaction signature.
- Despite the availability of tools to verify and secure online transactions, a significant share of e-commerce sites (10%) may still lack protection mechanisms for the transmission of credit card information, and some industries have significantly lower levels of implementation of security options.

Credit card companies have taken numerous steps to address security concerns, and a number of complementary systems have been developed. Some of them have not had a wide take-up, and currently the most important systems are MasterCard SecureCode and Verified by Visa. The latter two protect an existing credit card with a password created by the user, assuring the user that only they can use their credit card when shopping online. The idea is to have these more secure payments substitute simple credit card payments. An important step in this direction has been taken with the industry adoption of this payment technology as a standard.

Credit card risk management techniques and fraud-prevention software are widely available. ***The Merchant Fraud Squad*** provides education about fraud prevention techniques and encourages businesses selling online to adopt best practices and antifraud technologies. The organization combatfraud.org offers a variety of fraud-protection services. Members access the site's database of credit card numbers, e-mail addresses, and postal addresses that resulted in a chargeback. Merchants check for "deadbeats" at this site and then refuse to accept charges from them.

Debit Cards

In contrast to credit cards, debit card payments are directly withdrawn from the payee's bank account and not from an intermediary account. This can make it difficult for consumers to handle a dispute/chargeback, since there is typically no extra protection of the funds in a debit account. Once the funds have been withdrawn, they are harder to refund than with a credit card. In addition, for debit payments a physical card and/or providing a card number is often not necessary; an account number may be enough. Apart from these differences, the payment mechanism is comparable with credit card transactions.

Debit cards have a significant user spread, which in most countries is higher than the number of credit card users. However, debit card payments are generally not as widespread on merchant web sites as credit card payment. Their application is mostly limited to national payments, due to the national structures, operations and regulation of banking systems, and they do not address the demand for international payments. Furthermore, their cost structure (as for credit cards) is not suitable for realizing micropayments. It is again essential to provide SSL for the transaction as well as for merchants and consumers to take the necessary security precautions. Banks frequently impose stronger identification requirements for debit payments and their overall security has been found to be higher than for ordinary credit card payments.

Debit cardholders are less protected in terms of legislation than are credit card holders. For example, there is a lack of specific protection in case of undelivered goods or services, notably in the United States, Austria, Canada, Greece, and the United Kingdom. Furthermore, as this is an account-based payment card, it does not usually allow for anonymous payments.

3.3 E-Payment Intermediary Services

The e-payment ***intermediary service*** is provided by an online company that enables financial transactions between buyers and sellers. These services may also be called e-payment ***cybermediary*** or ***mediating service.*** E-payment transactions are usually done seamlessly by transferring money from the buyer's to seller's online accounts without using credit or debit cards or bank accounts.

PayPal

PayPal (www.PayPal.com) is a money transfer system that was originally launched for C2C (customer-to-customer) transactions, but then introduced for B2C and B2B transactions, by offering accounts for businesses. For C2C and B2C transactions, PayPal is the most popular payment method at eBay (PayPal has been a part of eBay since 2002) with over 50% of auctioning sellers recommending PayPal as the preferred payment method. PayPal can accept money from the customer (buyer) in one of three ways:

- Charging the customer's credit card for any transactions (payments)
- Debiting a checking account for any payments
- The customer deposits a check in his or her account at PayPal to create a positive balance, and has any payments deducted from the account.

Payment recipients (sellers) can use the money in the account for online purchases or payments, Sellers receive the payment from PayPal by check or by direct money deposit into the recipient's checking account.

PayPal contains a suite of different payment options that can assist merchants to start accepting payments online or enhance their existing payment functions. The first option—***Website Payments Standard*** uses PayPal's own website to process payments (see Figure 3.5A)[10]. Customers temporarily leave the online storefront, where they purchase an item, and pay on the PayPal web site with a credit card or by using their PayPal account, which contains funds deposited from their checking account. Customers are redirected to the storefront's web site at the end of the transaction.

The second ***Website Payments Pro*** option (see Figure 3.5B)[10] combines two payment systems:

- ***Direct Payments*** enable customers to pay at the storefront via credit card, without knowing that PayPal is involved. No PayPal branding appears on the payment page. This is an alternative to establishing a merchant account and payment gateway relationship, i.e., PayPal will be both merchant account provider and payment gateway

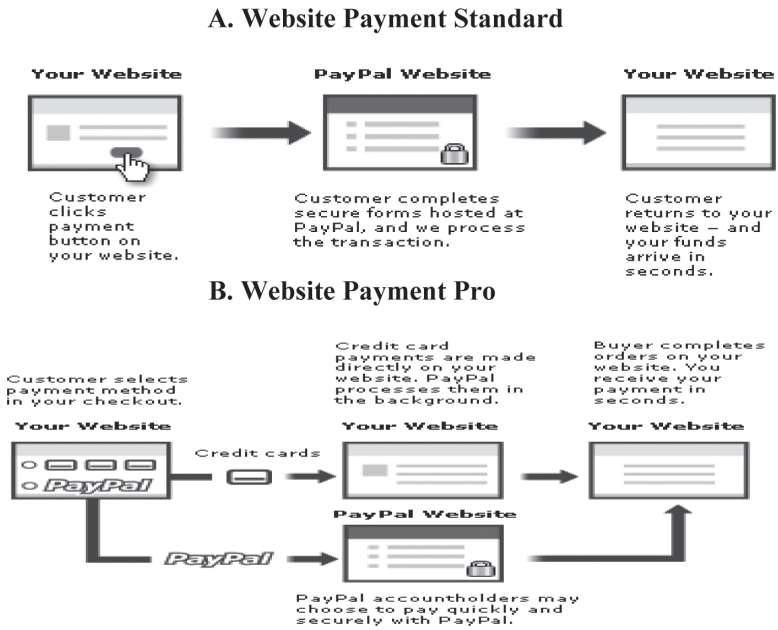

Figure 3.5 Paypal payment options

- ***Express Checkout*** allows users not to register or login to the storefront where they purchase; instead, they complete their purchases at PayPal, where the same login information can be used for any store that supports Express Checkout.

The third ***PayFlow Payment Gateway***[10] option presents two choices:

- ***PayFlow Pro*** is a standard payment gateway (see Section 3.2 of this chapter), which translates into a credit card form shown to customers during checkout (see Figure 3.6). (1) The customer inputs credit card information during the checkout process. The Payment Gateway (2) encrypts data and securely sends it to seller's Internet Merchant Account. (3) The transaction is reviewed for authorization. (4) The result is encrypted and sent back through the payment gateway. (5) The seller gets the results and decides whether to fulfill the order

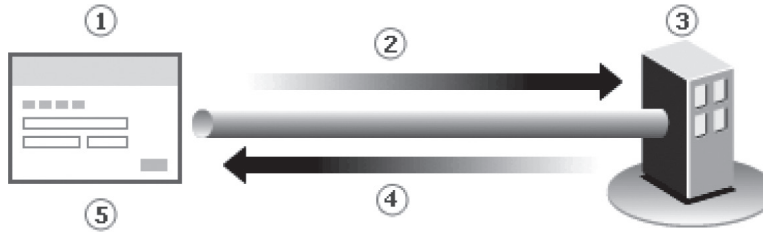

Figure 3.6 Payflow payment gateway

- ***PayFlow Link*** directs customers out of the store to the Payflow Link page, where they pay for the order. This system is typically used when a seller does not have a shopping cart, and is simply in need of a payment page to collect payment for a product or service.

The cost and usage of different PayPal options are present in Table 3.2.

The usage of PayPal, as well as other e-payment intermediary services, provides a number of value-added offerings:

- ***Applicability***–PayPal provides seamless payment methods for a variety of e-commerce web sites such as online forward auctions and storefronts. It allows person-to-person transfers without the seller having to register as a merchant (as required for accepting credit card payments). They can also increasingly be used in other areas, for example, to pay taxes in certain countries, provide gift vouchers, online music sales, etc.
- ***Ease to obtain***–Customer (buyers) can easily sign up for the service. In addition, a key advantage for sellers is that they can obtain an account easily and do not need to create a merchant account. This PayPal's option explains much of its success. It makes the service particularly attractive to small and medium sellers
- ***Cost***–The PayPal system is free of charge for buyers and earns revenue from charging merchants. It charges a rate of 2.2–2.9% and a flat fee of $0.30 per transaction. To make its cost structure more attractive for micropayments in the digital music sector, the company charges a rate of 2.5% plus $0.09 per transaction

Table 3.2 Paypal options: cost and usage

Paypal Payment Options	Cost	Usage
Website Payment Standard	No setup and monthly fees 1.9%–2.9% transaction fees + $0.30	Used for small online stores that do not have Express Checkout
Website Payment Pro: Direct	No setup fees $20 monthly and 2.2%–2.9% transaction fees + $0.30 depending on the transaction volume	This offers an easy way to support credit card payments on a storefront without having to get an Internet merchant account.
Website Payment Pro: Express Checkout	$20 monthly fees 2.2%–2.9% of transaction fees + $0.30 depending on the transaction volume	Activate it on the storefront if a customer wants to provide an alternative checkout option, similar to Google Checkout. Customers that hate to register with a new store will appreciate the ability to bypass the registration form.
PayFlow Pro	$249 setup fees $59 monthly fees 1000 free transactions Above 1000, $0.10 per transaction	If a storefront processes several hundred orders a day, use this option to take advantage of more robust reporting and transaction reconciliation tools. The customer will need an internet merchant account through the bank.
PayFlow Link	$179 setup fees $19.99 monthly fees 500 free transactions Above 1000, $0.10 per transaction	If a customer uses a professional shopping cart, he/she does not need this service.

