Business Models for E-Commerce

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ISBN-13: 978-1-63157-208-1 (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

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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.

Business 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.

Business 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

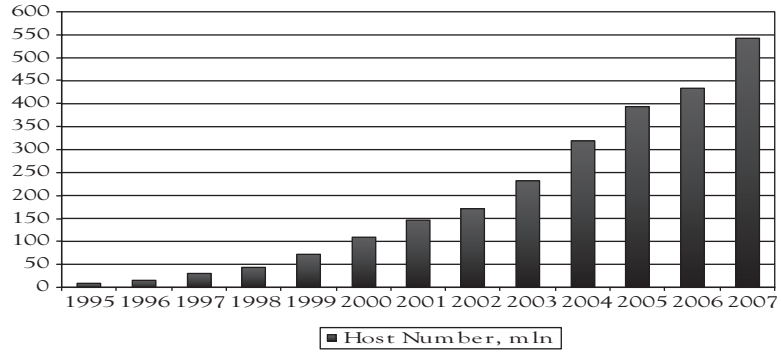

Figure 1.1 Internet hosts' growth

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

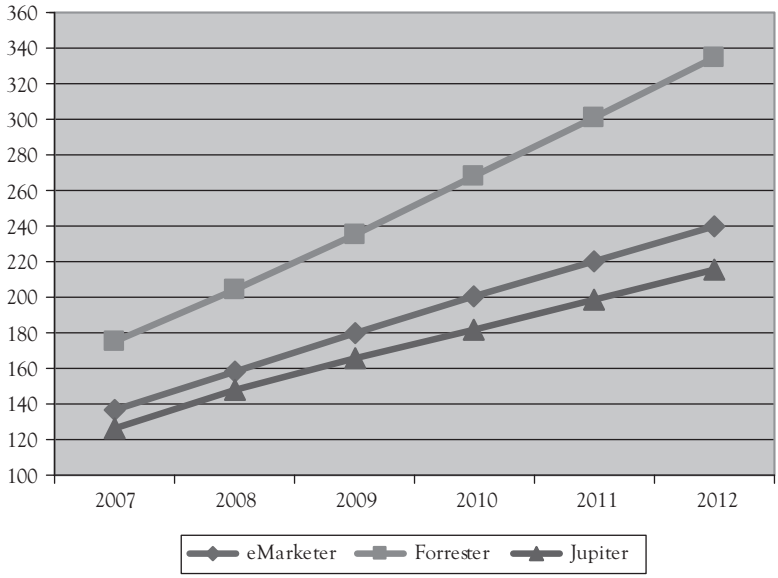

Figure 1.3 Comparative estimates: U.S. retail e-commerce sales, (billions)[10]

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).

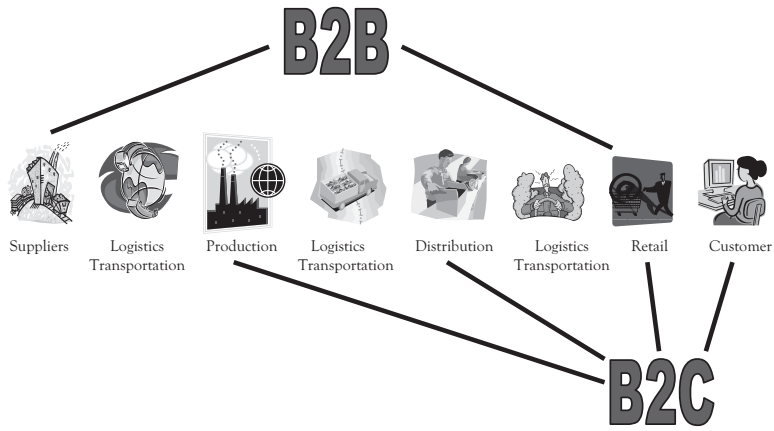

Figure 1.4 B2B and B2C E-commerce

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

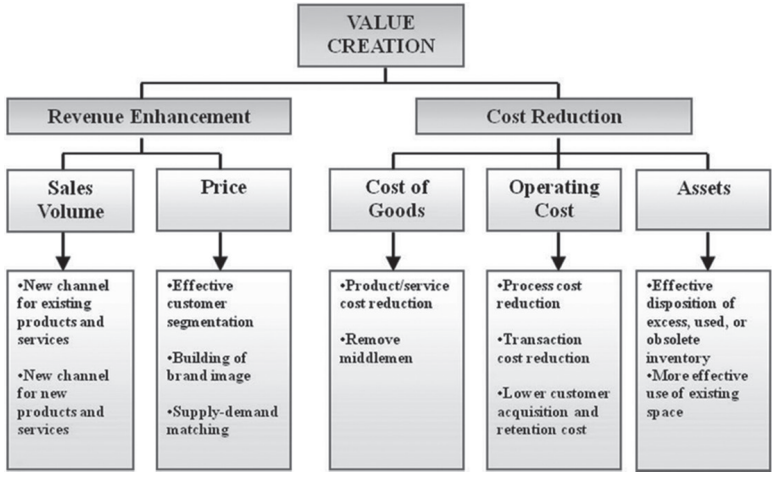

Figure 1.5 Creating monetary value in E-commerce

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

Business Models for E-Commerce

2.1 Why E-Commerce Business Model?

As we described in the previous chapter, the structure of e-commerce in organizations have completely changed in the last several years. In the early years of e-commerce development, it was predominantly technology-driven and largely based on venture capital financing. Today e-commerce development is mainly business-driven and financed by traditional sources. E-commerce applications are used by companies to increase and sustain their competitive advantage and as a way to produce more revenues/profits and reduce cost.

Generating successful performance results through e-commerce is based on a company's ability to develop an efficient e-commerce business model. A well-established business model can facilitate the company's competitive advantage and influence its monetary results. Successful utilization of e-commerce business models by IBM, Apple, Dell and many other companies have triggered interest in understanding components of their e-commerce business models. However, there is still a variety of views in terms of what an e-commerce business model means for an organization, how many of these models exist today and how they are clustered. According to one of the researchers, "Business models are perhaps the most discussed and least understood aspect of the web. There is so much talk about how the web changes traditional business models. But there is little clear-cut evidence of exactly what this means."[1].

Existing academic sources are quite fragmented in terms of defining and developing e-commerce business models. Many researchers

concentrate on clustering e-commerce models in several groups to define their common characteristics. However, the number of groups and their descriptions vary significantly. Some researchers tried to develop an overall definition of e-commerce business models regardless of clustering or grouping them. In this case, the business model definition is usually limited to the extent of describing value and revenue generating opportunities without recognizing other important components of e-commerce business models like supporting resources or value-added e-commerce processes.

Through existing literature sources, we have identified and analyzed modern approaches in defining and grouping e-commerce business models. This analysis allowed us to recognize that the definition of components used in e-commerce business models should be based upon answering the following questions:

- What is the need (value proposition) in creating e-commerce solutions?
- What are value-added e-commerce offerings (activities) including products, processes, and their relationships?
- How are the value proposition and value-added offerings supported by the company's resources?
- How does the company want to generate revenue and reduce cost through e-commerce?
- What value will be created by developing this e-commerce model?

The main goals of this chapter are to:

- Define and present a comprehensive set of components used in developing and/or improving any e-commerce business model in an organization in order to provide a sustainable competitive advantage and successful value creation through e-commerce.
- Identify and present a new taxonomy of e-commerce business models based on the set of components and predetermined classification criteria.

2.2 Defining E-Commerce Business Models

Before explaining e-commerce business models and their components, it is important to understand the meaning of the term "e-commerce business model." It is interesting to point out that a Google search for "e-commerce business model" would produce more than one million links to the sites that define, explain, and analyze business models. This shows popularity of the term "business model" and indicates a variety of views on how to define this term.

In academic sources, the term "***business model"*** is commonly defined as a ***tool/method by which a company would like to generate revenue/profit and serve the customer needs.*** This definition is correct in terms of considering revenue/profit generation as a part of an e-commerce business model. However, the described definition is limited in its emphasis on just revenue/profit creation. This does not reflect the fact that an e-commerce business model may be used to create and sustain a company's competitive advantage. In addition, these definitions do not consider cost reduction as an important factor, along with revenue, in generating a company's profitability and cost effectiveness. Finally, the described definition does not address the issue of e-commerce products and processes, as well as how this business model affects customer satisfaction and overall company results.

A variety of authors attempted to identify and explain general elements (components) of e-commerce business models. Laudon and Traver[2] define eight key ingredients/components of an e-commerce business model. These key components included:

- *Value Proposition*–defines how to fulfill the needs of customers.
- *Revenue Model*–describes how the company earns revenue and produces profit.
- *Market Opportunity*–refers to the company's intended marketplace.
- *Competitive Environment*–refers to other companies operating in the same marketplace.
- *Competitive Advantage*–achieved by a company through e-commerce solutions.
- *Market Strategy*–a plan on how to enter a new market and attract new customers.

- *Organizational Development*–describes how the company will organize the work.
- *Management Team*–employees of the company that make the business model work.

This extended definition is a step forward in identifying and explaining e-commerce business models. However, the extended definition does not include very important elements of e-commerce models such as value-added e-commerce offerings (products and processes), supporting resources, and value creation through e-commerce.

In a similar way, Rayport and Jaworski[3] present four main components of e-commerce business models:

- Value proposition–market segments, customer benefits and unique resources.
- Online offering–ordering scope, products, processes, and their mapping.
- Resource system–select and align company resources.
- Revenue models–a variety of ways to earn money in e-commerce solutions.

The four components are well described and associated case studies are provided. However, detailed analysis of these components reveals their main limitations. First, the construction of the four components fits well for the B2C e-commerce models. However, these components would not be sufficient to describe B2B models related to suppliers, for example, electronic procurement and strategic sourcing of suppliers. Secondly, the described components do not address the cost model, which is a critical factor in successful management of various e-commerce models. Finally, the four components do not include description of value creation–a very important element of showing potential results in developing or improving e-commerce business models.

Overall, the provided analysis shows that existing definitions of e-commerce business models lack comprehensiveness in terms of presenting a full scope of components that need to be employed for developing or improving e-commerce business models. Also, existing taxonomies of e-commerce models are not supported by underlying classification criteria.

2.3 Components of E-Commerce Business Models

To overcome the issues in defining and grouping e-commerce business models, we introduce a comprehensive set of components that may be employed to develop any e-commerce business model/application for any type (sector) of e-commerce, i.e., B2B, B2C, C2C, and others (see Figure 2.1)[4].

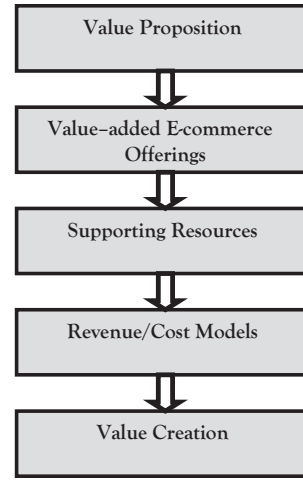

Figure 2.1 Components of E-commerce business models

In addition to previously explained components such as value proposition, online offering, resource system, and revenue models, we added two new components, cost model and value creation, and enhanced other components (that will be explained in the next section of this chapter). This is done to make the e-commerce model development more comprehensive and to embrace all types of e-commerce applications/solutions. The components in Figure 2.1 are logically connected with each other in a sequence that defines their position in the set.

The components of an e-commerce business model and main questions that need to be answered in order to develop or improve these models are listed in Table 2.1.

Table 2.1 Main questions for components of E-commerce business model

Component	Key questions
Value Proposition	Who are the target customers and what are their benefits?
Value-added E-commerce Offerings	What value-added offerings (value-added activities) including e-commerce products/services and e-commerce processes are involved in fulfilling the value proposition?
Supporting Resources	What resources are required to support the value proposition, e-commerce products/services and processes?
Revenue and Cost Models	How does the company generate revenue and reduce costs through its e-commerce model(s)?
Value Creation	What monetary and non-monetary value (results) is created through the e-commerce business model?

Value Proposition

The development and/or improvement of e-commerce business models start with identifying the need of creating an e-commerce model-value proposition (Table 2.1). The ***value proposition*** represents the way an organization attains competitive advantage through e-commerce. It is also based upon unique values that the organization offers to its customers through e-commerce. The value proposition describes two main elements: (1) customers (target market segment) that will be using these e-commerce solutions; and (2) core customer benefits.

The ***target market segment*** is a function of many variables. The key decision variables are frequently represented by *market size,* for example, significant dollar size of the market or high percentage of growth rates. The bigger the market size, the more opportunities a company has to build an e-commerce model in this market. The market segment may be associated with *consumer demands that are not met* for convenience-oriented customers, low-, mid-, and high-end price customers, business customers in demand-side models, or even suppliers. Finally, a target market segment may be derived from an *insufficient level of competition* in a target market. If there is a market with insufficient sales (competition) of products/services for convenience-oriented or low- price customers, then it will be a very good target market segment for developing an e-commerce business model.

Core customer benefits are multiple benefits that the company may offer to its target segments through e-commerce. It is usually associated with the following benefits:

- Less expensive products and services; more deep discounts
- Ability to choose the best quality products and services
- Easy access to products, services, and information
- More choices of products, services, and information
- Customization and personalization
- Removal of intermediaries

Value-added E-commerce Offerings

Value-added e-commerce offerings or simply value-added activities represent a set of e-commerce products/services, processes and their

relationships, which are required to fulfill the value proposition (market segments and core customer benefits) of an e-commerce model. The value-added offerings include three main elements: (1) product and service offerings, (2) e-commerce processes, and (3) relationships between products/services and processes.

The product and service offerings are based on a specific ***scope of offerings,*** which refers to a number of categories of products, services, and information that a company offers online. The scope of e-commerce offerings may be clustered into three groups:

- *Category-specific dominance* refers to companies that focus exclusively on one product category, a category killer (like YouTube.com is specializing on upload streaming and downloading movies).
- *Cross-category dominance* represents an extension of product offerings from a single category to additional product categories (HP.com sells Hewlet-Packard computers and related categories of electronic equipment after making a name for itself as a printer manufacturer).
- *Metamarkets* are e-commerce companies with cross-category dominance and many unrelated clusters of products. For example, Amazon.com sells books, CDs, toys, and other product categories that are not always related to each other.

For product and service offerings, a model presented by Alter[5] may be used to describe these offerings by utilizing three dimensions: degree of tangibility, degree of customization, and degree of digitization (see Figure 2.2). ***Degree of tangibility*** represents a company's offering of tangible products (books, computers, etc.) or intangible products/services (payment transactions, order tracking, etc.), or both through e-commerce solutions. ***Degree of customization*** designates an ability of a company to provide standardized/commodity products (like antiques, auction items, etc.), or customized products/services (computers, reports, etc.), or some combination of the two. ***Degree of digitization*** means that a company can offer either physical products or digital products/ services or a combination of physical and digital products.

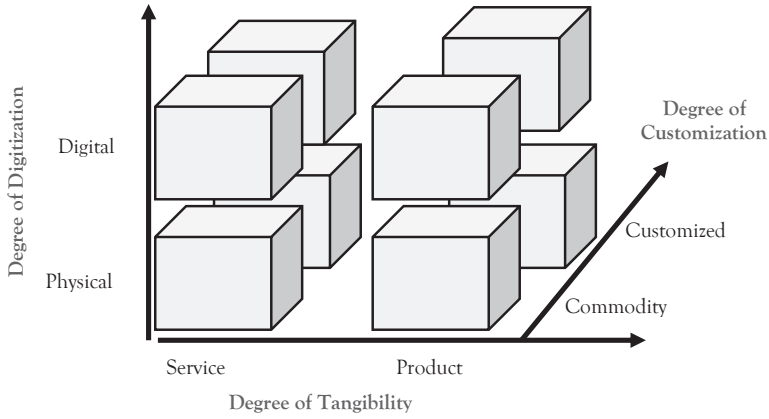

Figure 2.2 E-commerce products and services (Alter[5])

The product/service description in a three dimensional space clearly explains the impact of e-commerce on the value proposition. For example, if a company would like to sell online software as a service (SaaS), then the value-added dimensions will be as follows. First, the value will be added by a digitized e-commerce solution distributed online. Second, the value will be maintained by providing the service online, and, third, this online service may be fully customized.

An ***e-commerce process*** is a group of related online activities that uses information and other resources to deliver value to customers, whether they are end consumers, business customers, or suppliers. As can be seen from Table 2.2, value-added e-commerce processes may consist of customer processes, supplier, and internal organizational processes.

The ***customer-related processes*** define e-commerce processes that the company may want to establish or modify to add value to its customers (see Table 2.2). Examples of such processes, like online information search, checkout process and others, are listed in Table 2.2. An example of a typical customer process (buying computes from Dell's web site) is shown in Figure 2.3. The ***supplier-related processes*** are associated with a set of processes that may be needed in certain e-commerce business models like (e-procurement, e-reverse auctions, etc.) to providing value by facilitating supplier selection, outsourcing from suppliers, and supplier support. By doing all this, the company always adds value to its customers. Finally, the ***internal organizational processes*** provide technology,

Table 2.2 Value-added E-commerce processes

Process type	Main value-added processes
Customer Processes	Information search Product offerings Evaluation of alternatives Purchase decision Checkout process Order tracking Post-sales service and support Need recognition (reminders, gifts, etc.)
Supplier Processes	Information search Supplier selection Outsourcing supplies Supplier performance Supplier relations Supplier support Checkout process Order tracking
Internal Organizational Processes	Technology update Content development and update Online maintenance and support

content development, update, online maintenance and support that affect the value offering to the customers (see Table 2.2).

The customer process in Figure 2.3 also demonstrates ***relationships between products/services and e-commerce process***. This process should effectively walk the customers through the entire purchase-decision cycle and encourage the customer to continually revisit the process.

Supporting Resources

The third component required in developing or improving an e-commerce business model is based on a ***set of resources that supports the e-commerce model's value proposition and online value-added offerings*** (see Figure 2.1). A company should always consider identifying resources that would add value to e-commerce development and differentiate the company from its competitors. These unique resources could be e-commerce technology, brand name, and quality of products and services. They can also represent distribution networks, supplier networks, personnel, integrated software, an ERP system, outsourcing, and other

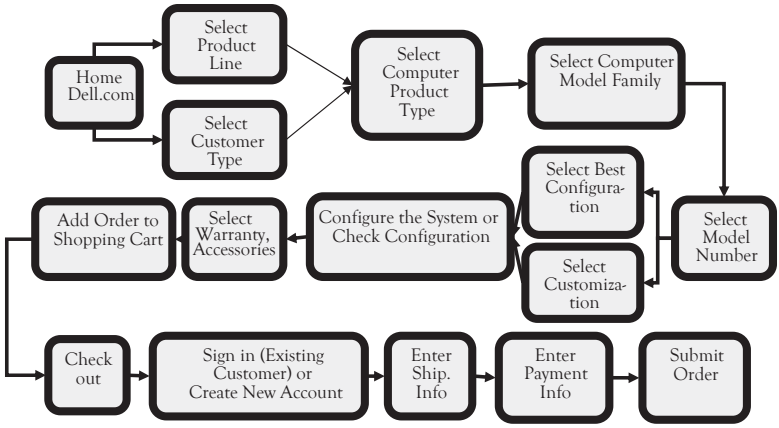

Figure 2.3 Typical e-commerce process

resources. The quality and appropriateness of e-commerce resources are based upon their ability to be unique in providing competitive advantage. Strong links should exist between resources and the value proposition. In addition, strong complementary and supporting links should also exist among the resources in the system. The quality and appropriateness of resources can be assessed based upon the following criteria:

- Uniqueness of the resource system
- Strong links between resources and value proposition
- Strong links (complementation and support) among the resources in the system
- Providing sustainable advantage

To identify resources needed to successfully develop an e-commerce business model, a company needs to:

- Establish core benefits of the value proposition, as discussed in this section
- Identify resources that relate to each benefit
- Recognize the extent to which the firm can provide these resources
- Find partners (if necessary) who can successfully complete identified resources

Revenue and Cost Models

The fourth component of the e-commerce business model is revenue and cost models (see Figure 2.1). The ***revenue model*** describes how a company will generate revenue/profit through e-commerce to build and sustain a competitive advantage. Examples of revenue models are presented in Table 2.3. A company developing or improving an e-commerce model needs to identify which revenue/profit model or combination of models is going to be employed in order to achieve a competitive advantage and fulfill the value proposition. For example, IBM may employ online product/service sales, subscription fees for their online services and licensing fees for the software they sell to the customers. An online company like www.bizrate.com provides comparison of products and services, and their respective prices, from different online sellers along with their Internet links. The company may receive affiliate fees from these sellers for referring customers to their web sites (see Table 2.3).

Table 2.3 Revenue and cost models

Revenue/cost model	Description
Revenue model	
Product, Service, or Information Sales	Sales through retail, wholesale sites or pay-per-use information
Transaction Fees	Charging a fee or taking a percentage of the transaction sum for facilitating a customer-seller transaction
Subscription Fees	Subscriber fees for magazines, newspapers or other information/service businesses
Advertising	Charging fees for selling adds, sponsoring links and sponsoring sites
Affiliate Fees	Companies receive commissions for referring customers to other sites
Licensing Fees	Fees generated from the licensing of content (software applications)
Cost model	
Direct or Indirect Material/ Resource Cost	Reduction of direct/indirect material costs through lower unit price, less inventory stock, on-time delivery, etc.
Cost Due to Paperless Environment	Reduction or elimination of paper transactions
Administrative Expenses	Reduction of human resources due to e-commerce solutions
Quality Cost	Reduction or elimination of costs associated with incorrect design, rework, repair, excessive warranty payments, etc.

The ***cost model*** emphasizes ways that a company uses for reducing cost through an e-commerce business model. It is important to point out that for demand-side e-commerce (e-tailing, auctions, etc.), both revenue and cost models are relevant. However for supply-side e-commerce (e-procurement, reverse auctions, etc.), the revenue generation aspect may not be relevant because companies do not generate revenues through outsourcing. The benefit of the e-commerce system is derived from its cost reduction. In this case, the cost model becomes the only model for supply-side e-commerce. For example, Hong Kong-based Cathay Pacific Airways developed an electronic procurement (e-procurement) web site for the maintenance department to generate purchase requisitions of components needed to service airplanes. These requisitions seamlessly go to the purchasing department, which generates purchase orders and sends them electronically to the required vendor. The Cathay Pacific cost model would be to reduce administrative expenses, provide a paperless environment, and reduce the cost of quality.

Value Creation

The fifth and final component of the e-commerce business model (see Figure 2.1) is value creation. This was discussed in detail in Chapter 1. ***Value creation*** represents the potential/expected monetary and non-monetary results of utilizing an e-commerce business model, i.e., an output of the e-commerce model development. The main ***monetary value creation*** includes:

- *Revenue enhancement* through volume growth and price differentiation
- *Cost reduction* related to cost of goods sold, operating costs, and asset intensity reduction through reducing the cost of working capital and/or fixed assets.

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

- Improved quality of products and services
- Faster delivery schedules

- Improved customer satisfaction
- Global outreach of products, services, and information
- Permanent access to information

2.4 Classification of E-Commerce Models

Classification Groups

The described set of components provides a comprehensive solution for developing a new, or improving an existing e-commerce business model. These components may be used to develop a variety of e-commerce models to fulfill various customer needs and market segments.

The classification of e-commerce models can be based upon clustering them into four classification groups, depending on their association with customers and suppliers, and on their service/ support role in e-commerce (Figure 2.4). These four groups contain the following definition:

- ***Demand (sell)-side models*** that provide e-commerce solutions to the organization's customers
- ***Supply (buy)-side models*** that are concerned with online outsourcing and supplier relationships
- ***Collaborative commerce (c-commerce)*** models that establish online collaboration between an organization and its customers, or an organization and its suppliers

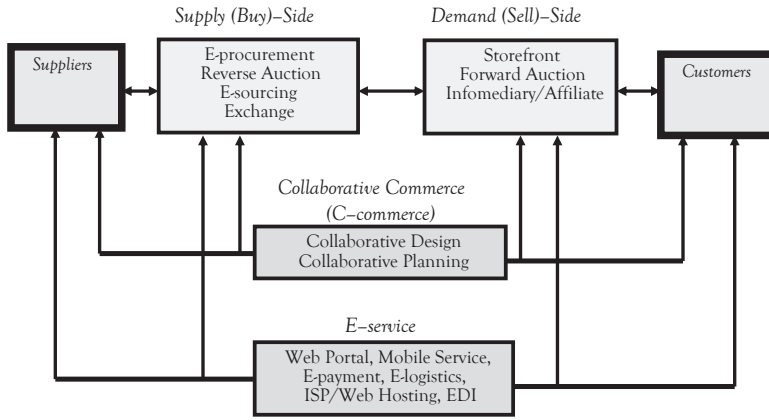

Figure 2.4 Classification of E-commerce Business Models

- ***E-service models***–a variety of models that provide different kinds of online services to its customers to support and enhance the previous three groups of e-commerce models.

The models specified in each classification group in Table 2.4 are typical examples of e-commerce development in this group. However, they do not represent an exhaustive list of all possible model solutions available today. It is an ongoing process of creating new, and refining existing models, in order to fulfill customer's needs in the online business environment. However, the five components of e-commerce business models described in the previous section should always be employed to create new or improve existing models in each of these groups.

Description of E-commerce Models

Brief descriptions of the models in each of the four classification groups are provided in Table 2.4. The table also contains examples of web sites based on each of the models.

The ***demand (sell)-side e-commerce models*** are designed by organizations (sellers) to provide selling opportunities on the *downstream of supply chains,* i.e., from the organization to its customers. The most common model in this group of e-commerce models is ***storefront,*** an online selling directly to consumers (B2C) or business customers (B2B) with established fixed and discounted prices. A direct-selling online without using an intermediary (retailer, for example) is also called ***e-tailing***.

The ***forward auction*** model is an online auction in which shoppers make bids for products and services, and the highest bidders wins the items. The item prices are not fixed but rather dynamically change depending on the bids. During the auction, the price of the auctioned product changes in an ascending order until the highest price will win the auction. The ***infomediary/affiliate*** models, sometimes called ***information brokers,*** are used to sell aggregated information. This aggregated information include online search, content, advertisement, and sponsored links to the affiliated sites, or selling research reports/papers to the customers.

The ***supply (buy)-side e-commerce models*** are established by organizations to enable outsourcing (buying) from their suppliers on the

upstream of the supply chains. One of the common models in this group is ***reverse auction*** (tender) model. In this model a buyer (buying organization) creates a request for quote (RFQ) and invites potential suppliers to submit bids, and then, using the online auction process, selects usually the lowest bidder. The price during the auction process is dynamically changing in descending order until the lowest price wins the customer. In this case the price change is the reverse of the ascending price trend in the forward auction, and, that is how this model got the term "reverse auction." In most cases, reverse auctions are used for business outsourcing, i.e., B2B type of e-commerce. However, reverse auctions for consumers also exist, for example, in a famous company Priceline.com. An individual through Priceline.com can invite airlines to bid on his air ticket price (also called "Name your own price").

E-procurement with electronic catalogs is also a common type of supply-side e-commerce. In this case, buyers do purchasing/procurement online based upon criteria established in the organization (or outsourced from a third party provider) electronically. In this case, the catalogs identify a list of suppliers, their respective products and associated prices. The ***e-sourcing*** model is used for online sourcing of suppliers. This may include identifying and comparing perspective suppliers, selecting suppliers, and negotiating contract terms with them.

The ***exchange*** model is built upon creation of a virtual electronic marketplace, where buyers and sellers can meet together to transact business online. A ***public exchange*** is run by an electronic intermediary company that facilitates electronic transactions between buyers and sellers and remains impartial (does not favor any part). A ***private exchange*** is designed and run by an individual company that invites other buyers and sellers to do online business. A ***consortia exchange*** is created by a group of buyers that opens an electronic (virtual) marketplace and invites potential suppliers to do business online. Main exchange functions are:

- ***Matching*** buyers and sellers in a virtual marketplace
- ***Aggregating*** product/service offerings from sellers
- ***Facilitating*** transactions (seller evaluation, information search, additional services, etc.)

Table 2.4 Description of E-Commerce business models

Groups	Models	Brief description	Example
Demand-side (Sell-side) E-commerce	Storefront	A seller opens an electronic marketplace to sell its products/services to the business customers or end consumers	Dell.com
	Forward Auction	A seller opens a seller-centric auction online to sell new, used, overstocked, obsolete products or hard to move commodities	Auctions.yahoo.com
	Infomediary/ Affiliate	Selling aggregated information on products, services and research reports/ papers online. This model may also provide purchase opportunities from other affiliated sites	*Google.com*
Supply-side (Buy-side) E-commerce	Reverse Auction	A buyer opens an electronic marketplace and invites potential suppliers to bid on the announced request for quotation (RFQ)	Procure.com
	E-procurement with Catalog	A buyer utilizes an electronic marketplace to do purchasing/outsourcing online	*Oracle iProcurement*
	E-sourcing	Strategic sourcing online; locating and selecting appropriate suppliers, and negotiating contracts with them	Ariba.com
	Exchange	A company creates an electronic marketplace where buyers and sellers can meet online to do business	Insure.com

Groups	Models	Brief description	Example
Collaborative commerce E-services	Collaborative Design	E-design/ Collaborative Product Commerce (CPC)-Provides online capabilities for design partners to sharing information, drawing, and other data on new product design and development	Dassault Systems for collaborative e-design and CPC
	Collaborative Planning	Collaborative Planning, Forecasting, and Replenishment (CPFR)-Suppliers and retailers collaborate in their planning and demand forecasting to optimize flow of materials along the supply chain	Logility.com for CPFR
	Web Portal	A web site that provides a starting point (gateway) to other resources on the Internet or an intranet	Yahoo.com
	Mobile Service/M-commerce	Provides wireless service to conduct any type of e-commerce (B2B, B2C, etc.) through wireless Internet	Wireless trading at Charles Schwab Financial
	E-payment	Allows payments and money transactions using any e-commerce business model	Verisign.com
	E-logistics	Provides logistics/transportation capabilities for online businesses	UPS.com
	ISP/ Web Hosting	Internet Service Provider (ISP) provides companies with access to the Internet. They also enable web hosting–A service that provides Internet users with online systems for storing information, images, video, or any content accessible via the web	Hostway.com
	EDI	Electronic Data Interchange (EDI)–Third parties provide EDI services that enable organizations with different computer equipment and software to connect for business transactions, for example, orders and invoices	EDI-Service.com

The ***Collaborative Commerce (c-commerce) group of models*** uses Internet-based technologies to collaboratively plan, design, develop and manage products and services through their life cycle. The c-commerce models are directly associated with the two described groups of e-commerce models, demand-side and supply-side e-commerce. C-commerce provides a virtual environment to improve products and their delivery to the customers in the case of demand-side e-commerce. Collaborative models also improve relationship and communication with suppliers in the supply-side e-commerce models (see Figure 2.4). The ***E-design/Collaborative Product Commerce (CPC)*** models provide online capabilities for design partners to share information, drawings, and other data on new product/service design and development. The ***Collaborative Planning, Forecasting, and Replenishment (CPFR)*** models are used by suppliers and retailers to collaborate in their planning and demand forecasting to optimize flow of materials along the supply chain. In this case, business partners—manufacturers, suppliers, distributors—all have real-time access to point-of-sale order information.

The ***E-service group*** of models contains a variety of different electronic services used to provide value-added online services to different parts of the e-commerce processes on both the demand and supply sides. One of the very popular e-service models is the ***web portal,*** which is a web site that provides a starting point (gateway) to other resources on the Internet or an intranet. The web portals typically provide personalized capabilities to their users from a number of different sources. The portals are also known as "Enterprise Information Portals" (EIP). Common types of portals are:

- ***Public portals*** that provide gateways to other resources to all customers.
- ***Corporate (enterprise) portals,*** also known as enterprise information portals (EIP); they may be developed for internal company's use, for customer access, or for supplier access.
- ***Publishing (vertical) portals*** for connecting to various sources of publishing information.

Mobile service or ***mobile commerce (m-commerce)*** models represent any e-commerce solution done in a wireless environment, especially

via the Internet. Mobile devices create an opportunity to deliver new services to existing customers. This relatively new and growing area of e-commerce models may be employed for financial applications like wireless banking and bill payment. M-commerce models are also used for intrabusiness and enterprise applications of supporting mobile employees and dispatching. They are also employed in supply chain management for vehicle and product location and monitoring systems.

In the next six chapters, we will discuss and analyze the described e-commerce business models including demand-side and supply side e-commerce, collaborative commerce, mobile commerce, e-payment and other services.