- ***Security***–In contrast to credit or debit card payment, the customer's financial information (credit card number or bank account number) stays with the intermediary service provider like PayPal. It is not transmitted to the seller. PayPal adds additional verification layers for customers and sellers, and insures up to a certain amount for each customer's payment transaction. As both buyers and sellers have frequent transactions with PayPal rather than with individual merchants or buyers, there are incentives on both sides not

to defraud, to ensure future benefits of making/accepting payments through the service

- ***Anonymity***–As customers have to register with the service, their private information (name, address, etc.) may not be revealed to the sellers.

Besides the described value-added offerings, the e-payment intermediary services including PayPal contain several major issues and problems. First, they still have a limited utilization in the overall online payment system. The size of the user network (buyers and sellers) is important for the intermediary service to survive. In fact, PayPal faces a restricted network outside eBay payments and outside of the United States. Second, in order to use an intermediary service, consumers have to sign up for the service, whereas using credit cards online does not involve any new services. Third, the fixed component in the intermediary payment structure (see Table 3.2) is a major cost disadvantage for competition in the micropayments sector. Finally, there is no inherent anonymity in the service. The provider (PayPal) may be storing and using the information provided, for example if there are close relations between the mediating service and a merchant site.

Other E-Payment Intermediary Services

Google introduced an e-payment intermediary service called ***Google Checkout*** (checkout.google.com/sell). Users provide Google with their credit card and shipping information, which is stored by Google. Users then purchase goods and services at participating merchants without sharing credit card information with merchants. Checkout supports credit cards from Visa, MasterCard, American Express Co. and Discover Financial Services. This service is similar to PayPal, except users cannot maintain an account balance with Google Checkout for future transactions, make payments using online bank withdrawals or make consumer-to-consumer payments. Google's transaction fees are lower than those transaction fees used by PayPal. Google Checkout charges merchants $0.20 and 2% per transaction.

To attract consumers, Google offered several incentives like $10 rebates to people who use Checkout to complete online purchases from

participating merchants, and free transactions until 2008. Checkout also offered discounts to merchants who buy AdWords (see case study on Google in Chapter 1), and merchants who had a Checkout shopping-cart icon next to their listings to indicate they accept Checkout. Checkout bundled with AdWords could be a powerful incentive for merchants to advertise with Google, boosting AdWord sales.

eBillme (www.ebillme.com) is an e-payment intermediary service that appeals to consumers who purchase online but do not have credit cards or who do not want to reveal personal financial information to online merchants/sellers. Consumers select the eBillme icon when purchasing online. Seconds later, an invoice confirming the purchase arrives in their e-mail, and shoppers use online bank accounts to make payments. Merchants pay 1% to 1.5% fee (depending on the merchant's volume) for eBillme transactions.

Pay-By-Touch (www.paybytouch.com) uses front-end biometric authentication in the form of fingerprint scans for payment, age verification, check cashing and loyalty programs. At checkout, shoppers place a finger on a reader and enter a search number (usually their phone number). They are then authenticated and presented with a list of financial accounts from which they select their payment method. Transactions are then processed as if a card or check were present. Loyalty programs are automatically recognized.

In general, the e-payment intermediary services will continue to grow in numbers and volume of transactions. They will become a major substitute application for online credit and debit card payments.

3.4 E-Payment Via Online Banking

By the end of 2005, the number of online banking customers in the U.S. increased to nearly 40 million in the fourth quarter of 2005[11]. That was a 27% increase over the previous year; online bill paying increased 36 % during that time[11].

For years, financial institutions have used powerful computer networks to automate millions of daily transactions. Now that the customers are connected to the Internet via personal computers, banks pursue similar economic advantages by adapting the same internal electronic processes to home use. Banks view online banking as a powerful value-added

tool to attract and retain new customers. Online banking also helps to eliminate costly paper handling and teller interactions in an increasingly competitive banking environment.

Today, most large national banks, many regional banks, and even smaller banks and credit unions offer some form of online banking, known as ***PC banking, home banking, electronic banking or Internet banking.*** Those that do are sometimes referred to as "brick-to-click" banks, both to distinguish them from "brick-and-mortar" banks that have yet to offer online banking, as well as from online or "virtual" banks that have no physical branches or tellers whatsoever.

The challenge for the banking industry has been to design this new e-payment service channel in such a way that its customers will readily learn to use and trust it. Most of the large banks now offer fully secure, fully functional online banking for free or for a small fee. Some smaller banks offer limited access or functionality; for instance, a customer may be able to view the account balance and history but not initiate transactions online. As more banks succeed online and more customers use their sites, fully functional online banking likely will become as common as automated teller machines.

The most typical online banking systems include:

- Online banking transfers where the account holder (customer) is redirected to the bank's web site by the merchant site to make payment.
- Advanced electronic and mobile banking, which have more advanced features, for example, scheduled payments.
- Electronic Bill Presentment and Payment (EBPP) transactions are automatically entered from the electronic bill. In this case, the customer simply needs to authorize the bill. The EBPP provider (either bank or third party) establishes contracts with the organizations whose bills it can present electronically (*e.g.* utility companies) and will send in the bills the customer has authorized.

According to the *Council for Electronic Billing and Payment (CEBP),* ***Electronic Presentment and Payment (EPP)*** represents one of the fastest growing Internet applications because it streamlines the billing and

invoicing process for billing corporations, financial institutions, and their customers. EPP is comprised of two primary applications, one consumer oriented, the other business oriented. *Electronic Bill Presentment and Payment (EBPP)* generally refers to the billing and payment process for consumers, or B2C applications. ***Electronic Invoice Presentment and Payment (EIPP)*** generally refers to the invoicing and payment process between businesses (discussed in Section 3–5 of this Chapter).

Electronic Bill Presentment and Payment (EBPP) is the electronic presentation of statements, bills, invoices, and related information sent by a company to its customers, and corresponding payment for goods or services. The internet provides billing companies and their customers with new methods to deliver and access billing information. One of the most common ways of EBPP is the ***Bill Direct*** payment model (see Figure 3.7)[12].

According to the Bill Direct model, the e-billing process flow consists of four main steps[12]:

- ***Step 1: Service Initiation.*** The customer signs up to receive and pay bills via the Biller's web site. ***Biller*** is an organization (utility, cell phone, mortgage, etc.) that bills the customer.
- ***Step 2: Presentment.*** The Biller makes the billing information available to the customer, i.e., provides an online bill statement called ***presentment.***

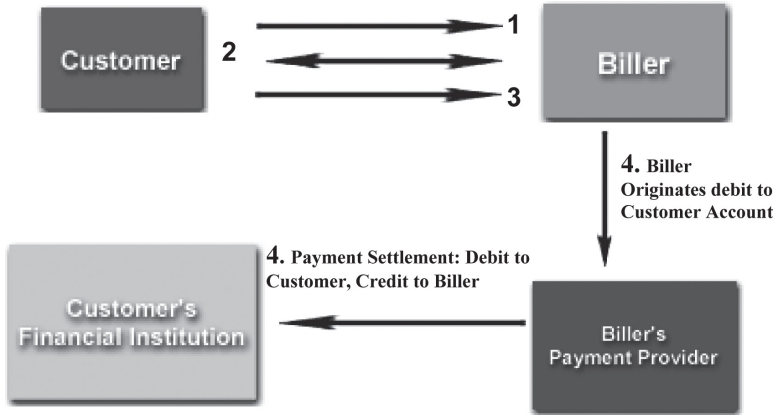

Figure 3.7 E-billing process flow: bill direct model

- ***Step 3: Payment.*** Once the customer views the bill, he/she authorizes it, which initiates a payment at the site
- ***Step 4: Payment.*** The Biller then initiates a payment transaction, which moves funds through the payment system.

Besides the ***Bill Direct*** payment model, the billing can be done through an intermediary aggregation services called the ***Third Party Consolidation/Aggregation*** model. For example, CheckFree.com is one of the popular third-party e-billing vendors that can consolidate and aggregates all of a customer's bills into a single presentment. This e-payment intermediary can also set up payments with companies that do not offer electronic billing, alert users to problems with any payments, and export the transaction records to ***Quicken*** or ***Microsoft Money*** software.

Table 3.3 Value-added offerings in online banking

Value Added Offerings	Explanation
Applicability	Online banking has grown rapidly in some countries as payment systems are in place and familiarity is very high so that there is potential for further applications and merchant use. The online payment option may be integrated into the shopping process, but it may also be used to pay after the purchased item has been received.
Ease to Obtain	Obtaining the online payment option via online banking is straightforward. The possession of a customer account and subscription to online banking automatically allows use of online payments as far as merchants accept them.
Cost	For merchants, setup costs are relatively low as the payment is effected via the bank's payment facilities and they do not need to install particular payment services and security devices. In addition, the system allows existing networks to be used and does not require the creation of a new one.
Security	Banks have frequently implemented supplementary security provisions beyond the standard use of a password and PIN number, for example, one-off passwords for authentication, which cannot be re-used. Online banking also often applies multiple authentications to improve payment security; the consumer has to provide several confidential pass codes to access a personal account.compared with alternative hardware systems, these are relatively low cost solutions. Ability to use the online banking to pay for the items that have been received provides additional security to buyers. This may encourage consumers who distrust online shopping to purchase on the Internet.

The e-payment systems via online banking provide a number of value-added offerings presented in Table 3.3.

Whether the bank is a traditional "brick-and-mortar" institution or a Web-only bank with no "brick-and-mortar" branches, online banking lets a customer connect to the bank through the Internet and do things such as view the customer accounts, transfer money between accounts, view images of canceled checks, print copies of those checks and pay bills online. The customer may find that it is common for online banking sites to be compatible with money managing programs such as Quicken and Microsoft Money.

Many banks make it easier to manage checking accounts by allowing set up of e-mail alerts so that the customer can be notified when checks clear or when the balance slips below a certain level. There is also a detailed listing of all canceled checks. If the customer wants to eliminate paper checks, then a growing number of companies allow this person to make automatic payments through the online banking account.

Online banking is not out to change customer money habits. It simply uses the Internet technology to give a customer the option of bypassing the time-consuming, paper-based aspects of traditional banking in order to manage finances more quickly and efficiently. It is almost certainly the way that most banking will be conducted business in the future.

Table 3.4 Value creation in online banking

For Customers	For Billers (Sellers)
Direct control over the timing and amount of the payment A savings on the cost of checks, postage and envelopes Simplify bill payment processing and record retention Centralize and streamline all bill payment functions and storage on their computer Review bills and make payments when they want, 24 hours a day Reduction or elimination of paper filing and storage	Improve customer service Leverage the delivery power of the Internet Provide a unique opportunity to touch customers in a new medium Create one-to-one marketing opportunities Integrate with existing automated billing and payment functions, such as cash management and accounts receivable Reduce billing and payments processing expense Customer retention Improve cash flow and posting time

3.5 E-Payment Currency Systems

Smart Cards

Smart card represents an electronic card containing an embedded microchip that stores personal information including cash account and the amount in this account. The card connects to a reader with direct physical contact or with a remote contactless radio frequency interface. With an embedded microcontroller, smart cards have the unique ability to store large amounts of data, carry out their own on-card functions, for example, encryption and mutual authentication, and interact intelligently with a smart card reader.

In practice, there are two general types of smart cards: contact and contactless. A ***contact smart card*** (see figure 3.8) must be inserted into a smart card reader with a direct connection to a conductive contact plate on the surface of the card (typically gold plated)[13]. Transmission of commands, data, and card status takes place over these physical contact points. A ***contactless smart card*** requires only close proximity to a reader. Both the reader and the card have antennae, and the two communicate using radio frequencies (RF) over this contactless link[13]. Most contactless cards also derive power for the internal chip from this electromagnetic signal. The range is typically one-half to three inches for non-battery-powered cards, ideal for applications such as building entry and payment that require a very fast card interface.

Smart cards are used in many applications worldwide, for example, in secure identity applications like employee ID badges or driver's licenses. They can be also employed in some countries as citizen health ID cards, physician ID cards, or portable medical records cards. Besides,

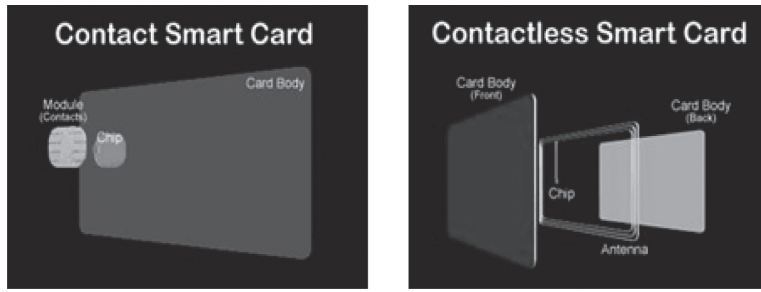

Figure 3.8 Contact and contactless smart card

smart cards are successfully used as an e-payment system including telephone payment cards, gift cards, or for paying small amounts within organizations like vending or copy machine cards. The smart cards usually rely on specialized hardware and dedicated smartcard readers for authentication.

Leading financial issuers have put millions of contactless credit and debit cards and devices into the hands of U.S. consumers. Issuers in the United States include American Express, Citibank, GE Consumer Finance, JPMorgan Chase, KeyBank, MBNA, Wells Fargo and others. Visa and JPMorgan Chase have also launched a contactless mobile payment pilot in Atlanta, and Discover has announced that it will pilot contactless payments using mobile phones[14]. Introduction of contactless credit and debit cards has focused on markets that have lower value transactions (less than $25). In these situations, the consumers use cash for payment, and transaction speed and customer convenience are critical. Merchant locations throughout the U.S. are now accepting contactless payment, including quick service restaurants, convenience stores, pharmacies, theaters, and sports venues, among others. Well-known national merchants such as McDonald's, 7-Eleven, AMC Theaters, and Regal Theaters have chosen to accept contactless payments.

Online Cash Systems

A number of online currency or cash systems have been designed for online cash payments. An ***online cash payment*** or ***e-cash*** is a digital equivalent of paper currency and coins, which enables secure and anonymous purchase of relatively inexpensive (low-priced) items. Online currency systems are software-only electronic money instruments based on signed money. They usually work via prepaid cards. For example, the B2B online cash payments are done with purchasing cards.

Purchasing card (P-card) is special-purpose payment cards issued to a company's employees to be used solely for purchasing non-strategic materials and services up to a preset dollar limit. The purchasing card is a mean of streamlining the traditional purchase order and payment processes for low cost transactions. Users, typically corporations and government agencies, find that a number of small dollar payments, those less than $1,000, make up the majority of payments while representing a small percentage of the dollars spent. This scenario represents the 80/20 rule at its best.

The transactional cost of making these payments using the traditional process is the same regardless of the dollar amount of the payment, i.e., it costs the same to process a $25 payment as it does a $100,000 payment. Often the cost of making a payment exceeds the value of the item being acquired, i.e., the cost to acquire a $25 wrench may exceed $100. The purchasing card simplifies the process and reduces the cost. Estimates of the transactional cost of the purchase order and payment process range from $50 to $250. The purchasing card's efficiencies result in savings ranging from 55% to 90% of this transactional cost[15].

- An example of how the purchasing card works is presented in Figure 3.9[15]. The information presented in Figure 3.9 describes the following process:
- A plastic purchasing card or non-plastic account number is issued to the cardholder.
- Each card/account is mapped to a general ledger account. (In some cases, G/L mapping can be done based on Merchant Category Codes or Point of Sale Information.)
- The cardholder places orders with suppliers providing appropriate payment instructions.
- The supplier processes the order using their acquiring bank's authorization process.

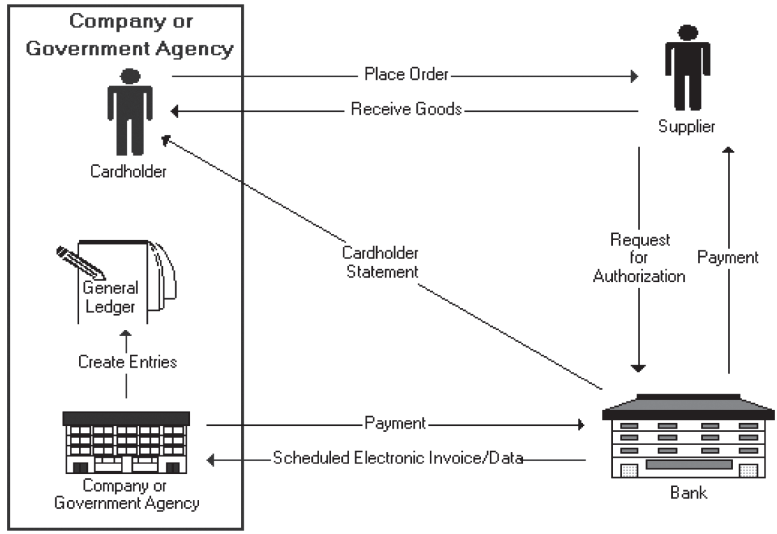

Figure 3.9 How purchasing card works

- The cardholder receives the purchasing card statement directly from the card issuer. The cardholder reviews and approves the statement. Cardholders do not submit a payment.
- A single electronic invoice is sent from the card issuer to the cardholder's organization on a monthly, weekly, or daily basis. The invoice is processed to create accounting entries and facilitate payment.