2.5 Measuring Results of E-Commerce Models

To measure results of development and further implementation of e-commerce business models various monetary (financial) and non-monetary measurements may be used. There may be several purposes for using those measurements. The measurements may be employed for getting support and investments for starting a new, or for the continuation of an existing e-commerce project. Measures may be needed to identify the progress of work on the e-commerce project or to determine whether benefits were achieved from investments in the e-commerce project. Below, we provide detailed information about those measurements and their calculations.

Monetary Measures

Monetary measurements are used to identify and analyze financial results of implementing e-commerce models. They may be also used at the stage of designing and developing the e-commerce model as expected (future) financial results. Among those measurements are:

- ***Revenue***–*Gross* revenue generated by the e-commerce sale.
- ***Cost***–Overall costs generated by the e-commerce model including operational cost of production use; cost to maintain, enhance, and support the online system; direct staff cost; management cost; and overhead cost. The cost

can be also identified as comparative costs of web site versus traditional business practice.

- ***Profits–***Gross profit generated by the online sale through a specific e-commerce model.

Return on Investment (ROI) defines the business value of e-commerce model. It is identified as an expected savings divided by investments in e-commerce, equal to some percentage figure:

$$\text{ROI} = (\text{Gains-Investment Cost}) / \text{Investment Cost} \quad (1)$$

This measure is a very popular indicator of how efficient and effective the implementation of an e-commerce business model will be.

Payback is a measurement of how long it will take the e-commerce investment to pay for itself:

$$\text{Payback} = \text{Investment Cost} / \text{Savings} \quad (2)$$

Usually measured in months or years, it is another very important indicator of how successful e-commerce implementation will be.

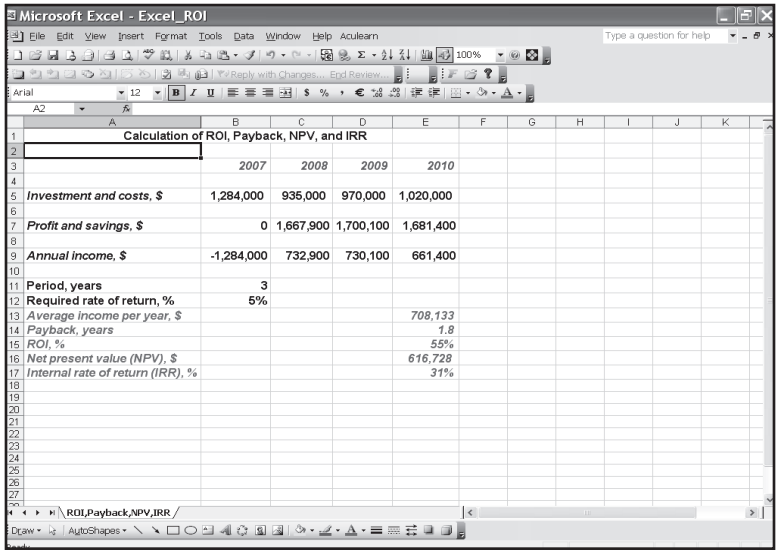

Figure 2.5 Calculation of Monetary Measures

Net Present Value (NPV) is cash flows less cash outflows of e-commerce model expressed in today's dollars**.** Cash inflows may include cost reductions as well as revenue increases, and represents the expected benefits of e-commerce

$$NPV(c,t,d) = \sum_{i=0}^{n} c(i)/(1+d)^{t(i)} \quad (3)$$

where

c(i) is cash flow,
t is unit time when the investment return is expected
d is discount rate.

NPV shows how much the current investment will be worth in the future at a given discount rate.

Internal Rate of Return (IRR) or Hurdle Rate is the rate at which the present value of cash inflows equals cash outflows, i.e., the rate at which NPV is equal to zero. Expressed in percentage terms, this value must exceed the minimum rate of return the management will accept. This measurement tells how efficient the investment in the e-commerce model might be as opposed to investing money in a bank account with a predetermined rate of return. For example, if the bank's rate of return is 6% and IRR is 24%, then investing in the e-commerce model is 4 times more efficient. An Excel spreadsheet presented in Figure 2.5 shows calculations of ROI, payback, NPV and IRR.

Suppose that the initial investments in designing and developing the e-commerce business model are going to be done in 2007 in the amount $1,284,000. This will require additional costs for maintaining the system in the subsequent years, when the model will be implemented (see cost numbers in Figure 2.5). The e-commerce model will "go live" at the beginning of 2008, and thus, there will be no income/profit and savings in the previous year. However, in the subsequent years (2008–2010), the e-commerce model will be expected to provide the savings listed in the spreadsheet in C7:E7. For each year, the annual income is the difference between profit and savings on one side and investment and costs on the other side in this year. In 2007, though, the number is just negative

representing initial investments. Let us assume that we are going to analyze this investment decision for a period of 3 years, and required rate of return will be 5%.

The average income per year is the average of annual incomes in 2008–2010. The Excel formula for that would be = *AVERAGE(C9:E9).* The payback may be calculated as the ratio between initial investments and average income per year:

$$Payback = 1{,}284{,}000/708{,}133 = 1.8 \text{ years.}$$

This number indicates that the initial investments in the e-commerce model will be recovered in about one year and 10 months. The ROI in this case will be opposite to payback, i.e., a ratio between the average annual income and initial investments:

$$ROI = (708{,}133/1{,}284{,}000)*100 = 55\%$$

This number tells us that for every dollar invested in the e-commerce business model, the return will be approximately 55 cents. To identify NPV, we can employ one of the Excel functions, =NPV(), which takes into consideration required rate of return and investment results in 2007–2010:

$$= NPV(B12, B9{:}E9) = \$616{,}728$$

Finally, the IRR value may be calculated by using another Excel function, =IRR():

$$= IRR(B9{:}E9, B12) = 31\%$$

This number tells that the investment in e-commerce model will be 6 times more efficient than just the required rate of return of 5%.

2.6 Chapter 2 Summary: Managerial Aspects of E-Commerce Business Models

1. In general, ***business model*** is defined as a method or tool by which a company would like to generate revenue/profit and serve the customer needs. ***E-commerce business model*** should be identified by ***five main components:*** value proposition, value added e-commerce offerings, supporting resources, revenue and cost models, and value creation.
2. ***Value proposition*** represents the way an organization attains competitive advantage through e-commerce. It is also based upon unique values that the organization offers to its customers through e-commerce. The value proposition is based on two main elements: (1) target market segment (customers) that will be using these e-commerce solutions and (2) core customer benefits that can be offered to the customers by through e-commerce.
3. ***Value-added e-commerce offerings*** or simply value-added activities represent a set of e-commerce products/services, processes and their relationships, which are required to fulfill the value proposition (market segments and core customer benefits) of an e-commerce model. The value-added offerings include three main elements: (1) product and service offerings, (2) e-commerce processes, and (3) relationships between products/services and processes.
4. ***Supporting resources*** is a set of resources that sustain the e-commerce model's value proposition and online value-added e-commerce offerings.
5. ***Revenue model*** describes how a company will generate revenue/profit through e-commerce to build and sustain a competitive advantage. A company developing or improving an e-commerce model needs to identify which revenue/profit model or combination of models is going to be employed. ***Cost model*** emphasizes ways that a company uses to reduce cost through an e- commerce business model.
6. ***Value creation*** represents the potential/expected monetary and non-monetary results of utilizing an e-commerce business model, i.e., an output of the e-commerce model development (discussed in Chapter 1).

7. The classification of e-commerce models can be based upon clustering them into four classification groups, depending on their association with customers and suppliers, and on their service/support role in e-commerce. These four groups are: (1) ***demand (sell)-side models*** that provide e-commerce solutions to the organization's customers; (2) ***supply (buy)-side models*** that are concerned with online outsourcing and supplier relationships; (3) ***collaborative commerce (c-commerce)*** models that establish online collaboration between an organization and its customers, or an organization and its suppliers; (4) ***e-service models-****a* variety of models that provide different kinds of online services to its customers to support and enhance the previous three groups of e-commerce models.
8. The models specified in each classification group are typical examples of e-commerce development in this group. However, they do not represent an exhaustive list of all possible model solutions available today. It is an ongoing process of creating new, and refining existing models, in order to fulfill customer's needs in the online business environment. The five components of e-commerce business models described in the previous section should always be employed to create new or improve existing models in each of these groups.
9. To measure results of development and further implementation of e-commerce business models various monetary (financial) and non-monetary measurements may be used. These measurements may be employed for getting support and investments for starting a new, or for the continuation of an existing e-commerce project. Measures may be needed to identify the progress of work on the e-commerce project or to determine whether benefits were achieved from investments in the e-commerce project.
10. ***Return on Investment (ROI)*** defines a business value of e-commerce model. It is identified as an expected savings divided by investments in e-commerce, equal to some percentage figure. This measure is a very popular indicator of how efficient and effective the implementation of an e-commerce business model will be.

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CHAPTER 3

Demand-Side Models

3.1 Demand-Side E-Commerce Models

As described in the previous chapter, the ***demand (sell)-side e-commerce models*** are designed by organizations (sellers) to provide selling opportunities on the downstream side of supply chains, i.e., from the organization to its customers. These are one of the most common types of e-commerce models in practice. The reasons for them to be the most common may be associated with the principles by which these models are designed. First, they are "for-profit" models used to generate additional revenue/profit for a "click-and mortar" company or as a main source of generating revenue/profit for a pure e-commerce company. Second, because of their "for-profit" nature, these models' components like value proposition and value creation can be easily established. This allows the company to see a need to make investments into e-commerce development. Finally, sufficient capabilities exist to develop these e-commerce models including existing company's web sites, e-commerce development software, and a variety of hosting companies to which design and development can be outsourced.

The classification of demand-side e-commerce models may depend on their configuration established in relation to sellers and their customers. ***One-to-many*** configuration (one seller— many customers) in Figure 3.1A is defined as an individual company that provides online sales to business customers (B2B) or end consumers (B2C). This configuration may include:

- Selling products and services from a ***storefront*** (for example, walmart.com), which is an online store to sell directly to consumers (B2C) or business customers (B2B). In this case, the storefront uses fixed and discounted prices listed in an online ***electronic catalog.***

- Selling via a ***forward auction*** (for example, dellauction.com), where shoppers make bids for a product or service, and the highest bidder wins the product. The auction also uses electronic catalogs, but prices are not fixed. They dynamically change in ascending order while the auction is in progress.
- Selling through an ***infomediary/affiliate*** online store. The store is used to sell aggregated information by providing search, content, advertisement, and sponsored links to the affiliated sites (google.com) or selling research reports/papers to their customers (gartner.com).

Many-to-many configuration (many sellers and many customers) in Figure 3.1B is defined by a web-based marketplace, in which many companies sell to businesses (B2B) or directly to customers (B2C), for example through ebay.com. Different configurations of demand-side e-commerce may require various elements and managerial consideration in order to reach desired results. We will discuss them in this chapter.

Another important classification of the demand-side e-commerce models is associated with the delivery channels, through which products and services come to the customers. ***Direct selling and auctioning*** (see Figure 3-2A) represents a direct online channel to business customers or end consumers. In this case, intermediaries like wholesalers or retailers are eliminated. The typical example of direct selling and auctioning is Dell Computers, which does not sell its products in retail stores, and uses Dell's online capabilities for direct selling to business customers and consumers.

Direct selling to business customers (Figure 3.2B) is associated with selling products and services online to an established network of business

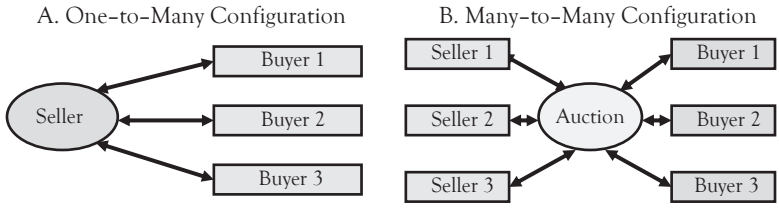

Figure 3.1 Demand-side E-commerce relationship

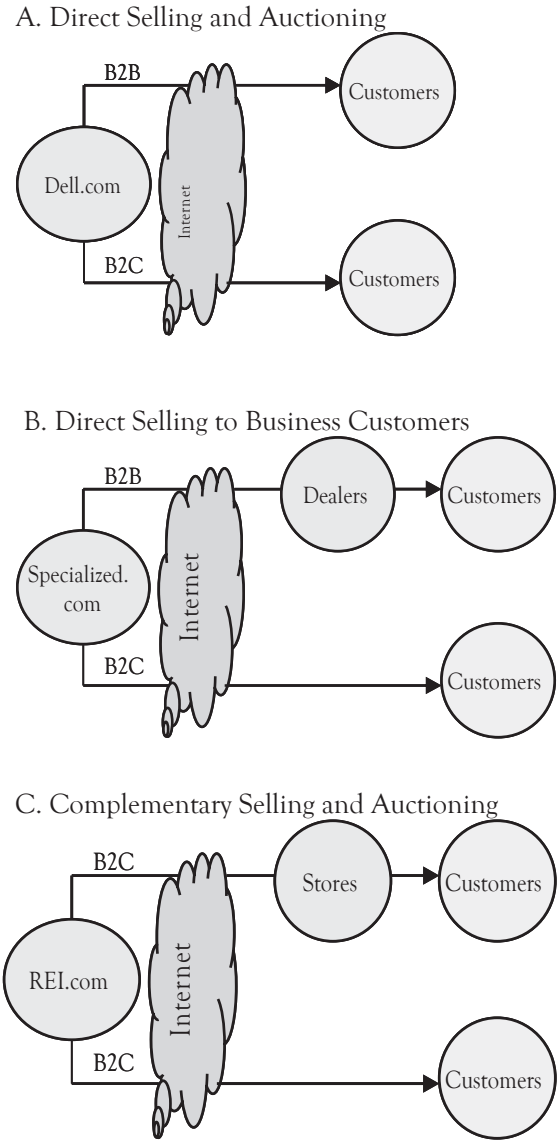

Figure 3.2 E-Commerce channels

customers that in turn distribute those products to the end consumers. For example, Specialized, a well-known biking company, has created an online storefront (specialized.com) for its business partners (dealers). This online storefront became the ultimate source of information and purchasing for the Specialized dealers. The storefront help dealers quickly

order bikes and research for new and updated bike models, which overall reduces ordering costs and improves relationship between the company and its dealers.

Complementary selling and auctioning (Figure 3.2C) represents an online channel of selling products and services to business customers and end consumers, which is a complementary channel to the existing traditional distribution/retail channels. The complementary channel may be used with direct selling to the customers. However, the customers can receive the order directly to their residential or business location, or pick it up at a local store. For example, REI (a major retailer of recreational equipment) sells its products through the online storefront, www.REI.com. Customers can receive orders directly at home or pick them up in a nearby REI store. In case of the in-store delivery, the customers would reduce their online cost of purchase by the amount of shipping and handling.

The establishment of the online selling channel in organizations, which already used traditional "on-the-ground" distribution channels, raises a question about the relationships between these channels. Some practitioners and researches considered online storefront as a cannibalizing

Table 3.1 Pricing options in demand-side E-commerce[2]

Pricing Option	Source of Value	Examples of market segments
Precision Determine the highest price that has little or no impact on purchase decision	***Test prices continuously*** to better understand market and the zone of price indifference	***Commodity products:*** • Bikes, books, jewelry etc.
Adaptability Change prices frequently in response to market conditions, inventory levels, etc.	***Prices can be changed quickly and frequently*** and in response to Internet-monitored conditions	***Consumer products with:*** • Short life cycle (electronics), • Perishable (food) • Fluctuating demand
Segmentation Divide customers into different classes and offer a different price for each segment	***Easily identify which segment a buyer belongs*** to and create barriers between segments	***Products in which customer profitability varies widely:*** • Credit cards, mortgages • Products with special offers

channel that would reduce volume and benefits of well-established traditional selling channels. In general, there is always a possibility of channel conflict if a company uses multiple distribution channels. However, a number of examples of firms using both online and "on-the-ground" sales channels in the same company proved to be non-cannibalizing. Moreover, different channels could help each other to increase selling volumes and improve relationships with customers. This has been proven in the case of REI's approach of sending products purchased online to the stores for a pickup. Not only has this approach increased the online sales by providing less costly options to the customers, it also facilitated the growth of about 1% of in-store sales (see the case on REI at the end of the chapter). The customers, while coming to the store to pick up online purchase, may end up buying more products from the store. Another possibility is for the customers to first search for the products online, and then come to the store to purchase them.