The usage of a purchasing card by an employee provides several important value-added benefits. The purchasing card directly increases productivity of the online purchasing process. The purchasing departments may be freed from the substantial day-to-day procurement activities required by purchasing cards, and can then focus on their core competencies like e-sourcing and relationships with suppliers. The purchasing card payments are usually consolidated into a single invoice that can be paid electronically through an electronic fund transfer. Additionally, values go beyond transactional savings when the organization begins to realize the behavioral changes required to make a purchasing card work most effectively. Additional values include:

- Supply base consolidation
- Reinforcement of general purchasing best practices
- A significant source of spend information
- Streamlining payees in the accounts payable system
- An opportunity for suppliers to streamline their processes

Suppliers accepting purchasing cards reap considerable benefits. When purchasers use their purchasing cards, suppliers:

- Receive payment within two to three days of submitting the transaction to the bank. The result is improved cash flow—2 days vs. the typical 30–60 days.
- Streamline their administrative functions via the elimination of invoices and the consolidation of receivables.
- Meet the requests of their customers, differentiate themselves from their competitors, and build better partnerships with their customers. The result is additional sales revenue.

Electronic Funds Transfer (EFT)

In general, ***Electronic Funds Transfer (EFT)*** is a system of transferring money from one bank account directly to another bank account through the electronic connections using a paperless environment. EFT may include money transfers for credit card, ATM, and point-of-sale (POS) transactions. It is used for both credit transfers, such as payroll payments, and for debit transfers, such as mortgage payments. Transactions are processed by the bank through the Automated Clearing House (ACH) network.

The ***Automated Clearing House (ACH) Network*** is a nationwide electronic payments system governed by the NACHA—the Electronic Payments Association, a trade association representing more than 12,000 financial institutions. The ACH Network is a batch-processing, store, and forward system. ACH transactions, or entries, that are received during the day by financial institutions are stored and processed in a group, or batch, mode. ACH transactions are accumulated and sorted by destination for transmission during a predetermined time. This process provides significant economies of scale and enables faster processing than is possible for checks, which must be physically handled. Instead of using paper to carry transaction information, ACH payments are sent from one financial institution to another via data transmission. An example of the EFT process using ACH is present in Figure 3.10[16].

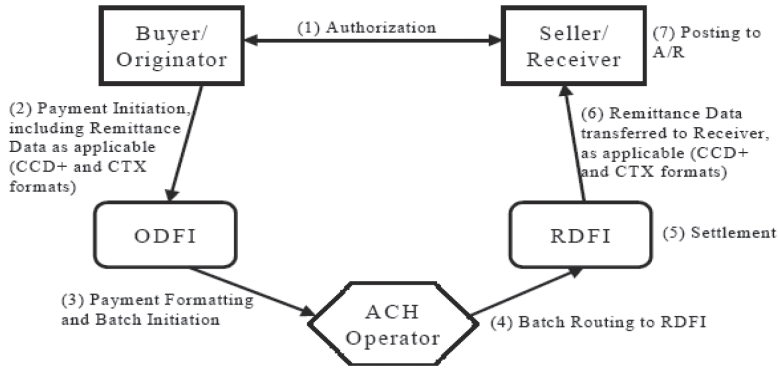

Figure 3.10 Example of EFT process using ACH

The process presented in Figure 3.10 consists of the following steps [16]:

- (1) The Buyer and the Seller enter into a contractual agreement that establishes authorization for ACH payment. The Seller must provide the Buyer with the bank routing number of their financial institution and depository account number or electronic lockbox account number. This information is used to route the ACH payment to the Seller. The Seller notifies the Buyer of the desired ACH format.
- (2) The Buyer, who is the originator of the ACH transaction, initiates an ACH credit through its financial institution, the *ODFI (Originating Depository Financial Institution).* The Buyer uses the payment and remittance format agreed to with the Seller. The ACH transaction can be initiated by the Buyer using a financial institution's information reporting system (which may or may not be internet based), PC software, a phone call, or by transmitting a formatted file.
- (3) The ODFI formats the payment and remittance data per the Originator's instructions, or uses formatted data provided by the Originator, and sends the ACH transaction to the ACH Operator in a batch transmission one to two days prior to the desired settlement date. The ODFI must have a minimum of one day prior to the settlement date to process the ACH request.
- (4) The *ACH Operator (Federal Reserve Bank or Electronic Payments Network (EPN), Payments Resource One, and Visa)* sorts and batches ACH transactions for the appropriate *RDFI (Receiving Depository Financial Institution)* and transmits the ACH transaction in a batch to the RDFI by the settlement date.
- (5) The ODFI debits the Buyer/ Originators account. The ACH Operator debits the ODFI and credits the RDFI. The RDFI credits the Seller's, or Receiver's, account on the settlement date. The settlement date is either one or two days after initiation of the payment transaction by the Originator,

depending on the ODFI's cutoff times for ACH origination and the timing of the Buyer's delivery of the payment request to the ODFI.

- (6) Remittance data, which is generated by the Buyer in step 2 above, is transferred by the RDFI to the Seller in the format agreed to by the Seller and the RDFI in their contract. Remittance data, accommodated in either CCD+ or CTX, contains the information necessary for the Seller to update its Accounts Receivable (A/R).
- (7) The payment is posted to the Seller's A/R. If a CCD is used, the payment is posted to A/R based on the amount credited to the Seller's account at the RDFI.

The growing popularity of EFT for online bill payment is paving the way for a paperless universe where checks, stamps, envelopes, and paper bills are obsolete. The benefits of EFT include reduced administrative costs, increased efficiency, simplified bookkeeping, and greater security. However, the number of companies who send and receive bills through the internet is still relatively small.

The U.S. Government monitors EFT compliance through Regulation E of the Federal Reserve Board, which implements the Electronic Funds Transfer Act (EFTA). Regulation E governs financial transactions with electronic payment services, specifically with regard to disclosure of information, consumer liability, error resolution, record retention, and receipts at electronic terminals.

3.6 Chapter 3 Summary: Managerial Aspects of Electronic Payments

1. The growth and proliferation of e-commerce facilitated the development of a completely new industry of e-commerce payments or simply e-payments, which are experiencing, along with other e-commerce models, significant growth.
2. The value-added offerings of an e-payment system should include its applicability, ease to obtain, reliability/ease of use, low cost of transaction, and security. The security of transactions and customer

information in an e-payment system places a crucial role. Customers would like to make sure that in an e-payment system, their financial data, including bank account and credit card information, will be securely transacted, and would not get into the hands of Internet hackers. The two main systems used for the payment transaction security are ***Secure Socket Layer*** and ***Secure Electronic Transaction***.

3. A wide range of e-payment models can be clustered into two main groups: account-based and electronic currency models ***Account-based Models*** allow payment via an existing personalized account, which is usually a bank account or intermediary account. The account-based models are based on online utilization of credit and debit cards, intermediary services, mobile/wireless payments, and payment via online banking. ***Electronic Currency Models*** allow payment simply if the payer has an appropriate amount of electronic currency. These systems can be divided into three main categories of payments based on smart cards, online cash systems, and electronic transfer of funds.
4. ***Credit cards*** are widely used to pay for online e-commerce transactions. A major difference, however, between online and offline payments is that in online purchases a physical copy of the card is not provided, and the merchant does not obtain a signed confirmation from the customer. In addition, all offline transactions are authorized at the point of sale, whereas this is not the case for all online purchases (especially with small businesses).
5. E-payments through credit cards provide a number of value-added offerings to the customers that should reflect availability of credit cards, ease of obtain and using them, low transaction cost, credit card security, and some others. Major limitations in using credit cards online are associated with their relatively high cost for micropayments ($10 or less, non-eligibility for some market segments (customers that are less than 18 years old), high level of payment rejection by issuer, and chargeback.
6. ***Debit cards*** have a significant user spread, which in most countries is higher than the number of credit card users depending on financial regulation and conditions attached to credit card issuance. However,

debit card payment is generally not as widespread on merchant Web sites as credit card payment. Their application is mostly limited to national payments, due to the national structures, operations and regulation of banking systems, and they do not address the demand for international payments.

7. The e-payment ***intermediary service*** is provided by an online company that enables financial transactions between buyers and sellers. These transactions are usually done seamlessly by transferring money from the buyer's to seller's online accounts without using credit or debit cards or bank accounts.
8. ***PayPal,*** the most popular e-payment intermediary service, contains a suite of different payment options that can assist merchants to start accepting payments online or enhance their existing payment functions. ***Website Payments Standard*** uses PayPal's own website to process payments ***Website Payments Pro*** enables customers to pay at the storefront via credit card, without knowing that PayPal is involved, or allows users not to register or login to the storefront but complete their purchases at PayPal. ***PayFlow Pro*** is a standard payment gateway, which translates into a credit card form shown to customers during checkout.
9. E-payment intermediary services including PayPal contain several major issues and problems. First, they still have a limited utilization in the overall online payment system. Second, in order to use an intermediary service, consumers have to sign up for the service, whereas using credit cards online does not involve any new services. Third, the fixed component in the intermediary payment structure is a major cost disadvantage for competition in the micropayments sector. Finally, there is no inherent anonymity in the service.
10. The challenge for the banking industry has been to design this new e-payment service channel in such a way that its customers will readily learn to use and trust it. Most of the large banks now offer fully secure, fully functional online banking for free or for a small fee. Some smaller banks offer limited access or functionality; for instance, a customer may be able to view the account balance and history but not initiate transactions online. As more banks succeed online and

more customers use their sites, fully functional online banking likely will become as common as automated teller machines.