In general, the ways to resolve the channel conflict between online and traditional channels can be as follows[1]:

- Let the established distributors handle e-business fulfillment to the customers. For example, Cisco Systems, a well-known networking company, sells all its products through a huge network of Cisco distributors and re-sellers, all of whom order their products from Cisco online.
- Provide online services/portals to intermediaries (distributors, retailers) and encourage them to use these services. Distributors and re-sellers use Cisco extranet enterprise portal for all their purchase needs including online information, purchase, accounting service, contract negotiations, and other business activities.
- Sell some products online only. Other products may be advertised online but sold exclusively offline. For example, Specialized provides online selling of bike accessories to the customers (gloves, helmets, t-shirts, etc.). However, their main products, bikes, are sold exclusively through the dealers.
- Do not sell online but offer information, catalogs, promotion, customer service online, etc.

3.2 Value-Added Offerings and Value Creation in Demand-Side E-Commerce

Why has the number of online storefronts increased dramatically in the last five years? What are the main value-added elements and benefits of this e-commerce model? As we discussed in Chapter 2, value-added e-commerce offerings represent products/services, processes, and their relationships that add value to the customers and the company that established these offerings. Sell-side e-commerce creates a ***new channel of marketing and product sales with global outreach***. The value added here is the capability of showing and promoting products and services to potentially unlimited number of customers on the global scale. The online store in most cases ***can be used at any time of the day or week (24/7).*** It may be accessed from home or workplace, which adds extensive convenience to the customer. An online storefront consolidates all current product and sales information and search capabilities online, ***allowing the customers to find quickly needed products or services*** and other related information (product descriptions and comparisons, associated services, etc.). In addition, the demand-side e-commerce model is ***based on direct orders from business customers or end consumers***, which adds value to the customers by reducing their purchase price and allowing customization of their orders. The direct order model also eliminates extra costs (margins) paid to an intermediary company like wholesaler or retailer.

Another very important value-added e-commerce offering is the ability of demand-side e-commerce to ***provide price differentiation online*** for various products and customer segments. The price may be different for a new customer versus a repeat customer, small business customer versus large volume customer, international customer versus domestic customer, and so on. All these can be incorporated into online storefront decisions, which add value to both the company and its customers. An e-commerce web site may also be an efficient way of testing different pricing options for various market segments. Table 3-1 provides three typical pricing options used online and how these create value in specific market segments[2]:

Another value-added offering is the ability to provide ***paperless processes***, which speeds up the order fulfillment process and reduces transaction costs. The e-commerce storefront may be connected to the internal computer-based

system like ERP (enterprise resources planning, see Chapter 10). This connection provides an opportunity to ***coordinate order taking and order execution,*** as well as ***order planning with other internal (back-end) systems*** like inventory, accounting, human resources, etc.

The monetary value creation in demand-side e-commerce is related to revenue/profit growth, cost reduction, and asset intensity reduction (see Chapters 1 and 2). ***Revenue/Income growth*** is associated with increased sales through a new e-commerce distribution channel, and price differentiation for different market segments. According to an estimate, the average income growth attributable to e-commerce may be around 5–10% of the total income growth[3]. ***Cost reduction*** is realized through lowering inventory cost by employing direct customer order, which may reduce the inventory cost by 5 to 15% on the average. The cost reduction may also be due to providing paperless transactions that reduce the total inventory cost by 1–3%[4]. In addition, the distribution cost may be reduced by elimination of intermediaries, which is estimated to be around 20–30% of the total distribution/logistics cost. Finally, the company can benefit from asset intensity reduction through selling obsolete commodities (machines, equipment, extra space, etc.) in forward auctions, or cutting inventory cost by selling overstocked and obsolete inventory.

3.3 Elements of Demand-Side E-Commerce

A demand-side e-commerce model should contain a variety of elements that allow customers to easily make their orders, pay for them, and obtain necessary customer service and support. On the other hand, companies need to provide a secure environment for the online transactions, and integrate their online storefront with internal (back-end) management systems for quick and effective fulfillment of the customer orders. Overall, a typical demand-side e-commerce model may consist of the following elements:

- ***Electronic catalog*** represents an online searchable database with a collection of products or services that may be purchased on line. The product/service price may be fixed for a regular e-commerce storefront, or may be dynamically created for a forward auction web site.

- ***Configuration tool,*** along with electronic catalogs, is used to customize a product or service order according to the customer needs.
- ***Auction tool*** is also employed with electronic catalogs for conducting the online auctions, i.e., providing the customer with a bidding process on a timely basis, identifying the auction winner or canceling unsuccessful auction, etc.
- ***Order processing*** is established to complete the customer order by usually employing an electronic shopping cart and associated checkout process.
- ***Payment processing*** allows a customer to pay for his/her order online using appropriate electronic payment methods. For a consumer (retail e-commerce), these are usually online payment by a credit card or online accounts established by a third-party provider like PayPal. For B2B customers, the payment options may be wider, including not only credit card and PayPal, but also electronic transfer of funds, purchasing cards, electronic letter of credit, etc.
- ***Integration with internal processes*** provides connections of the storefront data with internal computer-based management systems like inventory, marketing, order management, etc. This is done to provide a quick and effective process of moving the customer order through the production and distribution for its successful fulfillment, i.e., receipt by the customer in a timely manner.
- ***Security system*** is employed for providing security and privacy of customer connection, ordering, and payments. It is also used to provide security of customer and company data stored in the e-commerce web site.
- ***Customer service*** may provide a variety of options in managing online customer needs including information content, customer support and maintenance (answering customer questions, resolving problems with orders, etc.), financial support, and others.

In general, the web-based elements and architecture for B2B demand-side e-commerce are similar to those of B2C e-commerce. However,

online selling processes in B2B storefronts are usually more complicated than B2C. These are due to the following reasons:

- Business customers may require registration to special private stores.
- Large volume of transactions may require automation of input.
- Large customers may get customized catalogs and prices.
- Payment systems may be based not only on credit cards, but also on other options like electronic transfer of funds, purchasing cards, electronic letter of credit, etc.
- Order fulfillment process (order-to-market) may need to be very fast.

We will describe below the main elements of demand-side e-commerce model.

Electronic Catalogs

An ***electronic catalog*** is the virtual equivalent of a traditional product catalog. The electronic catalog contains a database of products and services that the company sells online, and search capabilities for finding appropriate products and services. In addition, the electronic catalog includes written description and photos of products along with information about various promotions, discounts, payment methods, and methods of delivery.

The electronic catalog contains substantially more advantages than its paper equivalent. These advantages are based on the ease of updating such catalogs, and thus, providing the customer with up-to-date product information. The electronic catalog is directly integrated with the customer ordering system, including shopping cart and checkout process. It may also be integrated with back-end enterprise systems like inventory, order management, accounting, and others. Another major advantage of the electronic catalog versus its paper counterpart is the ability of the former to provide extensive search capability. This capability allows the customers to quickly find necessary products, compare them, and then select the right one for purchase. The electronic catalog

is also a paperless environment, which provides long-term cost savings based on elimination of printing, shipping, and handling costs of paper catalogs.

Electronic catalogs may substantially differ from one another depending on the specific features and elements incorporated into them. The catalog's classification may be based on three main parameters presented in Table 3.2: ***degree of ownership, dynamics of the presented information,*** and ***degree of customization***[5]:

An example of the electronic catalog from REI.com is presented in Figure 3-3 (see the case on *How REI Scaled e-commerce Mountain* at the end of this chapter). This catalog is very typical to demand (sell)-side storefronts. It is an internal catalog with the products sold by REI. It is also a static catalog, where products are presented by their textual descriptions and static pictures. In addition, it is a mostly ready-made catalog, in which the same catalog with limited customization options is offered to any consumer.

Despite the fact that the catalog's customization options are limited, they do exist. For example, Figure 3.3 shows that the color of the backpack demonstrated on this webpage may be adjusted according to a customer choice. This tells you that the catalog does have some minimal

Table 3.2 Classification of catalogs

Classification parameter	Types of catalogs	Description
Degree of ownership	Internal	Catalog and product there belong to the organization that sells them
	External	Hosted by suppliers or third-party organizations
Dynamics of the information presentation	Static	Presented by textual description and static picture
	Dynamic	Presented by motion pictures, animation, and/or with sound; content may change frequently
Degree of customization	Ready-made	Sellers offer the same catalog to any customer without possible options
	Customized	Customized content, pricing, and display depend upon customer characteristics

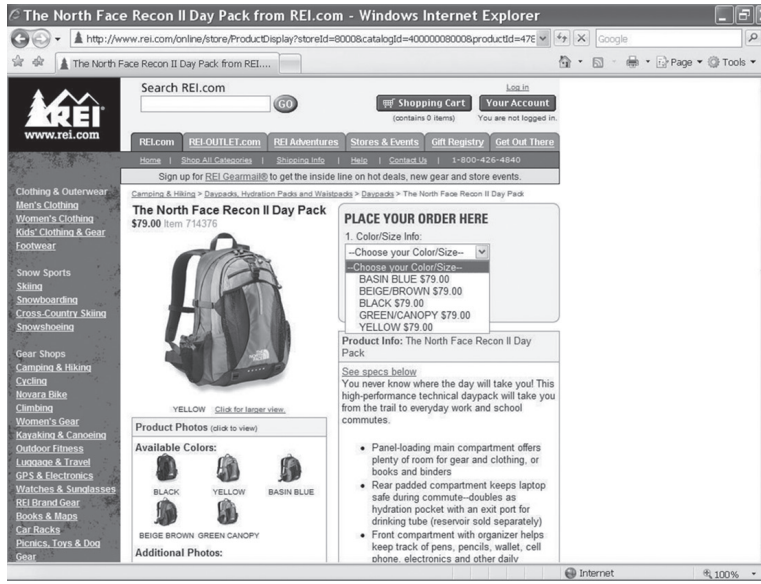

Figure 3.3 REI Electronic catalog (from www.REI.com)

customization choices. In general, however, a ***customized catalog*** contains a variety of product or service options that enable a customer to customize his/her product/service order.

The catalog customization may be done in several ways. One of them is to enable online ***product configuration***, which is particularly useful to sell multiple combinations of products online. The ***e-commerce product configuration tool (software)*** defines the available product options and accessories, and determines the product's price from the options chosen. The configuration tool may establish rules that define the requirements for certain categories of products, allow more than one choice for a given category, or do not allow certain combinations of options for specific products. A typical example of extensive product configuration is Dell's web site that enables substantial configuration of product offerings within each product group like desktops, notebooks, accessories, etc. For example, the product configuration tool, built-in to the Dell's electronic catalog, provides a variety of customized options including computer processor, operating system, LCD panel, memory (RAM), hard drive, optical drive (CD/DVD drive), and others (see Figure 3.4). The final product price also depends on the chosen configuration.

The configuration tools require the following:

- Database search based on multiple criteria (by product title, product family, product number, etc.).
- Online product configuration intelligence that would prohibit wrong configurations and suggest correct combinations of products.
- Full integration with the catalog, shopping cart, pricing and other elements of a seller-oriented model.
- Download configurations to the buyers' systems.

The online configuration intelligence is done by special ***intelligent agents***–a software tool that can perform routine tasks that require intelligence. You can find detailed information about intelligent agents and their usage at the following site: www.agentland.com.

The second option of product customization is to ***provide a variety of online choices.*** This may be done by packaging a specific product, that may not be configured otherwise, with complementary products or services, and then sell this combination as one product offer. Companies like

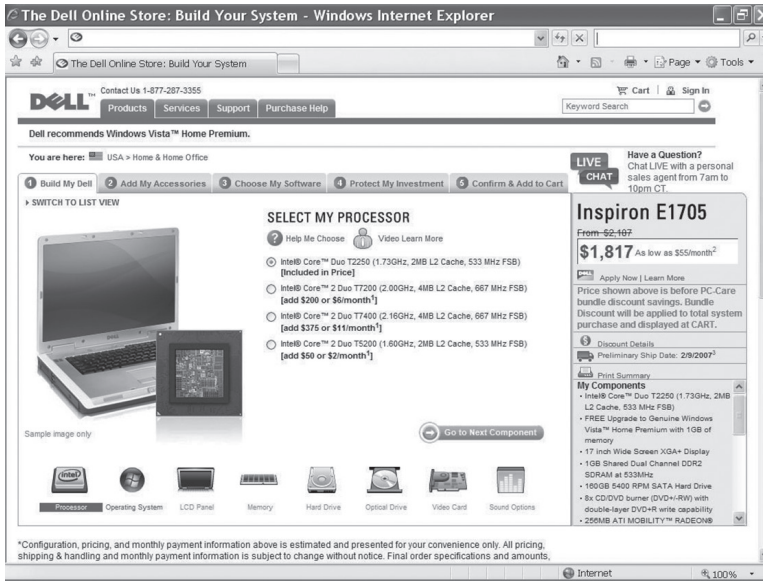

Figure 3.4 Dell's configuration (from www.dell.com)

eBay, Overstock.com, and others enable online auctions with a big variety of the same product offerings. For example, a Canon picture camera, besides being auctioned as an individual product, can be also packaged together with a variety of other associated products like car battery charger, high capacity data disk, or cleaning kit, etc. All these online selling combinations may represent customized choices for the consumers.

Order Processing

Order processing in the demand-side e-commerce model may involve a variety of elements. They include electronic shopping cart, checkout process using electronic shopping cart and payment systems. Order processing may also involve order confirmation online and through an e-mail, order tracking by connecting to the logistics carrier that handles the order shipment and delivery. In addition, the order processing system may export all order and payment information to the internal back-end system like order management and accounting.

Electronic shopping cart or simply ***shopping cart (S-Cart)*** is a virtual shopping cart that keeps track of the items visitors have ordered and allows them to add, remove items, and change the quantities of these items. The shopping cart (S-cart) usually resides on the seller's site (see Figure 3-5). It is integrated with the seller's catalog, configuration tool, and other elements of the demand-side e-commerce.

In the B2B environment, a customer (large customers, in particular) may need to maintain order information on its own site in order to integrate this information with the internal purchasing or enterprise resource planning (ERP) system. In this case, a shopping cart that is called ***buyer shopping car (B-cart)*** resides on the buyer's system (see Figure 3-5) rather than on the seller's storefront site. This creates interoperable interface between the seller's storefront and customer's internal purchasing system.

When a visitor decides to purchase the items online, the shopping cart sends the order information into the ***checkout process***, which involves several steps:

- Requires a customer to provide shipping address and other appropriate information (place of residence for tax purposes, e-mail address, delivery requirements, etc.)

- Calculates the total price for the purchased item including shipping and handling fees, and applicable taxes
- Provides a method of payment (credit card, third party payment system like PayPal, or variety of other payment methods for B2B selling), and requires the customer to submit his/ her payment information
- Requires the customer to verify all presented shipping and payment information before final order submission
- Generates an order confirmation with a confirmation number, e-mails the confirmation information to the customer, and provides tracking information.

Involving a variety of steps, this checkout process may be quite extensive and time-consuming. Online sellers may require filling information on 3 to 5 consecutive web pages before the process is completed. Sometimes, an online seller deliberately withholds tax and shipping information until the customer is at the end of the checkout process. The rational of this is that anticipation would make an illusion of lower overall prices for the product.

To improve the checkout process, e-commerce sellers introduced a checkout process with a very limited number of pages. Some online sellers provide a ***single-page shopping cart and checkout process*** using the

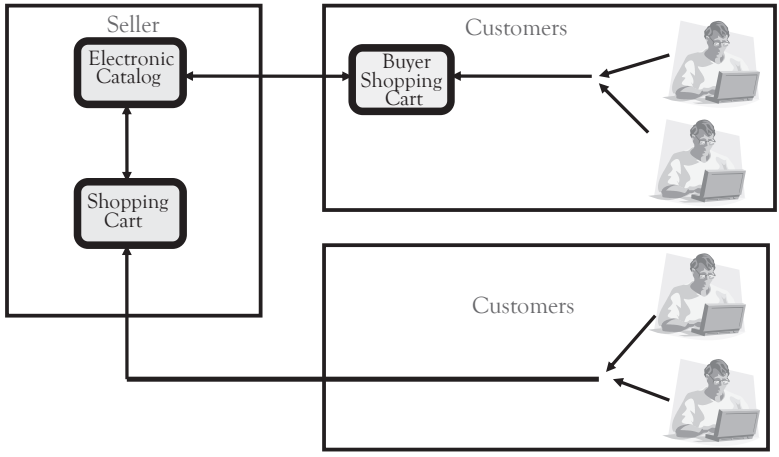

Figure 3.5 S-Cart and B-Cart

software like ***Macromedia Flash*** (see information in www.adobe.com/products/flash/flashpro). For example, in Figure 3-6 you can see a single webpage with both shopping cart (check-in and checkout dates, and room choices) and checkout process (name, address, credit card information, etc.) for the Watergate Hotel[6]. By clicking on "Finish Reservation"(see Figure 3-6), the completed input information will be verified and accepted by the system. The customer would see the whole information again, and would be required to click on the Submit button to submit the reservation.

Another improvement in the checkout process is possible through ***"one-click shopping cart."*** This approach originated by Amazon is used by many other online sellers. When using the "one- click shopping cart" approach, a customer establishes an online account, which contains this customer's name, home address, and payment information. After selecting product(s) for purchase and submitting them to the checkout process, the customer's address and payment information along with prices and shipping and handling appear on the checkout page. This saves times, and the quickness of the checkout process increases customer satisfaction.

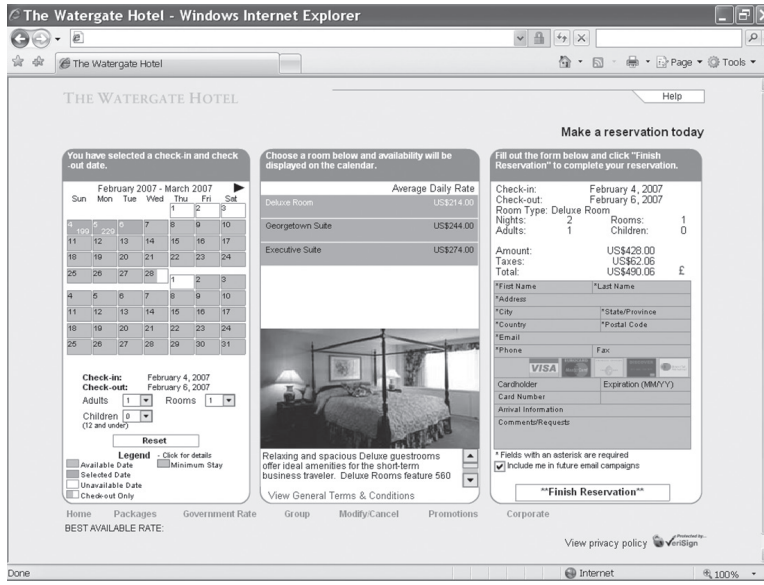

Figure 3.6 One-page Shopping Cart and Checkout Process

In some online B2B selling sites, the process of retrieving payment information (billing, credit card, etc.) is done offline in order to validate potentially high volume payments through the company's secure connections. After validation, the product order is sent to the seller. Some business customers do the shopping process and checkout offline using downloadable catalogs and buyer shopping carts (B-carts). All these reduce checkout time and make the whole process more secure.

Integration with Internal Systems

To provide quick, high-quality online transactions of online customer orders, a company's e-commerce demand-side should be integrated with its internal computer management system. It is specifically important for B2B online sites with large volumes of sales and complex payment systems. Integration of the online storefront order information should be done with:

- ***Order Management*** for validating and accepting order receipts and processing them further for production
- ***Accounts Receivable*** for accumulating order payment information

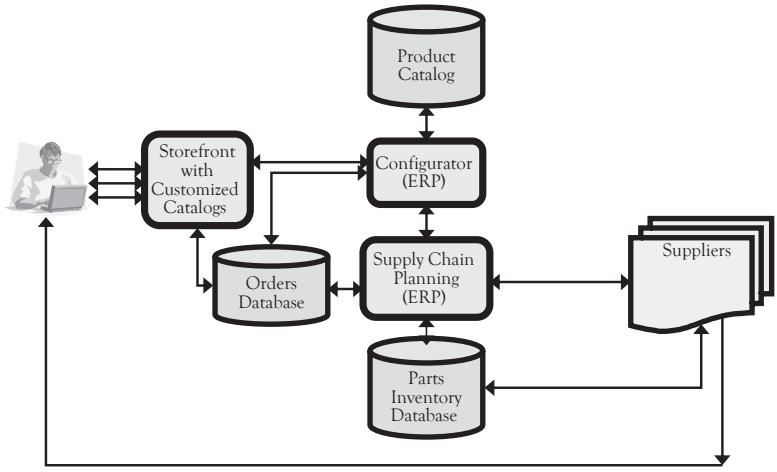

Figure 3.7 E-Fulfillment Process

- ***Manufacturing and Supply Chain Planning*** for processing order information through the production process that involves getting required materials from suppliers, actual order execution/production, and finally order distribution to the customers (shipping and handling)
- ***Inventory Control*** for checking on-hand materials, parts, components, and finished good inventory for shipment.

The seller may provide customer order information directly to suppliers. This speeds up the outsourcing process and enables quick delivery of final products to customers. ***E-fulfillment*** is an online process that provides collaboration between sellers and suppliers in order to facilitate and speed-up production and delivery of customer orders. According to the e-fulfillment process, the seller makes order information directly available to suppliers. This may be done by giving the supplier's direct access to the seller's back-end (ERP) system. In this case, the supplier quickly identifies the order's needs, produces it, and ships directly to the customer.

The e-fulfillment process is explained in Figure 3-7. A customer selects the *configure* function and uses the *Configurator* options to configure a product. The customer completes the configuration and requests a price quote. The *Configurator* (via Enterprise Resource Planning system) returns the price of the product configured by the customer. Then, the customer using the checkout process orders the product. The customer's order information is transferred into the *Orders Database.* The *Supply Chain Planning* ERP module checks the *Parts Inventory Database* (for product availability) and generates a plan to produce the customer's order and the list of parts needed to fulfill the customer order. The ERP software also updates the *Parts Inventory Database.* The customer order information and list of parts is electronically sent to a supplier. In addition, the supplier may have real-time access to the *Parts Inventory Database* and to the product and parts demand forecasts. The supplier, based on the customer order information, completes the product and sends it to the customer. The supplier also updates the *Parts Inventory Database,* and if necessary, may contractually be required to replenish parts that have fallen below appropriate levels.

3.4 Software for Demand-Side E-Commerce

Main Characteristics

The heart of developing demand-side e-commerce is development software. This software should be able to create a variety of features used in demand-side models like user registration, logons, search options, searchable database of products, customization and configuration options. The demand-side development software may also be used to place online orders, utilize shopping carts and checkout processes including order tracking capabilities, payment, shipping, and tax calculations. Finally, the software should provide secure process transactions, site analysis, reporting tools, product data imported from other web sites or internal systems, documentation and support, and integration with internal computerized management systems.

The software industry provides a great variety of solutions associated with the demand-side e-commerce models. Despite common design and development principles, these solutions differ from each other in terms of functionality, ways of distribution to the customers, prices, and other characteristics. Table 3.3 shows examples of some popular storefront development software including Microsoft Office Live (former Microsoft Commerce Manager), eBay Stores , Yahoo Merchant Solutions, Storefront.net, and Oracle iStore. In addition, Table 3.3 provides the main characteristics, benefits, and limitations of these software applications.

Examples of Demand-Side E-commerce Software

Microsoft's Office Live is one of the most inexpensive and easy-to-use solutions enabling sellers, specifically in small start-up companies, to create quickly an online store without using any special programming tools. This online web site may be used to sell products anywhere and in association with any other web site like eBay, Amazon, or other major electronic marketplace. It is also a hosted solution, which means that the developed solutions, product database, and all related information are physically located on the Microsoft's servers. Microsoft also provides support and maintenance of the online solutions. However, these solutions lack

important features of demand-side e-commerce like providing promotions and cross-selling of products, connections with internal ERP system (if it is not Microsoft-based) and suppliers.

The ***eBay Stores*** and ***Yahoo!Merchant Solutions*** are also relatively inexpensive, but more functionality-rich solutions. They are hosted solutions that do not require any programming for development and implementation. For example, Yahoo! Merchant provides the full-range of capabilities (see http://smallbusiness.yahoo.com/ecommerce/features.php) for a product catalog with up to 50,000 products for sale, shopping cart and checkout, customer service, marketing and product promotion, payment system and order processing, shipping, and handling options, and online statistics. In addition, the demand side e-commerce model has the ability to be integrated with the inventory management system, QuickBooks accounting packages, UPS online tools, etc. However, Yahoo! Merchant Solutions allows creating their solutions only for selling products on Yahoo Shopping, which prohibits sellers from marketing and selling their products in other electronic marketplaces. The same concept of limited usage on the Internet is maintained by eBay Stores.

Storefront.net is a software package that contains tools used to develop and implement an online storefront. It is usually not a hosted solution, and needs to be purchased and installed on the seller's site. It also requires programming resources for developing storefront pages. However, Storefront.net provides more flexibility and customization in storefront design, which makes it more appropriate for a small and mid-size companies involved in developing more sophisticated e-commerce web sites. Despite these benefits, Storefront.net is still standalone software, which does not provide sufficient capabilities of integration with internal ERP functions and external suppliers.

Oracle iStore is a set of solutions for creating global B2B and B2C demand-side e-commerce models. It provides an extensive set of development tools, and it is a part of the Oracle's ERP software called the E-Business Suite. Thus, iStore is well-integrated with the other back-order Oracle applications including Inventory, Order Management, Shipping, Accounts Receivable, Customer Relationship Management (CRM), Supply Chain Planning, and some others.

Table 3.3 Examples of demand-side software

Product	Software distribution	Main benefits	Main limitations
Microsoft Office Live	Online hosted solutions	-Needed features for startups -Easy to use -Inexpensive -May be used with any web site	-Limited design flexibility -Lack of important features like product promotions, cross selling, etc. -Limited or no connection to internal ERP system and suppliers
eBay Stores	Online hosted solutions	-Easy to implement -Extensive set of storefront development features -Some integration with internal customer system	Limited design flexibility -Only for selling on eBay -Limited integration with internal ERP functions and suppliers
Yahoo! Merchant Solutions	Online hosted solutions	-Easy to implement -Extensive set of storefront development features - Some integration with internal customer systems	-Limited design flexibility -Only for selling on Yahoo -Limited integration with internal ERP functions and suppliers
Storefront. net	Sold to the customers via web site or by ground distribution	- Flexibility in storefront design and development -Variety of sophisticated design tools	-More expensive than hosted solutions -Limited or no integration with internal ERP functions and suppliers
Oracle iStore	Sold online or by ground distribution	-Comprehensive tools for developing sophisticated e-commerce demand-side -Full integration with internal ERP system and suppliers	-Very expensive -Complex implementation; time- and money-consuming -Requires resources for using development tools

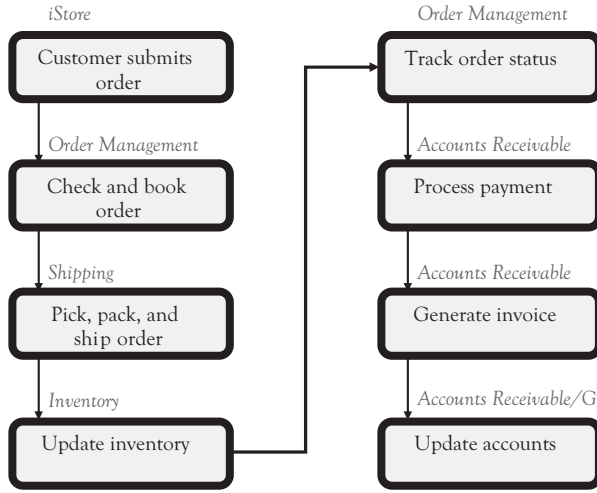

Figure 3.8 Order-to-fulfillment-to-payment process

The detailed process and integration of systems used in processing the order to its fulfillment and payment (order-to-fulfillment-to payment) is shown in Figure 3.8. As seen from Figure 3-8, the process involves eight steps and requires integration of iStore with five other ERP modules: Inventory, Order Management, Shipping, Accounts Receivable, and General Ledger (GL).

Drawbacks and Problems in Demand-Side Implementation

Design, development, and implementation of demand-side e-commerce models are generally associated with possible drawbacks and problems. First, the implementation could be complex and cost a sufficient amount of money. The ***total cost of ownership (TCO)*** includes software development and/or licensing fees, hardware, installation, implementation, training, and support. Components of the storefront budget development and their proportion in the total TCO may be seen in Table 3.4[7].

Besides high costs, there are may other problems. The demand-side e-commerce model may not be properly integrated with the company's back-end computer systems and suppliers' systems, which in most cases reduces speed of transaction and increases transaction costs. Even if a company creates a great web site, there are may be not enough customers (buyers) to generate steady online sale. Customers may also have security concerns in terms of passing proprietary information to sellers. Business

Table 3.4 Components of storefront budget

COMPONENTS	*PROPORTION OF COST IN TCO, %*
Software Licenses	21
Hardware	18
Hosting	11
Content Design and Development	18
Marketing	6
System Development and Maintenance	26
Total	100

customers could have some resistance to buying online due to some general human "conservatism," not being sufficiently computer-savvy and not being trained well enough or sufficiently exposed to the technology. All these factors should be taken into consideration while designing, developing, and implementing an e-commerce site.

3.5 Measurements of Demand-Side E-Commerce

The ***financial measurements*** of demand-side e-commerce are similar to those of other e-commerce models (see explanations in Chapter 2). Specifically, while planning implementation of a new site or redesign of an existing web site, the seller wants to know how quickly the investments in the site's design and development can be recovered, and how profitable this e-commerce solution may be. In this case, the seller may calculate the company's return on investments (ROI), payback, net present value of invested money, internal rate of return (IRR), and average profits. These measures are frequently used to estimate future results of implementing demand-side e-commerce solutions. An example of calculating these measures is presented in Table 3.5.

Return on Investment (ROI) describes the business value of e-commerce business models (see Chapter 2 for details). It is defined as an expected gross profit divided by investments in e-commerce, equal to some percentage figure (for example ROI = 40% or 50%). The numerator of the ROI can refer to profit, cost reduction, or savings derived from operational improvements associated with e-commerce implementation. This measure is a very popular indicator of how efficient and effective the implementation of e-commerce will be based upon future implementation of a specific e-commerce business model.

The ROI analysis in Table 3-5 is provided for the e-commerce implementation in 2007, and then its subsequent usage in the three consecutive years, 2008–2010. According to the sales forecast, the company, for which we estimate ROI, is going to increase its revenue by 10% annually in 2008–2010. At the same time, the overall cost would represent 75% of the revenue, and, thus, a gross profit margin of 25%. The initial investments in purchasing the e-commerce software (software license) in 2007 will be $865,000, which, according to the data in Table 3-4, represents 21% of the total budget. Using the proportions of the budget elements in Table 3-4, we can identify components of initial investment in e-commerce development. For example, hardware and Internet infrastructure (including hosting) is 29%, which will be $1,194,524 (865,000/0.21)*0.29). Using the same logic, we can identify estimated costs for other budget elements including consulting fees (18%), additional staff and customer support (26%), and advertising (6%). The model would "go live" in 2008, then for the next three years would require additional expenditures in infrastructure, staff and service, and advertising. The total investments in 2007 and expenditures in 2008–2010 are summarized for each year (see Table 3-5).

Besides expenditure, the demand-side e-commerce site is going to generate in 2008-2010 income through increased sale (we consider 5%) and savings by reducing inventory cost (5% of the total cost) and creating paperless environment (1% of the total cost). The total income and saving are also summarized for each year (see Table 3-5). The annual profit for each year will be the difference between income and savings on one side and investment and costs on the other side in this year. In 2007, though, the number is just a negative number representing initial investments. Let us assume that we are going to analyze this investment decision for a period of 3 years, and the required rate of return will be 5%.

The average income per year of $2,569,478 is the average of annual profits in 2008–2010. It represents 10.8% of the average annual gross income. The payback may be calculated as the ratio between initial investments and average annual income:

$$\text{Payback} = 4{,}199{,}048/2{,}569{,}478 = 1.6 \text{ years}.$$

This number indicated that the initial investments in the e-commerce model would be recovered in about one year and 7 months.