11. ***Smart card*** represents an electronic card containing an embedded microchip that stores personal information including cash account and the amount in this account. The card connects to a reader with direct physical contact or with a remote contactless radio frequency interface. With an embedded microcontroller, smart cards have the unique ability to store large amounts of data, carry out their own on-card functions, for example, encryption and mutual authentication, and interact intelligently with a smart card reader.
12. ***Online cash payment*** or ***e-cash*** is a digital equivalent of paper currency and coins, which enables secure and anonymous purchase of relatively inexpensive (low-priced) items. Online currency systems are software-only electronic money instruments based on signed money. They usually work via prepaid cards. For example, the B2B online cash payments are done with purchasing cards. ***Purchasing card (P-card)*** is special-purpose payment cards issued to a company's employees to be used solely for purchasing non-strategic materials and services up to a preset dollar limit. The purchasing card is a mean of streamlining the traditional purchase order and payment processes for low cost transactions.
13. ***Electronic Funds Transfer (EFT)*** is a system of transferring money from one bank account directly to another bank account through the electronic connections using a paperless environment. EFT may include money transfers for credit card, ATM, and point-of-sale (POS) transactions. It is used for both credit transfers, such as payroll payments, and for debit transfers, such as mortgage payments. Transactions are processed by the bank through the ***Automated Clearing House (ACH) Network,*** which is a nationwide electronic payments system for batch-processing, store, and forwarding electronic fund transfers.

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CHAPTER 4

Electronic Services Applications

In the previous chapters, we discussed a variety of e-commerce models including demand-side e-commerce, supply-side e-commerce, and collaborative commerce. In addition, we discussed mobile commerce and e-payments. The last two models, because of the way they are defined and used, may also be recognized as electronic services or simple e-services. In fact, the internet contains an increasing number of online models that have the service nature and application. We need to understand what these models mean, and what their classification and utilization are in the modern business environment.

4.1 Definition and Classification of Electronic Services

In general, ***electronic service (e-service)*** can be defined as the distributed services that can be accessed via the internet. They are used to support and facilitate business and non-business related activities in organizations and for individual consumers. It is a natural extension of e-commerce (e-business), which may create extensive opportunities to deliver new services to existing customers.

E-service Business Concepts

One of the ***e-service business concepts*** was originated by Hewlett Packard (HP)[1]. It is the idea that the World Wide Web is moving beyond e-business and e-commerce into a new phase where many business services can be provided for a business or consumer using the Web. Some

e-services, such as remote bulk printing, may be done at a Web site; other e-services, such as news updates to subscribers, may be sent to your computer. Other e-services will be done in the background without the customer's immediate knowledge. HP defines e-services as "modular, nimble, electronic services that perform work, achieve tasks, or complete transactions."

Using HP's e-services concept, any application program or information resource is a potential e-service or ***Internet Service Provider (ISP),*** and other companies are logical distributors or access points for such service. The e-services concept also sees services being built into "cars, networked devices, and virtually anything that has a microchip in it." HP's vision is that IT departments will increasingly address their needs in a modular way so that individual modules can potentially be addressed by some e-service[1]. According to HP, the three trends in e-services were:

- The increasing availability of service applications providers, for example, for accounting, payment systems, purchasing, and enterprise resource planning (ERP).
- A growing number of specialized web portal sites.
- More "on-the-fly" management of service requests that may require handling by several companies.

Besides the three specified trends, there are several more trends existing in e-service development. We will discuss them in the next section of this chapter.

Another concept of e-service is based on ***e-service outsourcing.*** Outsourcing is an arrangement in which one company provides services for another company that could also be, or usually have been, provided in-house. Outsourcing is a trend that is becoming more common in information technology and other industries. It is used for services that have usually been regarded as intrinsic to managing a business. The main reasons for e-service outsourcing are:

- A desire of companies to concentrate on their core business
- The need to have services up and running rapidly
- Lack of expertise and resources for many support services

- The inability to have the economy of scale enjoyed by outsourcers, which often results in high costs for in-house service options
- The inability to keep up with rapidly fluctuating demands if an in-house service option is used
- The number of required services, which usually are simply too many for one company to handle

E-service Classification

The Internet contains a significant number of e-services, sometimes quite different in nature, activities, business models, and results. However, all this variety of services can be classified into several groups of service models presented in Figure 4.1.

The clustering of the e-service models into six different groups is based on the objectives and functionality of these models. The first group, ***E-infrastructure,*** contains e-service models that provide technical, technological, and managerial infrastructure services to customers. These include e-service companies that enable access to the Internet (Internet Service Providers) or mobile service (Mobile Service Providers), establish integration between e-commerce models and internal ERP system, and participate in consulting and customer services. The second group, ***E-content and Information,*** include online information services, content providers, and Internet search companies (for example, Google). The third group, ***E-process,*** deals with a variety of online transactional services used in e-commerce models, for example, e-payments, m-commerce, e-logistics, etc.

The fourth group of e-services, ***E-communities,*** contains a number of e-services associated with different online communities, for example,

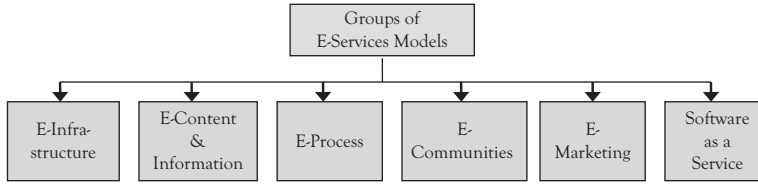

Figure 4.1 Classification of e-service models

government services, business directories, blog web sites, and others. The fifth group, ***E-marketing,*** combines a number of services related to marketing, advertising, and affiliate services. Finally, the sixth group, ***Software as a Service (SaaS)***, includes a variety of business software systems and applications that may be used by business customers and consumers on an as needed basis or on-demand basis. This is a very fast growing area of e-services, which we will discuss in more details in this chapter.

Table 4.1 Components of e-service business model

Components	Description	
Value Proposition	Construction of a value proposition requires to specification of two things: • *Target segment* • *Core customer benefits*	
Value-added Offerings	Represents value-added activities in the following categories: • *Scope of offering* • *Products and services* • *E-service processes* • *Mapping products and services to e-commerce processes*	
Supporting Resources	Select and then align resources to deliver the benefits of the value proposition	
Revenue/Cost Model	Revenue model: • *Product, service, or information sales* • *Transaction fees* • *Subscription fees* • *Advertising* • *Affiliate fees* • *Licensing fees*	Cost model: • Direct and/or indirect cost • Inventory cost reduction • Paperless environment • Administrative expenses • Quality cost
Value Creation	Monetary value creation • *Revenue enhancement/growth* • *Cost reduction* • *Asset intensity reduction* Non-monetary value creation • *Improve quality of service* • *Faster delivery of products and services* • *Convenience of obtaining services* • *Permanent and quick access to data* • *24/7 operation* • *Data accuracy* • *Improve customer service* • *Improve customer satisfaction*	

E-Service Business Model

The categories of e-service business model are very similar to those presented in Chapter 2 for a general e-commerce business model. The business model components and their brief description are shown in Table 4.1.

4.2 Description of E-Service Model Groups

E-Infrastructure

The electronic infrastructure services are used by companies and individual consumers to develop technical, technological, and managerial capabilities of using e-commerce models. This is a large group of diverse e-services.

One of the typical infrastructure e-services is ***Internet Service Provider (ISP)***, which is used to enable direct access to the internet. ISPs contain the equipment and telecommunication line access, which is required in order to have a point-of-presence on the Internet for the geographic area served. The larger ISPs have their own high-speed leased lines so that they are less dependent on telecommunication providers and can ensure better service to their customers. Among the largest national and regional ISPs are AT&T WorldNet, IBM Global Network, Comcast Cable, and others. The list of ISPs can be found, for example, at dir.yahoo.com or www.cix.org (US Internet Service Provide Association).

Network Service Provider (NSP) is a company that enables backbone services to the ISP. The world's top NSPs are AT&T in the U.S.A, British Telecom in the U.K., NTT DoCoMo in Japan, and SingTel in Singapore. Additionally, there are a number of NSP companies that do connection, installation, maintenance and support of a customer's (usually, a business customer) network services. This may include local area network (LAN), wide area network (WAN), wireless network, connection to the high-bandwidth links, and other activities. The directory of NSPs can also be found at dir.yahoo.com. ***Electronic Data Interchange (EDI)*** services provide development and implementation of EDI systems for a variety of business customers. EDI is the process of using computers to exchange business documents between companies. Previously, fax machines or traditional mail was used to exchange documents. Mailing and faxing are still used in business, but EDI is a much quicker way to do the same thing.

Internet Security Providers are e-services that enable security tools and applications on the customer's web site. The customers can outsource firewall and antivirus software. The security providers guarantee constant signature updates, maintenance, and support of the security applications. A good selection of internet security providers can be found at www .internetsecuritydirectory.com.

A big cluster of the e-infrastructure services is associated with ***Mobile Service Providers*** (Verizon, AT&T, Sprint and others) that enable customer access to wireless communication and provide m-commerce capabilities (see Chapter 2). Another group of e-services, ***Web Portals and Web Hosting,*** is used to provide online hosting of customer web sites, their software, and product/ service databases. A specific hosting or web portal vendor may be found in www.portalwebhosting.com or www.findmyhosting.com.