Table 3.5 ROI analysis of demand-side E-commerce

	Para meter Used	*2007*	*2008*	*2009*	*2010*
Revenue, COGS, and gross income, $					
Total revenue from sales (forecast)	0.10		85,950,000	94,545,000	103,999,500
Total cost of goods sold (COGS)	0.75		64,462,500	70,908,750	77,999,625
Gross income	0.25		21,487,500	23,636,250	25,999,875
Investment and costs, $					
Software licensing fees (21% of the total investment), vendor- based information	0.21	865,000			
Hardware and infrastructure including hosting (29% of the total cost)	0.29	1,194,524	1,194,524	1,194,524	1,194,524
Consulting fees including content development (18% of the total cost)	0.18	741,429	370,714	370,714	370,714
Additional staff and customer support (26% of the total cost)	0.26	1,070,952	1,070,952	1,070,952	1,070,952
Advertising (6% of the total cost)	0.06	247,143	247,143	247,143	247,143
Total investment and costs	1.00	4,119,048	2,883,333	2,883,333	2,883,333
Income and savings, $					
Income through increased sale (5-10% of gross income)	0.05		1,074,375	1,181,813	1,299,994
Inventory cost reduction (5-15% of COGS)	0.05		3,223,125	3,545,438	3,899,981

Saving from paperless sales (1-3% of COGS)	0.01		644,625	709,088	779,996
Total income and savings		0	4,942,125	5,436,338	5,979,971
Annual profit, $		-4,119,048	2,058,792	2,553,004	3,096,638
Period, years		3			
Required rate of return, %		5%			
Average income per year, $					2,569,478
Average income as a % of gross income					**10.8%**
Payback, years					***1.6***
ROI, %					**62%**
Net present value (NPV), $					***2,697,475***
Internal rate of return (IRR), %					**36%**

The ROI in this case will be opposite to payback, i.e., a ratio between the average annual income and initial investments:

$$ROI = (2{,}569{,}478/4{,}199{,}048)*100 = 62\%$$

This number tells that for every dollar invested in the e-commerce business model, the return will be 62 cents. The IRR number of 36% tells that the investment in e-commerce model will be more than 7 times more efficient than the required rate of return of 5%.

Besides the financial measurements used to estimate the long-term effect of implementing demand-side e-commerce model, there is also a need to establish ***operating measurements*** that will reflect the short-term results of already implemented e-commerce solutions. In this case, several operating measurements may be employed:

- ***Total sales (revenue) from the storefront (R),*** which is the revenue in dollars from the web site measured on a daily, weekly, monthly, quarterly, and annual basis.
- ***Total costs (C),*** representing the total cost of products sold at the storefront combined with the storefront support and maintenance.
- ***Total gross profit (GP),*** the difference between the total sales and total costs of products and storefront support and maintenance, $GP = R\text{-}C$**.**
- ***Number of visitors (N).*** The number of customers that visit the storefront per unit time (month, year, etc.)
- ***Average Sale (AS),*** the average amount that a customer spent per sale, $AS = R/N$**.**
- ***Buy to Visit Ratio (BV),*** the average percentage of web site visits resulted in sales, %.

3.6 Chapter 3 Summary: Managerial Aspects of Sell-Side E-Commerce

1. ***Demand (sell)-side e-commerce models*** are designed by organizations (sellers) to provide selling opportunities on the downstream

side of supply chains, i.e., from the organization to its customers. These are one of the most common types of e-commerce models in practice.

2. ***Direct selling and auctioning*** represents a direct online channel to business customers or end consumers. ***Direct selling to business customers*** is associated with the selling products and services online to established network of business customers that in turn distribute those products to the end consumers. ***Complementary selling and auctioning*** represents an online channel of selling products and services to business customers and end consumers, which is complementary to the existing traditional distribution/retail channels.
3. Some practitioners and researches considered online storefront as a cannibalizing channel that would reduce volume and benefits of well-established traditional selling channels. In general, there is always a possibility of channel conflict if a company uses multiple distribution channels. However, a number of examples of firms using both online and "on-the-ground" sales channels in the same company proved to be non-cannibalizing. Moreover, different channels could help each other to increase selling volumes and improve relationships with customers.
4. The value added capabilities of demand-side e-commerce involve creating ***new channel of marketing and product sales with global outreach.*** The online store in most cases *can be used at any time of the day or week (24/7).* An online storefront consolidates all current product and sales information and search capabilities online, *allowing the customers to find quickly needed products or services* and other related information (product descriptions and comparisons, associated services, etc.). Another value-added offering is the ability to provide ***paperless processes***, which speeds up the order fulfillment process and reduces transaction costs. The e-commerce storefront may be connected to the internal computer-based system like ERP (enterprise resources planning). This connection provides an opportunity to ***coordinate order taking and order execution,*** as well as ***order planning with other internal (back-end) systems*** like inventory, accounting, human resources, etc.

5. Demand-side e-commerce provides ***price differentiation online*** for various products and customer segments. The price may be different for a new customer versus a repeat customer, small business customer versus large volume customer, international customer versus domestic customer, and so on. All these can be incorporated into online storefront decisions, which add value to both the company and its customers. An e-commerce web site may also be an efficient way of testing different pricing options for various market segments.
6. An ***electronic catalog*** is the virtual equivalent of a traditional product catalog. The electronic catalog contains a database of products and services that the company sells online, and search capabilities for finding appropriate products and services. In addition, the electronic catalog includes written description and photos of products along with information about various promotions, discounts, payment methods, and methods of delivery. A ***customized catalog*** contains a variety of product or service options that enable a customer to customize his/her product/service order. The ***e-commerce product configuration tool (software)*** defines the available product options and accessories, and determines the product's price from the options chosen.
7. ***Order processing*** in the demand-side e-commerce model may involve a variety of elements. They include electronic shopping cart, checkout process using electronic shopping cart and payment system. Order processing may also involve order confirmation online and through an e-mail, order tracking by connecting to the logistics carrier that handles the order shipment and delivery. In addition, the order processing system may export all order and payment information to the internal back-end system like order management and accounting.
8. Integration of the online storefront order information should be done with ***Order Management*** for validating and accepting order receipts and processing them further for production; Accounts Receivable for accumulating order payment information; Manufacturing and Supply Chain Planning for processing order information through the production process that involves getting required materials from suppliers; and Inventory Control for checking on-hand materials, parts, components, and finished good inventory for shipment.

9. ***E-fulfillment*** is an online process that provides collaboration between sellers and suppliers in order to facilitate and speed-up production and delivery of customer orders. According to the e-fulfillment process, the seller makes order information directly available to suppliers.
10. ***Demand-side software,*** which is in the heart of e-commerce development, should be able to create a variety of features used in demand-side models like user registration, logons, search options, searchable database of products, customization and configuration options. The software may also be used to place online orders, utilize shopping carts and checkout processes including order tracking capabilities, payment, shipping, and tax calculations.
11. The software industry provides a great variety of solutions associated with the demand-side e-commerce models. Despite common design and development principles, these solutions differ from each other in terms of functionality, ways of distribution to the customers, prices, and other characteristics. Among the popular e-commerce software for demand-side e-commerce are Microsoft Office Live (former Microsoft Commerce Manager), eBay Stores, Yahoo Merchant Solutions, Storefront.net, and Oracle iStore.

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CHAPTER 4

Supply-Side Models

The need to stay competitive in the global environment requires companies to reduce cost and improve management of cost savings processes. One of the main ways to reduce purchasing costs and improve efficiency of supply chain management is to utilize supply- side e-commerce models. Supply-side e-commerce or electronic procurement (e-procurement) represents a variety of activities related to procure supplies over the Internet. E-procurement enables to automate many buying/procurement functions. Through implementing supply-side e-commerce, companies expect to better control inventory, reduce costs, and increase efficiency of order processing.

Supply-side e-commerce is one of the major elements of the modern procurement systems in organizations. According to CAPS Research[1], more than 77% of organizations use supply-side e-commerce tools for 34% of purchasing of the organizations' spend. At the same time, more than 92% of companies employ supply-side e-commerce for purchasing order processing. In this paper, we present various aspects of managing supply-side e-commerce models.

4.1 Modern Supply-Side E-Commerce

Traditional Procurement System and Its Problems

Procurement is a purposeful set of activities (processes) of obtaining goods and services for specific production or service needs. From the strategic standpoint, procurement involves several major elements:

- ***Supplier selection*** also called strategic sourcing includes researching and gathering information about perspective suppliers, and their background analysis of suppliers.

This is done to identify and potentially negotiate contracts with suitable suppliers that can satisfy company's requirements in various materials supplies.

- ***Supplier contacts*** are used to send supplier-related requirements to appropriate suppliers. Depending on the company's needs and level of specificity, these requirements may be sent in a different format including request for information (RFI), request for proposal (RFP), or request for quote (RFQ).
- ***Contract negotiation and renewal*** involves a legal process of negotiating and using the terms of relationships with suppliers. These incorporate supplier and customer responsibilities, product specifications, delivery schedules, payment options, etc.
- ***Supplier relationships*** are based on managing and updating supplier information, measuring supplier performance results, and maintaining relations with suppliers.
- ***Procurement process*** is characterized by operational activities of acquiring and fulfilling material supplies and services to a company.

As a part of the procurement process, purchasing departments are responsible for supplying (outsourcing) ***direct materials,*** which are core to the company's product offering, i.e., raw materials, parts, components and sub-assemblies, and machinery. They are also responsible for outsourcing ***indirect materials*** required to operate a business. The indirect materials include various office equipment and supplies, MRO (maintenance, repair, and operations) parts and materials, services (janitorial, garden, etc.), and other related expenses.

A procurement process for typical indirect materials may consist of the following steps (see Figure 4.1):

1. A requestor creates a purchase requisition to buy specific materials. The requisition may require an approval from the immediate supervisor/department manager. Then, it is delivered to the purchasing department via e-mail or fax.

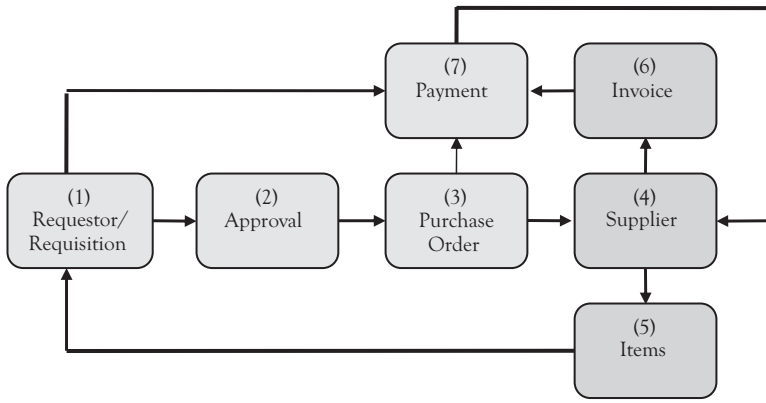

Figure 4.1 Traditional procurement process

2. The requisition is reviewed and approved by the purchasing department. It may also require an approval from the accounting/finance department.
3. The requisition information is used to create a purchase order (PO) that is sent to the supplier usually via e-mail or fax.
4. The supplier receives and acknowledges PO, and then prepares for the delivery of the items according to PO.
5. The supplier delivers the items that are ordered by the customer.
6. The supplier also creates an invoice sent to the customer's accounting department (accounts payable). At the customer site, the accuracy of the invoice is checked and compared with the original PO and received products. This is called a *three-way matching* process, i.e., the information from PO, received order, and supplier's invoice should match.
7. After the approval from the required authority, the payment to the supplier is made.

Most of the described activities (see Figure 4.1) are performed by manual data entry using a huge amount of paperwork and utilizing fax or e-mail. With existence of numerous processes and sub-processes, there are multiple points of failure. Many errors are caused by the inaccuracy of POs and invoices. Purchase order returns, error corrections, and re-submissions of the paperwork cause delays in order processing and order delivery.

One more problem of the traditional procurement is ***maverick purchasing,*** which is a process of acquiring goods and services from suppliers

that are outside of a preferred supplier list. During a calendar year, business units may require goods and services that need urgent delivery or special goods, for which there are no preferred suppliers. To satisfy these requests, the purchasing departments may do outsourcing from previously unknown (local) suppliers without going through a normal process of selecting suppliers and negotiating/bidding appropriate prices. This "maverick" purchase means that a department buys an item in an ad-hoc fashion, which results in paying a higher premium for that item.

The problems with a huge amount of procurement errors and paperwork, maverick purchasing, and overall level of purchasing/procurement costs can be substantially reduced with introduction of supply-side e-commerce applications .

What is Supply-side E-commerce?

Supply-side e-commerce or ***e-procurement*** is a growing area of e-commerce models. It provides direct and efficient purchasing process linkages between the requesters (employees) and suppliers, enabled by a new class of Internet-networked solutions (see Figure 4.2).

Supply-side e-commerce fundamentally restructures the way organizations practice traditional procurement activities in terms of automating and simplifying many buying transactions. These include supplier selection, contact negotiation, price bidding, supplier relations, and others. For the actual procurement process, supply-side e-commerce is characterized by a number of integrated and automated activities like using electronic catalogs of supplied products, creation and sending of purchase orders (POs), controlling item receipts, automatic three-way matching, identifying, and analyzing procurement spend, etc. The main distinguishing points between supply-side e- commerce and traditional procurement are presented in Table 4.1.

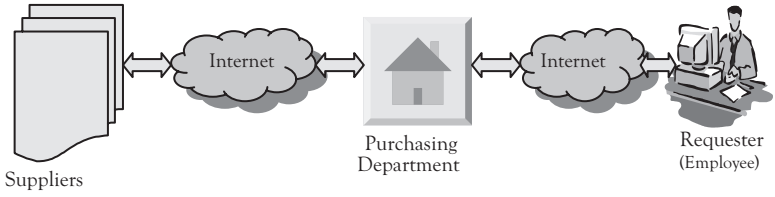

Figure 4.2 General structure of supply-side E-commerce system

Table 4.1: Supply-side E-commerce versus traditional procurement

Element of procurement	Traditional procurement	E-Procurement
Sourcing	• Extensive paperwork • Time- and money consuming process • Hard to identify and evaluate all potential sources, and select the most appropriate suppliers	• Reduce unnecessary paperwork • Select the most appropriate suppliers • Lower both capital and personnel resources
Contract Negotiation	• Long contract negotiation time • Substantial resources involved in contract negotiation	• Shorten contract negotiation time • Reduce resources involved in contract negotiation
Requisition	• Long procurement processing time • Frequent inaccuracies in transactions in terms of purchase order, invoice and payment errors • Hard to control quantity and quality of supplied and received items • Maverick buying	• Shorten procurement processing time • Reduce or completely eliminate errors in purchase order, invoice, and payment • On-time payments to suppliers can be ensured • Improve control of quantity and quality of supplied and received items • Reduce or eliminate maverick buying
Catalogs	• Utilize paper catalogs that lengthen and complicate the way to search and order goods and services • Time- and money-consuming order process	• Online catalogs simplify the way to order goods and services • Reduce procurement cycle time and associated resources
Purchase Order (PO)	• Paper PO can increase procurement cycle time and errors due to huge amount of paperwork	• Electronically transmitted Pos reduce procurement cycle time and improve procurement accuracy
Procurement Intelligence	• Limited capability of comparing and evaluating suppliers • Limited information for prices comparison between suppliers	• Provide detailed information for comparing and evaluating suppliers • Provide buyers with price comparison and industry analysis

Historical Overview

Supply-side e-commerce (e-procurement) has a long history of development. The first attempt to automate procurement operations and improve relationships with suppliers happened in early 1970s with the development of ***electronic data interchange (EDI) systems.***

EDI provides the capability to exchange any standardized data or documents such as purchase order, invoice, delivery schedule, contract information, etc. from one computer system to another via electronic wired connections called value-added network (VAN). The transfer of documents and data is based on agreed message standards, and can be exchanged via EDI between two parties or trading partners as long as both sides have implemented EDI and made appropriate preparations. This system was able to overcome many deficiencies of the traditional procurement process in terms of communication speed, multiple errors and paperwork, inaccuracies of order submissions, and others.

Despite the benefits, EDI implementation was rather complex, costly, and unaffordable by most small- and medium-size companies. EDI required specific hardware, software, and end-user training. It also involved a major business process restructuring for adapting to standardized electronic forms and procedures. EDI was a complicated system to operate requiring significant resources and training for employing and supporting the system. The EDI system was predominately used for one-to-one communication (one buyer-one supplier). Thus, in case of many suppliers, the EDI system needed to be installed separately for each supplier. EDI is still used today in a number of companies, predominately for procurement between large buyers and their large suppliers.

As e-commerce became a factor of business environment in mid-1990s, a new version of electronic procurement started to be actively used in various companies. The proliferation of supply-side e-commerce was associated with development and implementation of several Internet-based procurement software types. One of them was online software for procurement of goods through electronic catalogs, specifically used for indirect material procurement. The second software tool was electronic reverse actions used by buyers to organize and conduct an online bidding process to select a supplier with the lowest price. The third software tools

were exchanges (e-marketplaces). These provided an electronic forum, in which a large numbers of buyers and sellers can meet online and exchange information and bids, and, thus, expand opportunities for suppliers and reduce the purchase price for buyers.

Supply-side e-commerce systems experience a gradual evolution into a more sophisticated, efficient and well-accepted system for processing, measuring, and improving companies' procurement through the Internet-enabled software applications. This is based on extensive functionality of modern supply-side e-commerce applications, less expensive pricing and more efficient delivery models, as well as developed catalogs and supplier networks.

In the recent time, supply-side e-commerce became one of the major enablers for supply chain management (SCM). One of the surveys on SCM[2] revealed that supply-side e-commerce tools are among the leading factors driving the progress in supply chain development. The surveyed companies responded that e-procurement systems along with supplier relationship management and business-to-business exchanges represent the main information technology tools used to advance SCM. The supply-side e-commerce advantages in SCM include the following[3, 4]:

- Providing an improved information and communication technology to SCM.
- Reducing transaction time and increasing quality and accuracy of SCM transactions.
- Reducing cost of purchasing/outsourcing function inside the supply chain organizations.
- Increase sales/revenues to final customers in supply chain.

4.2 Supply-Side E-Commerce Models

Supply-side e-commerce, providing direct and efficient procurement linkages between business customers (buyers) and suppliers, is enabled by a group of Internet-networked models. These models differ by the type of relationships existing in a model and by model functionality (see Figure 4.3). ***Many-to-one (company-centric) relationships*** are based on a single buyer's initiative to establish an online procurement site to deal

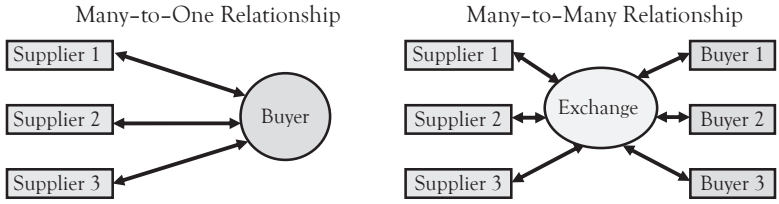

Figure 4.3 E-commerce relationship

with suppliers. For example, a company may create an online environment to identify and select suppliers, and negotiate purchasing contracts with them. ***Many-to-many relationships*** (see Figure 4-3) are organized by several buying organizations (customers) that establish relationships with suppliers via an online exchange. These buying organizations are not competing on main materials (specifically, indirect materials) and services they outsource from suppliers. Thus, the buying organizations can aggregate their procurement needs, and negotiate through the exchange better deals with suppliers.

Based on procurement elements and their functionality, there are four main types of supply-side e-commerce (e-procurement) models:

- ***E-sourcing*** is used for online strategic sourcing and selection of suppliers including identifying and comparing perspective suppliers, selecting suppliers, and negotiating contract terms with them.
- ***Electronic reverse auction (e-RA)*** is a common type of supply-side e-commerce. According to this model, a buyer (buying organization) creates a request for quote (RFQ) and invites potential suppliers to submit bids, and then, using the online auction process, selects the lowest-priced bidder. The price during the auction process is dynamically changing in descending (reverse) order until the lowest supplier price wins the auction.
- ***E-procurement with electronic catalogs*** is another very common supply-side e-commerce model. In this case, a buyer (buying organization) develops an electronic marketplace to do procurement utilizing available electronic catalogs of suppliers' products and/or services. These catalogs are usually

used to outsource indirect materials, and sometimes—direct materials. They may be also employed for outsourcing labor resources and services.

- ***Electronic exchange*** (also called ***e-tendering)*** has many-to-many type of relationships. In this case, a company (buyer) or group of companies creates an electronic marketplace, where buyers and sellers can meet to do online business. Usually, a buying organization posts an RFQ, to which suppliers respond. Then, an online negotiation process between the buyer or group of buyers, and suppliers takes place, until the supplier who meets RFQ requirements with the lowest price is selected.

We will discuss in detail each supply-side e-commerce model in the next four sections.

4.3 E-Sourcing

In the early 21st century, the e-sourcing applications and solutions showed a significant surge in sales and amount of companies that utilized the e-sourcing software solutions. ***E-sourcing*** is defined as the use of Web-based applications, decision-support tools, and associated services to identify, evaluate, negotiate, and configure purchases and supplier relationships that will effectively support supply chain and other business operations[5]. At the same time, e-sourcing is the application of technology tools to the strategic sourcing process to enable faster cycle times, improved cost performance, and increased competitive advantage by reducing supply redundancies, increasing speed and flexibility, and maximizing the combined organizational benefits of centralization and decentralization. Information is transparent and available in real time internally within the buying organization and with external supply stakeholders[6].

According to several authors[5, 7], e-sourcing involves four sequential processes displayed in Figure 4.4.

The first process consists of identifying company's strategic needs for outsourcing goods and services, and developing an associated ***e-sourcing strategy.*** The second process (see Figure 4) is used to ***evaluate potential***

Figure 4.4 Main E-Sourcing processes

suppliers in terms of their availability and applicability to the established e-sourcing strategy. This process also includes searching and prequalifying suppliers using applicable e-sourcing software and online supplier resources. In the third process, the company ***negotiates and establishes contracts*** with suppliers using Internet-based software and tools. Finally, the fourth sequential process ***provides online supplier relationship management*** (SRM) to maintain supplier relationships and measure supplier performance.

The effective e-sourcing platform[5] is based on utilizing several major core elements of e-sourcing system including:

- ***Negotiation***—providing various negotiation tools like auctioning, RFP, RFQ, RFI, bid-ask, weighted scores, and others.
- ***Collaboration***—incorporating collaborative tools like massaging, net meetings, collaborative workspaces, and portals that enable effective interaction between buyers, sourcing teams, and suppliers.
- ***Project management***—identifying activities, time, and resources for e-sourcing projects; tracking e-souring project completion; and developing ways to optimizing project performance.
- ***Knowledge management***—maintaining a data repository of all product specifications and changes, sourcing activities, and external market information, including part obsolescence and alternatives. Access to such information can help manufacturers avoid faulty product designs and supply shortages, and drive part standardization.
- ***Document management***—utilizing an online exchange of all documents related to sourcing decisions. These documents may include bill of materials information, computer-aided

design drawings and charts, various requisition information, purchase orders, receipts, etc. The e-sourcing system should contain an advance search engine to be able to retrieve quickly required information.

- ***Analytics***—providing quantitative and statistical tools to identify and analyze performance results of various steps of e-sourcing. It may include assessing performance measurements of bidding and auction results, product costing, procurement spend, supplier performance, sourcing optimization, and others.

Most of the companies that implemented e-sourcing strategy employ it to negotiate with existing and new suppliers a wide range of goods. These include MRO materials, standard production parts, raw materials, and IT equipment. The companies also use e-sourcing for custom parts, sub assemblies, and transportation services. In general, any size company (large, medium- and small size corporation) can utilize elements of e-sourcing. However, strong candidates for e-sourcing implementation will be companies that[7]:

- Currently are unable to drive best practice strategic sourcing across all materials and services on a global basis, but may achieve best practices in some sourcing categories and/or geographies.
- Frequently "reinvent the wheel" with respect to their sourcing practices.
- Suspect that their negotiation processes do not succeed in driving total cost of ownership to the lowest possible level.
- Perceive the supplier response process as cumbersome, time consuming and largely non-collaborative.

E-sourcing provides a variety of value-added elements to companies' procurement processes[7]. The utilization of these processes in e-sourcing software ***promotes sourcing best practices***. E-sourcing software applications are based on companies' best practices, which are then made available for use across all product categories. E-sourcing ***extends collaboration on***

sourcing activities. Web-based sourcing applications can be made accessible to all appropriate individuals across departments, business units, and company and geographic boundaries. The latter enhances a company's ability to identify, evaluate, and negotiate with new and foreign sources of supply: E-sourcing ***increases the efficiency of sourcing processes.*** Through online automation, the sourcing process speeds up individual tasks and cuts sourcing cycle time, reduces error rates and mistakes, and improves process flows. E-sourcing ***improves sourcing decisions*** by contributing to the completeness, accuracy, and ability to retrieve and analyze sourcing information. Finally, e-sourcing ***improves the skills of sourcing professionals***. Many e-sourcing applications can be adapted as offline simulation engines by using a company's own historical data to provide a highly relevant training environment.

Overall, e-sourcing utilization in companies has shown to reduce sourcing cycle times by 25 to 50%, cut time-to-market cycles 10 to 15%, reduce on the average materials and sourcing costs by 5 to 15%, and reduce sourcing administration cost by around 60%[5, 7].

Besides the evident advantages, the companies face a number of issues in implementing and using e-sourcing. It remains a fragmented, labor-intensive, and lengthy process for most companies. These companies often base e-sourcing strategies on sending information that is incomplete, imperfect, and may not be used for thorough and accurate analyses. Many firms lack organizational structures or IT infrastructures that sufficiently support the development and standardization of e-sourcing strategies on an enterprise-wide basis. Most companies continue to support a portion of the sourcing process using a disconnected mix of phone calls, faxes, e-mails, snail-mail, and basic spreadsheet applications. These increase the procurement costs and time associated with sourcing.

4.4 Electronic Reverse Auctions

Electronic reverse auction (e-RA) is one of the major models of supply-side e-commerce. A research provided by CAPS[8] showed that percentage of larger firms (over $100 million spend) using electronic e-RAs is at least 35% and probably over 50%. This percentage is lower for smaller firms and service organizations. The amount of spend that goes through

the electronic reverse auction is around 5-10% of a company's total outsourcing expenses. However, some companies are already using e-RAs for more than 25% of the total outsourcing expenses[8]. The efficiency of e-RAs will continue to drive their use in the future.

In electronic reverse auctions, a buyer (buying organization) creates an RFQ and invites potential suppliers to submit bids. Then, using the online auction process, the buyer selects the lowest-price bidder (supplier) to negotiate the purchasing contract.

The e-RA process may be administered from a company's web site or outsourced from an intermediary e-commerce organization. In the first case, the company acquires auction-related software. Then, the company uses this software internally to establish an online site for conducting reverse auctions with suppliers. In the second case, which is more popular with small- and middle-size enterprises (SAME), a company outsources the whole e-RA process from an online provider, who hosts the e-RA.

The bidding process itself may last from half an hour to about an hour. However, the e-RA preparation may take more time usually measured in weeks (sometimes up to 4-6 weeks in a large corporation). A typical e-RA process is presented in Figure 4.5.

It consists of several steps:

1. The buying organization, or simply the buyer, prepares an RFQ with a detailed description of required product(s) and projected prices. In addition, the buyer prepares the e-RA rules identifying the date, time, and auction duration as well as bidding requirements, price visibility, and others.
2. This RFQ and auction rules are sent out to perspective suppliers that may participate in the e-RA bidding. The selection of suppliers may be done through online sources containing an extensive list of prospective suppliers for each category of products and services. The qualified suppliers are companies that can potentially provide

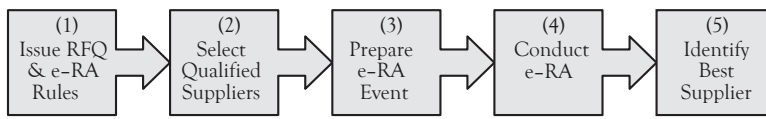

Figure 4.5 Reverse auction process

necessary products with good quality, on-time delivery, and competitive prices.

3. The preparation for e-RA involves several elements. The buyer receives and evaluates the suppliers' proposals in terms of their applicability and prices. According to the price evaluation, the buyer will establish a ***reserve price***, which is a maximum (highest) price that the buyer is willing to pay for the product. The expectations are that during the auction this price will go down from the reserve price. Also, a ***ceiling price*** is defined as a maximum bid a bidder (supplier) can submit during the event. In addition, a range of bidding decrements (an amount by which a bidder can lower it bid at one time) is established. The buyer may provide a testing of the e-RA software, and may train the bidders on how to participate in e-RA and utilize its rules. Finally, the buyer sends to the suppliers the date, time, and duration of e-RA, a link to buyer's e-auction web site, and their user name and password.
4. The buyer conducts e-RA, which usually lasts from one-half to one hour. During the online auction, bids are ranked using the online auction system, and bidders receive instant feedback on their rank. Rank position 1 has the lowest prices of bidding.
5. Upon completion of the auction, a bidder with the lowest price is notified of winning the auction. The buyer may engage the winning supplier in further contract negotiation. Sometimes, the buyer notifies two lowest-price winners, and then tries to negotiate the terms with either one of them, or select the best supplier out of the two alternatives.

Before developing a reverse auction process, a company may need to understand which products can be good candidates for the online reverse auction. In general, is it possible to outsource any product or service through the online e-RA? The answer to this question is "no." The practice of e-RA in a variety of companies enabled to define ***biddable requirements or conditions for conducting successful e-RAs***. One of the main requirements is the need for a ***product/item to be clearly defined*** through its design characteristics, terms, and RFQ specifications. Any vague specification may be interpreted differently

by each perspective supplier, which may influence his or her ability to provide fair price definition. Another important condition is a strong likelihood that ***the current price the buyer pays for a product is sufficiently higher than the market price,*** which makes the e-RA event cost effective. In addition, an important biddable requirement is to ***purchase the product/item(s) in large volumes***, which provides more opportunities for lowering the prices. A critical requirement for conducting a successful e-RA is an existence of ***sufficient number of qualified suppliers that are willing to participate*** in an e-RA. A reverse auction become useless if there is only one or two suppliers that are willing to do bidding online. Finally, one more condition is that the ***switching costs from changing suppliers should be acceptable.*** The winning bidder may not be the current supplier of the product, and thus, the company needs to estimate the cost associated with switching to the new supplier. This cost should not offset the benefits of lowering the purchase price.

Examples of products/services that may be good candidates for online e-RAs are listed below:

- Packaging materials
- Plastic-molded pieces
- Made-to-order printed circuit boards
- Machines and equipment for manufacturing organizations
- Capital equipment for the labs
- Grocery products in large volumes

The value-added offerings in reverse auction may be considered for both parts of e-RA: buyers (buying organizations) and suppliers. Generally, the e-RA environment is somewhat biased to buyers. They originate and conduct e-RAs, and thus expect the online bidding process to reduce the purchase prices, which potentially may be detrimental to suppliers. At the same time, by posting RFQ online, the buyers may reach to the worldwide community of suppliers, and thus, generate a better pool of prospective suppliers. The e-RA process enables price and supplier visibility through the auction process, which provides a buyer with more insights into bidding price levels. The actual online auction process takes

a short time and does not require any paper work. It is a truly paperless environment. In addition, e-RA is a well-documented quality process. In case of any potential disagreements and conflicts, the stored online information can be easily retrieved and presented.

If an online e-RA favors buyers, are there any benefits for suppliers participating in the process? The answer is "yes." Even with somewhat biased approach toward the buyer, suppliers can find several important value-added offerings in e-RA participation. A supplier could gain a customer or customers by winning the online reverse auction. While preparing to and participating in the auction, suppliers may better understand their products' cost structure and how much they can earn by providing lower pricing during the auction bidding. Even if suppliers lost the auction, they can perform a post-event analysis to better understand the reasons they did not win. Suppliers also get constructive feedback from the buyer. All these benefits will help suppliers to improve their products' cost structure and be better prepared for the next e-RA or negotiations with prospective customers.

e-RAs create substantial value and are among the most cost-efficient e-commerce solutions for buyers (customers). According to CAPS Research[8], the price paid through e-RA may be reduced on the average by around 15% as opposed to traditional outsourcing. However, in some companies price reduction through e-RAs may be up to 90%. Value creation in electronic reverse auctions may be also associated with substantial reduction of outsourcing cycle time, which may decrease in RA of up to 90%. In addition, the error reduction due to a better accuracy of outsourcing and bidding records can range from 30 to 90%[8].

Despite benefits, online e-RAs are not free from a variety of drawbacks and problems. They may be potentially expensive, specifically for small- and mid-size companies. A buying organization needs to make sure that the price savings generated through RA would offset auction costs. Any supplier can be potentially a winner in RA, and thus, the role of supplier-customer partnerships may be diminished. This may be detrimental to the company's long-term outsourcing results. In addition, e-RAs focus on price only lowers opportunities to differentiate between suppliers with such intangibles as quality, on-time delivery, and customer service.

e-RAs may also be detrimental to suppliers. If suppliers do not do their "homework" and come unprepared for an online e-RA, the competitive and quick bidding may adversary affect their ability to be profitable. A supplier might win a contract by substantially lowering its price below the supplier cost, which leads later to the ultimate loss of profit. The supplier always needs to know its break-even price, and never let the over-excitement to prevail during the auction bidding process. Another common problem for supplier is security concerns in terms of revealing its price to competition. In addition, as the number of e-RA sites increases, suppliers will not be able to trace all these sites.