The integration between e-commerce web sites and internal enterprise computer systems like enterprise resources planning (ERP) or functional computer systems (accounting, marketing, or operations) may involve a lot of complexity. The internal systems could be developed long before the internet era (they are usually called the "legacy systems"), and thus may not be compatible with the modern e-commerce systems. In addition, the companies may seek help to integrate their dispersed computerized system into one combined system. In these cases, the customers may use ***System and Application Integration*** e-service providers that are also called ***Enterprise Application Integration (EAI).*** EAI is a business computing term for the plans, methods, and tools aimed at modernizing, consolidating, and coordinating the computer applications in an enterprise [2]. Typically, an enterprise has existing legacy applications and databases and wants to continue to use them while adding or migrating to a new set of applications that exploit the internet, e-commerce, extranet, and other new technologies. EAI may involve developing a totally new view of an enterprise's business and its applications, seeing how existing applications fit into the new view, and then devising ways to reuse efficiently what already exists while adding new applications and data[2]. The directory of EAI services and related information may be found at eai.ittoolbox.com.

Besides the software integration, e-commerce requires a number of integration standards that enable compatibility and communication

between various e-commerce sites. For this purpose, the e-commerce companies may employ ***Integration Standard*** services that help with establishing and maintaining a variety of standards in e-commerce, collaboration (c-commerce), and m-commerce. For example, EPCGlobal (www.epcglobalinc.org) leads in the development of the industry-driven standards for the Electronic Product Code (EPC) to support the RFID systems. Another set of standards may be found from Universal Code Council (UCC) (www.uc-council. org) that establishes and promotes multi-industry standards for product identification and related electronic communication.

E-content and Information

I-content and Information group is well defined by its name. E-services in this group are used to providing rich information content, search results, directory services, and research information to e-commerce customers and individual consumers. The summary of the services in the E-content and Information group is present in Table 4.2.

Table 4.2 Summary of e-content and information services

Subgroup	Description	Examples
Information Search	Online service providing news, information, and links to other web sites Establish online encyclopedia of terms collaboratively developed by users worldwide	www.wsj.com, www.businessweek.com www.Wikipedia.com
Content Providers	Provide information content (breaking news and information) to other information services	www.reuters.com www.ap.org
Information Services	Enable search for general subject or specific industry information	www.google.com www.ask.com
Consulting Services	Develop, market, and sell research reports and papers on different areas of e-commerce Provide systems and applications consulting in e-commerce	www.gartner.com www.oracle.com
Directory Services	Store and organize information about network computer users and network resources.	Microsoft Active Directory Mac OS Open Directory Apache Directory Server

E-process

E-process is a conglomerate of diverse e-services which is used for enabling and facilitating transactions in various e-commerce models. A ***transaction*** in this case means a process of moving a physical or virtual product/service, information, data, or expertise from one organization/customer to another organization/customer. The examples of the e-process services include:

- ***E-payment,*** which establishes a variety of payment services to business customers and consumers like www.PayPal.com (see Chapter 3)
- ***E-logistics*** that provides logistics services like product transportation, order tracking, and order fulfillment like www.fedex.com
- ***Database and Record Processing*** allows database and recordkeeping services, for example, electronic medical records
- ***Insurance*** enable the customer to purchase online different types of insurances from a variety of insurance companies (www.insure.com)
- ***Loans*** enable online services for acquiring loans from a variety of lenders (www.eloan.com).

E-Communities

The ***E-Communities*** group includes an extensive number of e-services associated with various government, business, and consumer organizations that have online representation. These e-services are mostly used for providing information, guidelines, education, and useful links in different areas of business and life.

One such e-service is ***Government Services*** that provide information about various aspects of government activities, resources, policies, and procedures. For example, a U.S. government portal www.firstgov.gov provides a number of links to government-related information and resources on the web (see Figure 4.2), like Benefits and Grants, Consumer Guides, Defense and International, Environment and Energy, Agriculture, Family,

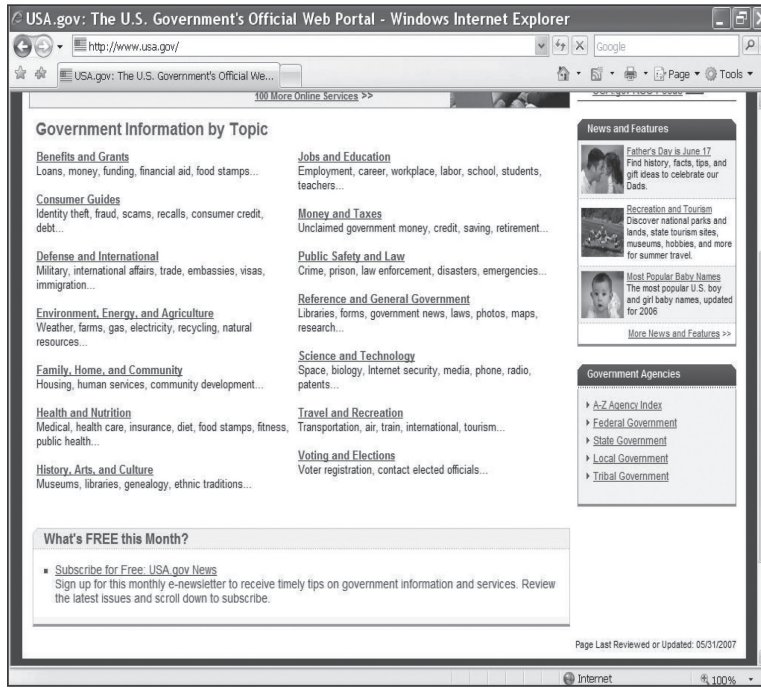

Figure 4.2 U.S. Government information portal

Home, Community, and many others. Besides information, the web site provides links to transactional (e-process) services including driver's license renewal, vital records changes, government online auctions, passport renewal, government job applications, and others.

The next popular e-service is ***Business and Consumer Blogs.*** Blog is a short form for the word weblog and the two words are used interchangeably. In general, a blog is a frequently updated online journal or diary. It could be managed by an individual, organization, or business. A blog is the place to express personal or business opinion and share thoughts. A typical blog combines text, images, and links to other blogs, web pages, and other media related to its topic. The ability for readers to leave comments in an interactive format is an important aspect of many blogs.

The number of blogs today is hard to estimate; it is measured in thousands and thousands of web pages. There are special online companies that help create and maintain blogs, for example, www.blogger.com. To find the blog companies, or to respond to the blog postings, customers may

use several e-service portals that contain links to business and consumer blogs, for example, www. bloggersblog.com and www.bloguniverse.com.

Supplier Directories are a common e-service in the area of supply management, procurement, and sourcing (see Chapter 4 on Supply-side Ecommerce). They enable identification and evaluation of prospective suppliers that may be used for outsourcing or for participation in reverse auctions. One of the popular supplier directories is Thomas Register, www.thomasnet.com. The web site allows searching for suppliers by browsing product categories. In addition, the supplier may be found by product name, company's name, or location.

E-marketing

The ***E-marketing*** group contains a variety of online services that help organizations with advertising, promotions, marketing, market research, and data mining. The ***Advertising and Marketing*** e-services provide service and consulting in the following areas:

- E-mail and off-line marketing campaigns
- Banner and text advertising
- Mailing lists and newsletter services
- Web site promotion services
- Online branding
- Performance analysis and lead generation
- Market analysis
- Web site design for marketing and promotion campaigns.

The number of internet-based companies that can help with online marketing and advertising is measured in the hundreds. A list of such companies can be found in online business directories like: dmoz.org and www.business.com.

Affiliate Services or ***Affiliate Marketing Services*** is a way for a company to sell its products online by signing up individuals or companies (affiliates) who market the company's products online for a commission. These services are usually "pay-per-sale" or "pay-per-click" marketing programs based on the concept of revenue sharing. Companies selling

products or services online give the affiliates a cut of their profits (a share in their revenue) as a commission on any sales generated from a customer they introduce to the partner site. Internet affiliate programs are popular with both companies looking to increase sales and web sites wanting to generate extra income. The affiliates help the merchants by exposing the merchant's products/services to visitors of their web site through careful placement of banners and links.

There are several ways to establish an affiliate service. An e-commerce company can offer an affiliate program to others or an online company can sign up to be the affiliate. The e-commerce business company will pay affiliates a commission fee for every lead or sale they drive to the company's web site. An affiliated company may provide services to many e-commerce companies at the same time. For example, www.bizrate.com provides product price comparisons and ranking of e-commerce shopping sites (see Figure 4.3). If a customer clicks on one of these shopping sites to

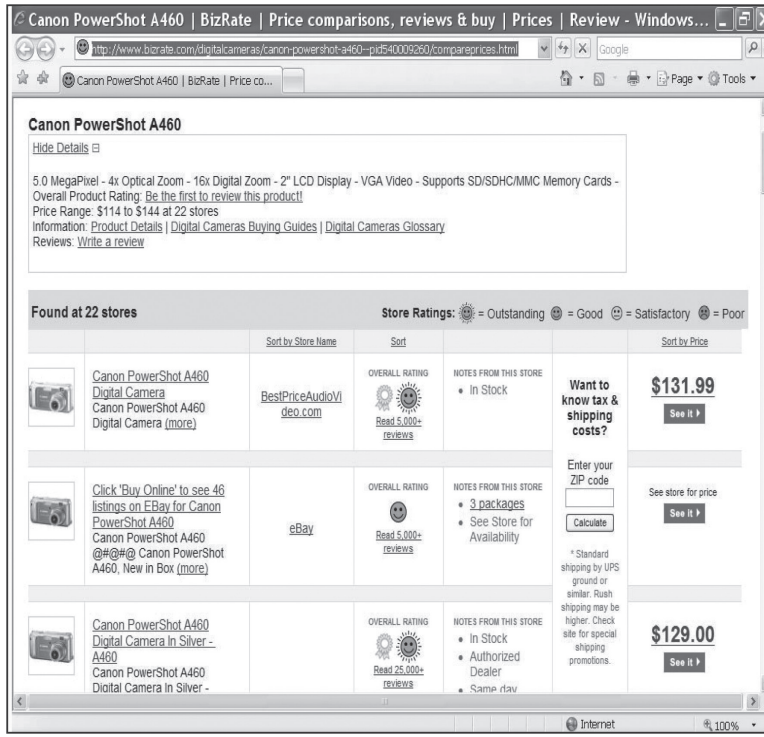

Figure 4.3 Example of affiliate web site (www.BizRate.com)

continue shopping, the affiliate company (in this case www.bizrate.com) will get an affiliate fee (commission) from that site.

Data Mining Services provide software and expertise to improve data extraction and analysis of company statistical information. This includes financial, marketing, and operational data, consumer surveys, competitors' results, and other data relevant to the company. Businesses of all sizes have embraced data mining as a process for improving the bottom line. With enormous amounts of customer information now centralized in enterprise data warehouses, and improved technology to support integration and dissemination of information for marketing purposes, data mining and analytical customer relationship management (CRM) applications appear to have the potential to greatly improve marketing ROI. However, there is growing sentiment that investments in data mining and analytical CRM have not paid substantial dividends.

4.3 Software as a Service

The concept of the software development and distribution has significantly changed from the time companies started to use computers to now. Originally, development of computer systems usually took place inside an organization, which created homegrown computer systems for internal business and engineering needs. They were used predominantly on powerful mainframe and mini computers, and distributed to the end users via terminals connected to the internal computer networks. These systems may still be found today in large corporations, where they are usually used for high-volume batch transactions. The old computer systems are usually referred as "legacy systems" (see Figure 4.4). Overall, the internal software development process required significant resources and time, and was not necessarily based on the best practices in this field.

In the late 1980s and early 1990s, a new generation of software distribution became popular: client-server software. The development of personal PC and powerful servers signified a possibility for companies to purchase the software license from a vendor (software provider) with the established core competencies in software development, and then install the software on the company's server(s). End-user PCs in the company became "clients" that contained run-time applications of the

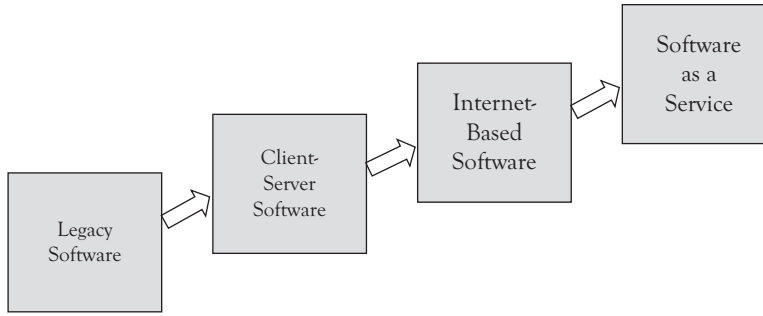

Figure 4.4 Evolution of software development and distribution

same software. This facilitated the delivery and performance results of the software on the client PC. However, the implementation of the vendor's software was still lengthy and not free from substantial implementation errors and delays. It would also require significant resources for completion.

In the late 1990s, the development and proliferation of internet-based e-commerce applications opened new opportunities for software delivery to users. Business customers could buy software licenses and download the applications from the software provider' e-commerce storefront. The Internet also brought the opportunity to outsource software capabilities from a hosting provider via the Internet network. This created a new concept in software delivery-software as a service (SaaS).

Software as a Service (SaaS) is a software delivery model in which online applications are hosted by a service provider and made available to customers over the Internet. The hosting company (a software vendor or a third-party organization) provides hardware, installation, maintenance, daily technical operation, and support for the software delivered to their clients via the Internet (World Wide Web). The software can be delivered to any market segment including home consumers, small business, medium and large business. The main characteristics of SaaS are:

- Network-based access to, and management of commercially available (e.g., not custom) software.
- Activities that are managed from central locations rather than at each customer's site, enabling customers to access applications remotely via the Web.

- Application delivery that typically is closer to a one-to-many model (single instance, multiuser architecture) than to a one-to-one model, including architecture, pricing, partnership, and management characteristics.

The SaaS application has captured a relatively big market share in specific business functions like Customer Relationship Management (CRM), HR, and Procurement, and vertical markets (Technology, Financial Services, and Utilities) (see Figure 4.5)[3]. The Gartner group estimated that by 2011, 25% of all software spending would be in applications delivered using SaaS[3].

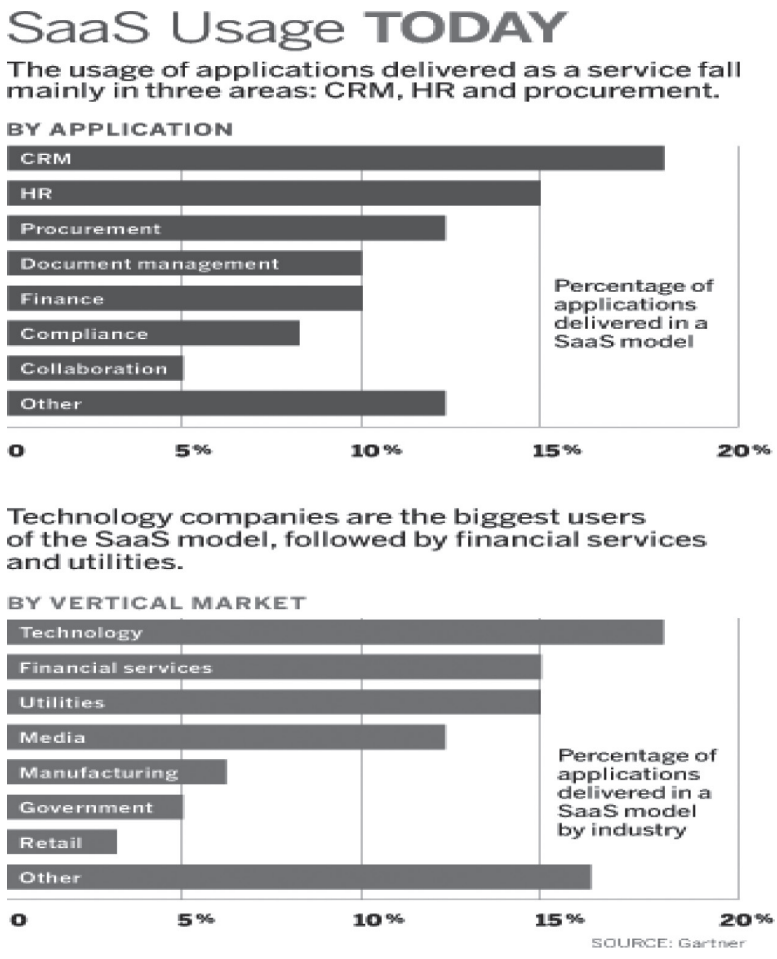

Figure 4.5 Market share of SaaS/On-demand applications

The early version of SaaS that had evolved during the dot-com era was ***Applications Service Providers (ASP).*** According to ASPnews.com [4], an ASP is a third party entity that deploys, hosts and manages access to a packaged application, and delivers software-based services and solutions to customers across a wide area network from a central data center. Companies used ASPs to outsource some or most applications for their information technology needs. ASPnews.com breaks the industry into five subcategories[4]:

- ***Enterprise*** ASPs—deliver high-end business applications.
- ***Local/Regional*** ASPs—supply wide variety of application services for smaller businesses in a local area
- ***Specialist*** ASPs—provide applications for a specific need, such as Web site services or human resources
- ***Vertical Market*** ASPs—provide support to a specific industry such as healthcare
- ***Volume Business*** ASPs—supply general small/medium-sized businesses with prepackaged application services in volume.

ASPs may also be commercial ventures that cater to customers, or not-for-profit or government organizations, providing service and support to end users. In general, an ASP hosting company purchased and deployed on its server(s) a copy of software requested by the customer. The hosting company could also offer widely available software for use by customers. A licensing fee and monthly subscription fees were separately paid to the maker of the software and the ASP hosting company, respectively. The hosting company also enabled some level of software customization.

When ASPs sprang up in the 1990s, they offered essentially the same thing SaaS vendors offer today: hosted applications delivered over the internet[5]. The problem ASPs ran into (actually, they ran into *many* problems, not the least of which was the venture capital money that dried up in the 2000–2001 time frame during the dot-com crash) was that they tried to be all things to all people, and they buckled under the weight of their own infrastructure. In trying to serve the unique needs of each of their customers, ASPs lost the economies of scale that were necessary

for them to provide their services in a cost-effective manner[5]. Other ASP problems were associated with the following:

- ASP generation was merely traditional client-server applications with HTML front-ends.
- These applications were hosted by third parties who ordinarily did not have application expertise, but were managed server providers.
- Because the applications were not written as net-native applications, performance was poor and application updates were no better than self-managed applications.

The current (after ASP) generation of Software as a Service is also known as ***Software On-Demand (SOD).*** Unlike traditional packaged applications or ASPs models, in which users owned the software licenses, the SOD vendor/provider owns the software and runs it on computers in its data center. The customer does not own the software but effectively rents it, usually for a monthly fee. The SOD provider offers software specifically built for one-to-many hosting, i.e., one copy of the software is installed for use by many companies who access the software across the Web. The SOD vendor may not provide software customization for specific customers. However, there may be a variety of similar software products for outsourcing by customers.

The main value-added offerings and value creation in SaaS/on-demand software are presented in Table 4.3.

One of the leaders in SOD services is *www.salesforce.com,* which provides on-demand customer relationship management (CRM) applications. These applications include:

- ***Sales Force Automation*** for managing different sales information, forecasts, pricing, sale leads and sales campaigns
- ***Service and Support*** that is used for identifying and managing customers, providing customer support, analyzing feedback and customer complaints
- ***Marketing*** for providing marketing and promotion campaigns, analyzing markets, and providing optimal marketing decisions

Table 4.3 Main Value-added offerings and benefits of SaaS/ On-demand software

Value-Added Offerings	Value Creation (Benefits)
The customer is renting and using software via the Internet The hosting company provides a variety of standardized software options that the customer can choose from The hosting company owns the software, and is responsible for hardware and software installation and implementation The hosting company provides constant and seamless updates and improvement of the software for all customers at the same time	Reduce costs through low upfront investments in hardware, installation, and implementation Reduce cost through low subscription fees Relatively quick implementation cycle (usually from 3 to 6 months) Reduce implementation errors and bugs Improve customer satisfaction

- ***Partner Relationship Management*** including planning and recruiting partners, partner marketing, sales, and analysis
- ***Analytics*** which provides business intelligence and analytical tools for facilitating and improving management of various CRM applications (see Figure 4.6).

The company also established the AppExchange site that provides an online marketplace of applications developed by salesforce.com and its community of developers, customers, and partners. These applications are clustered into Sales, Marketing, Service and Support, Analytics, Finance and Administration, Human Resources, Financial Service, and Non-Profits.companies can visit the AppExchange to choose from hundreds of on-demand applications. With just a few clicks, these apps can be installed into a company's salesforce.com environment and begin delivering added functionality immediately. The AppExchange is a way for independent software vendors (ISVs) to distribute applications to the largest audience of on-demand subscribers in the world. Developers at companies of all sizes are building applications on Salesforce's on-demand platform and bringing them to market on the AppExchange.

In general, SaaS solutions work best for non-strategic, non-mission-critical processes and functions such as expense and travel management, procurement, and employee performance management that are simple,

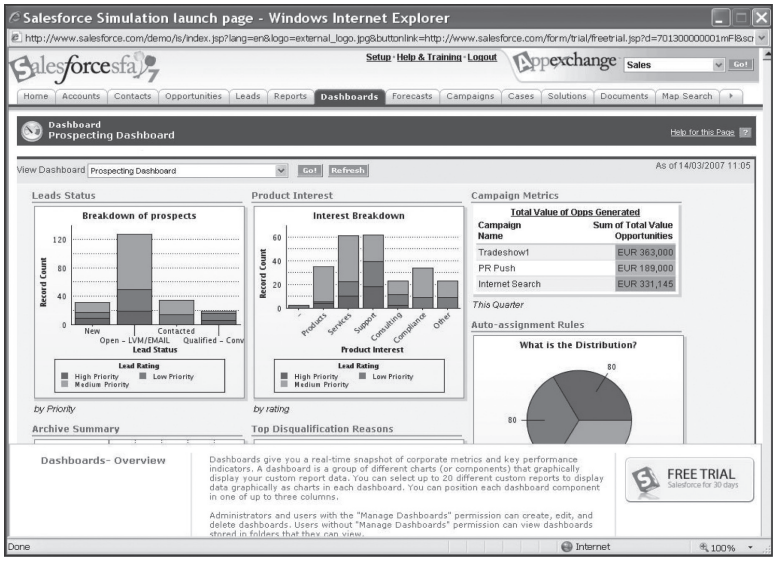

Figure 4.6 Example of salesforce's On-demand analytics

standard, and not highly dependent on or integrated with other business functions and systems. SaaS also works well for processes that are being automated for the first time, because there are no legacy processes to replace and thus fewer change-management challenges[5].

4.4 Chapter 4 Summary: Managerial Aspects of Electronic Services

1. The ***electronic service (e-service) business concepts*** originated by Hewlett Packard (HP) is the idea that the Internet and World Wide Web are moving beyond e-business and e- commerce into a new phase where many services can be provided for a business organization or end consumer using the Web. Any application program or information resource is a potential e-service or Internet Service Provider (ISP), and other companies are logical distributors or access points for such service.
2. Main trends in e-service development are associated with the increasing availability of ISPs applications providers, growing number of specialized web portal service sites, and more "on-the-fly"

management of service requests that may require handling by several companies.

3. ***E-service outsourcing*** concept is an arrangement in which one company provides services for another company that could also be, or usually has been, provided in-house. The main reasons for e-service outsourcing are: (a) the desire of companies to concentrate on their core business; (b) the need to have services up and running rapidly; (c) the lack of expertise and resources for many support services; (d) the inability to have the economy of scale enjoyed by outsourcers; (e) the inability to keep up with rapidly fluctuating demands if an in-house service option is used; and (f) the number of required services, which usually are simply too many for one company to handle.
4. The internet contains a significant number of e-services, sometimes quite different in nature, activities, and business models. However, all this variety of services can be classified into six main groups of e-service models based on their objectives and functionality.
5. ***E-infrastructure*** contains e-service models that provide technical, technological, and managerial infrastructure services to the customers. These include e-service companies that enable access to the internet (Internet Service Providers) or mobile service (Mobile Service Providers), establish integration between e-commerce models and internal ERP system, and participate in consulting and customer services.
6. ***E-content and Information*** include online information services, content providers, and Internet search companies (for example, Google). The third group, ***E-process,*** deals with a variety of online transactional services used in e-commerce models, for example, e-payments, m-commerce, e-logistics, etc.
7. ***E-communities*** contain a number of e-services associated with different online communities, for example, government services, business directories, blog web sites, and others.
8. ***E-marketing*** combines a number of services related to marketing, advertising, and affiliate services.
9. ***Software as a Service (SaaS)*** is a software delivery model in which online applications are hosted by a service provider and made available to customers over the internet. The hosting company

(a software vendor or a third-party organization) provides hardware, installation, maintenance, daily technical operation, and support for the software delivered to their clients via the internet (World Wide Web). The software can be delivered to any market segment including home consumers, small business, medium and large business.

10. The early version of SaaS that had evolved during the dot-com era was ***Applications Service Providers (ASP).*** ASP is a third party entity that deploys, hosts, and manages access to a packaged application, and delivers software-based services and solutions to customers across a wide area network from a central data center. Companies used ASPs to outsource some or most business applications for their information technology needs. The main problem ASPs ran into was that they tried to be all things to all people, and they buckled under the weight of their own infrastructure. In trying to serve the unique needs of each of their customers, ASPs lost the economies of scale that were necessary for them to provide their services in a cost-effective manner.
11. The current (after ASP) generation of Software as a Service is known as ***Software On-Demand (SOD).*** Unlike traditional packaged applications or ASPs models, in which users owned the software licenses, the SOD vendor/provider owns the software and runs it on computers in its data center. The customer does not own the software but effectively rents it, usually for a monthly fee.
12. Value-added offerings provided by SOD are based on renting and using software via the internet. The hosting company develops a variety of standardized software options that the customer can choose from; it owns the software, and is responsible for hardware and software installation. Finally, the hosting company provides constant and seamless updates and improvement of the software for all customers at the same time.
13. SOD value creation is associated with reduced costs through low upfront investments in hardware, installation, and implementation; reduced cost through low subscription fees; relatively quick implementation cycle (usually from 3 to 6 months); reduced implementation errors and bugs; and, finally, improved customer satisfaction.

14. In general, SaaS/SOD solutions work best for non-strategic, non-mission-critical processes and functions such as expense and travel management, procurement, and employee performance management that are simple, standard, and not highly dependent on or integrated with other business functions and systems. SaaS also works well for processes that are being automated for the first time, because there are no legacy processes to replace and thus fewer change-management challenges

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Index

Application Models for E-Commerce

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e-ISBN 978-1-63157-209-8

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