One of the ways to reduce the level of problems in online RAs is to apply a more up-to-date way of doing e-RAs through expressive bidding[9]. ***Expressive bidding*** is much like a traditional request for proposal (RFP), but with a twist. The twist is that it allows—and encourages—suppliers to answer an RFP with a variety of possibilities. Suppliers can suggest different specifications, terms, conditions, product and service combinations, and prices. This ultimately creates a deal that is better for both sides. In other words, while a straightforward RFP follows a simple question-and-answer model, expressive bidding creates an opportunity for an open-ended conversation between buyers and suppliers. By moving beyond the "lowest-price-wins," suppliers have the opportunity to present options that are more valuable to the buyers. The difference between reverse auction and expressive bidding are presented in Table 4.2.

Table 4.2 Reverse auction vs. expressive bidding

Reverse auction	Expressive bidding
Main approach-"lowest price wins"	Moves beyond price by encouraging suppliers to bid RFQ/RFP with a variety of possibilities
e-RA is a very constrained process based on RFQ specifications with usually one variable-price.	Suppliers can present more valuable options (options that the buyer may not have even realized existed). For example, suppliers may suggest different specifications, terms, conditions, product and service combinations, and prices
No conversation between buyer and suppliers	Creates an opportunity for an open-ended conversation between buyers and suppliers

The unrestrained savings from expressive bidding can on the average top 30%, which is double that of current best practices in e-RA[9]. However, expressive bidding does contain several major drawbacks:

- It is hard to establish supplier evaluation criteria based upon multiple requirements.
- Sourcing employees need to be properly trained to accept the unconventional supplier selection process.
- High switching cost to expressive bidding including new types of auction technology and software, implementation, training, consulting, etc.

4.5 Electronic Procurement With Catalogs

E-procurement with electronic catalogs is the purposeful activity of purchasing materials and other resources online utilizing electronic catalogs. These catalogs contain products for online purchasing from predetermined suppliers. The catalogs' prices are usually fixed, but discount prices are also available, particularly for larger procurement volumes.

The e-procurement with catalogs system consists of three main groups of online software applications. The ***Ordering*** group includes applications associated with the ***procure-to-pay process,*** i.e., developing product/service requisitions, electronically developing purchase orders (POs) of these product/service requisitions and electronically submitting them to the supplier, and getting back product/service receipts. The next, ***Reporting and Analysis*** group of applications includes electronic payments to suppliers, and also recording and analyzing their performance. Finally, ***Supplier and Catalog Management*** group consists of applications supporting the main process, i.e., supplier management (supplier information, contact personnel, supplier product updates, etc.), supplier scheduling (scheduling supplier shipments and receipts), and catalog content management.

Catalog content management involves developing, updating, and maintaining online purchasing catalogs for the e-procurement processes. This online catalog may be filled with the purchased or outsourced items/services from the company's internal inventory system (a part of the core

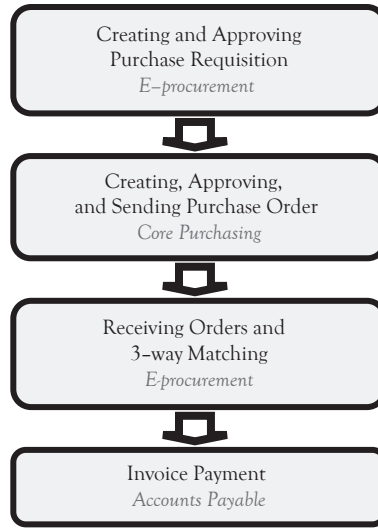

Figure 4.6 Online Procure-to-Pay Process

ERP system), or information from the third-part organizations like MRO (maintenance, repair and operations) or Corporate Express with a number of indirect material items. The online catalog may also include links to the external public catalogs used for direct or indirect purchasing.

The e-procurement with catalogs offers access to a variety of elements in the online e-procurement process. A customer (internal buyer) can initiate the creation of a purchase requisition, search for or select items from the catalog or a supplier web site. The customer can view and respond to PO notifications, identify a requisition status, or simply view the company's latest purchasing news. The customer can also review the company's purchasing policies. The procure-to-pay process consists of the following activities (see Figure 4.6):

- Creating a material/resource requisition. For example, a production department can use the iProcurement system to purchase parts and components for the final assembly, or an accounting department can purchase new desktops for the department.
- Seeking requisition approval (if required by the systems) from a direct supervisor/manager.

- Sending the approved requisition to the purchasing department for final approval and subsequent creation of PO.
- Sending PO to the supplier.
- Receiving supplier confirmation and invoice for payment.
- Receiving requested products/services from the supplier.
- Checking the receipt with PO and invoice for matching (3-way match).
- Paying for the receipt (in accounts payable).

E-procurement with catalog provides a variety of value-added offerings for both buyers (customers) and suppliers. Among the value-added offerings for buyers are:

- The e-procurement system consolidates and standardizes multiple applications of customer purchasing into one integrated system with the same online web site for all customers.
- The system provides paperless purchasing environment.
- Customers can quickly identify and select required materials and services for purchase/ outsourcing.
- The e-procurement web site provides full information on policies and procedures of outsourcing.
- The system facilitates greater empowerment for end users (customers) in terms of doing procurement.
- Supplier performances is closely monitored.
- The e-procurement system provides analysis, tracking, and control of spending (payables).

The value-added benefits for suppliers may be different from those for buyers. For suppliers, they include:

- Sales through additional online channels of selling.
- Expanded market reach worldwide; identifying and building relationship with new buyers worldwide.
- Lowered costs for sales and marketing activities.

- Shortened selling cycle by quickly receiving buyers information.
- Increased ability to monitor buyer information.
- Improved analysis, tracking, and control of receivables.

The value creation (benefits) of e-procurement with electronic catalogs is associated with lowering the procure-to-order cycle time and cost, reducing prices of materials, and lowering maverick purchases. Some quantitative benefits of e-procurement with catalogs are presented in Table 4.3[10, 11].

As any other model, e-procurement with electronic catalog does contain a number of issues. These include the following:

- The buying organizations may have problems or delays in changing the procurement structure or modifying the existing procurement processes to fit e-procurement system.
- The e-procurement software may be expensive for small and mid-size companies, and would require a lengthy implementation process.
- Suppliers may be reluctant to adopt the idea of e-procurement because of the necessity of dealing with more than one marketplace, high training costs associated with switching to e-procurement, turbulence in this new industry, the high risk of compromising sensitive data.

Table 4.3 Value Creation in E-procurement with catalogs

	Traditional/ Manual	***E-procurement with catalogs***
Requisition-to-order cycles	20.4 days	3.8 days
Requisition-to-order cost	$56	$23
Reduction of price of direct and indirect materials and services	—	10–20%
Price savings on maverick purchase brought into compliance	—	7.3%

4.6 Electronic Exchanges

The ***exchange*** model or ***e-tendering*** is built upon the creation of a virtual electronic marketplace, where buyers and sellers can meet together to transact business online. A ***public exchange*** is run by an electronic intermediary company that facilitates electronic transactions between buyers and sellers and remains impartial (does not favor any part). A ***private exchange*** is designed and run by an individual company that invites other buyers and sellers to do online business. A ***consortia exchange*** is created by a group of buyers that opens an electronic (virtual) marketplace and invites potential suppliers to do business online.

An exchange is a many-to-may supply-side e-commerce model. It includes a variety of sellers that provide their supplier catalogs to perspective customers-buyers. Buyers, on the other hand, use the online exchange for sourcing to locate perspective suppliers, sending RFP or RFQ, and then either organize an online auction, use bid-ask systems or direct negotiation with suppliers to identify the best supplier for outsourcing. The fundamental exchange functions are:

- ***Matching*** buyers and sellers in a virtual marketplace
- ***Aggregating*** product/service offerings from sellers
- ***Facilitating*** transactions (seller evaluation, information search, additional services, etc.)

An electronic exchange provides a variety of online software tools to fulfill these functions. Among them: online collaboration between partners, electronic sourcing tools and catalogs, e-RAs, electronic RFQ and RFP, online negotiations, supplier performance analysis, and others. The benefits and issues of electronic exchanges are described in Table 4.4.

4.7 Benefits, Returns, and Future Development

Supply-side E-commerce benefits

The main benefits of the supply-side e-commerce models come from their ability to make procurement order processing more efficient by

Table 4.4 Benefits and issues of electronic exchanges

	Buyer	Seller
Benefits	• Lower transaction costs • Better prices • Increased IT effectiveness • 24/7 ordering from suppliers • Better supply sources • Quantity discounts • Faster deliveries and ease of purchase tracking	• New sales channel and improved marketing • Lower transaction costs • Access to new revenue potential • Increased IT effectiveness • 24/7 selling • Reduced processing errors
Issues	• Unreliable unknown suppliers • Buyer-supplier partnerships may be diminished • Initial investment may be high • Quality of goods and services may be lower • Security concerns	• Increased competition for either prices or value-added services • No long-term relationships with buyers

reducing the order time, lowering number of errors and redundancies in the process, and improving relationships with suppliers. The utilization of supply-side e-commerce process also leads to overall inventory cost reduction, paperless environment, and decrease or complete elimination of maverick buying.

According to a survey results[12] the most important cost categories reduced by implementing supply-side e-commerce appeared to be transactional cost due to paperless environment, 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 supply-side e-commerce implementation. According to the survey respondents, main benefits of implementing supply-side e-commerce solutions were[12]:

- Shorter procurement cycle
- Improved communication and relationships with suppliers
- Better reliability and control of purchase orders
- Reduced inventory level and cost
- Decreased number of intermediaries
- Reduced purchase prices

According to another survey by Aberdeen Group[10], the implementation of supply-side e-commerce models led to the following benefits:

- Reduced off-contract ("maverick") spending by 64%.
- Reduced prices by 7.3% for spend brought back onto contract.
- Reduced requisition-to-order cycles by 66%.
- Reduced requisition-to-order costs by 58%.
- Increased total spend under management of procurement group by 20%.
- Each new dollar brought under management can yield 5% to 20% cost reductions.

Many companies have successfully implemented supply-side e-commerce models. For example, IBM has achieved impressive results in implementing supply-side e-commerce models[13]. The company was able to reduce the order processing time from 30 days to only 1 day. IBM also reduced the level of maverick buying from 30% to less than 2%. At the same time, the contract negotiation time reduced from 6–12 months to only 30 days with a minimum number of six pages per contract. All this enabled to improve satisfaction of internal customers (managers and other employees that were involved in procurement) from 40 to 85%[13].

In general, reduction of material and other costs associated with the supply-side e-commerce models can substantially influence the company's bottom line in terms of profit margin. For example, lets assume that the cost of indirect materials through the implementation of an supply-side e-commerce model, for example e-RA, was reduced by three points from 35% to 32% or 8.6% ((35-32)/35 = 0.086 = 8.6%). Then, the profit margin can increase from the original 6% to 9% (three points up), or 50% ((9-6)/6 = 0.5). Thus, the increase in profit through the more efficient online supply-side e-commerce may be almost 6 times higher than the reduction of costs (50% versus 8.6%).

Return on Investments (ROI)

The ROI analysis of supply-side e-commerce is similar to that of demand-side e-commerce described in previous Chapter 3. However, the main

difference is that the supply-side e-commerce models do not generate profit, but rather reduce costs associated with purchasing/procurement activities. Thus, the main savings will potentially come from reducing a variety of costs like direct and indirect material costs. The financial measurements of supply-side e-commerce are similar to those of other e-commerce models (see explanations in Chapter 2).

The ROI analysis of supply-side e-commerce can be effectively used for planning implementation of a new or redesign of existing supply-side e-commerce system. For example, a company may want to know how quickly they can recover investments in supply-side e-commerce design and development, and how profitable this supply-side e-commerce system may be. Calculations of ROI along with payback, net present value (NPV) of invested money, and internal rate of return (IRR) are presented in Table 4.5.

The ROI analysis is provided for the supply-side e-commerce implementation in 2007, and then its subsequent usage in the three consecutive years, 2008–2010. The data presented in the table are fictitious, and are not taken from a specific company. The initial investments in purchasing the e-procurement software (software license) in 2007 will be $250,000, which may be considered as 21% of the total budget. Using the proportions of the budget elements in Table 4.5, the company can identify other components of the initial investment in e-procurement development. For example, hardware and Internet infrastructure (including hosting) is 29%, which will be $345,238 (250,000/0.21)*0.29) in 2007. In the subsequent years (2008-2010), the hardware cost will be gradually reduced, because the company won't extensively invest in hardware, but will continue paying for hardware maintenance and hosting. The company can identify estimated costs for other budget elements like consulting fees including content development and training (18%), additional staff and customer support (26%), and advertising (6%). The model would "go live" in 2008, then, for the next three years would require additional expenditures in infrastructure maintenance and training, staff and support, and advertising. The total investments in 2007 and expenditures in 2008–2010 are summarized for each year (see Table 4.5).

The ROI analysis is provided for the supply-side e-commerce implementation in 2007, and then its subsequent usage in the three consecutive years, 2008-2010. The data presented in the table are fictitious, and are not

Table 4.5: ROI analysis of supply-side E-Commerce system

	Parameter used in calculations	2007	2008	2009	2010
Investment and costs, $					
Software licensing fees (21% of the total investment)	0.21	250,000			
Hardware and infrastructure including hosting (29% of the total cost)	0.29	345,238	172,619	115,079	86,310
Consulting fees including content development and training (18% of the total cost)	0.18	214,286	214,286	214,286	214,286
Additional staff and customer support (26% of the total cost)	0.26	309,524	309,524	309,524	309,524
Advertising (6% of the total cost)	0.06	71,429	71,429	71,429	71,429
Total investment and costs		1,190,476	767,857	710,317	681,548
Annual outsourcing of materials, $					
Direct materials cost (forecast)			4,600,000	4,370,000	4,151,500
Indirect materials cost (forecast)			5,920,000	5,624,000	5,342,800
Savings, $					
Direct materials cost reduction (10–15% of the direct cost)	0.10		460,000	437,000	415,150
Indirect materials cost reduction (20–25% of the indirect cost)	0.20		1,184,000	1,124,800	1,068,560
Total savings		0	1,644,000	1,561,800	1,483,710

Annual profit, $		-1,190,476	876,143	851,483	802,162
Period, years		3			
Required rate of return, %		5%			
Average income per year, $					843,263
Payback, years					1.4
ROI					71%
Net present value (NPV), $					1,056,384
Internal rate of return (IRR)					51%

taken from a specific company. The initial investments in purchasing the e-procurement software (software license) in 2007 will be $250,000, which may be considered as 21% of the total budget. Using the proportions of the budget elements in Table 6, the company can identify other components of the initial investment in e-procurement development. For example, hardware and Internet infrastructure (including hosting) is 29%, which will be $345,238 (250,000/0.21)*0.29 in 2007. In the subsequent years (2008-2010), the hardware cost will be gradually reduced, because the company won't extensively invest in hardware, but will continue paying for hardware maintenance and hosting. The company can identify estimated costs for other budget elements like consulting fees including content development and training (18%), additional staff and customer support (26%), and advertising (6%). The model would "go live" in 2008, then, for the next three years would require additional expenditures in infrastructure maintenance and training, staff and support, and advertising. The total investments in 2007 and expenditures in 2008-2010 are summarized for each year (see Table 4.5).

The implemented e-procurement system is going to generate in 2008–2010 savings through reduction of direct material costs (we consider this reduction as 10% of direct costs) and indirect material costs (considered as 20% of the indirect cost). The annual income for each year will be a difference between cost savings on one side and investment and costs on the other side in this year. Let's assume that the company is going to analyze this investment decision for a period of three years, and required rate of return will be 5%.

The average income per year of *$843,263* is the average of the annual incomes in 2008-2010. The payback may be calculated as the ratio between initial investments and average annual income:

$$Payback = 1{,}190{,}476/843{,}263 = 1.4 \text{ years.}$$

This number indicated that the initial investments in the e-procurement system would be recovered in about one year and five months.

The ROI in this case will be opposite of the payback, i.e., a ratio between the average annual income and initial investments:

$$ROI = (843{,}263/1{,}190{,}476)*100 = 71\%$$

This number tells that for every dollar invested in the e-commerce business model, the return will be 71 cents. The IRR may be calculated using the Excel function IRR. The IRR number of 51% tells that the investment in the e-commerce model will be 10 times more efficient than just the required rate of return of 5%.

Supply-side E-commerce Software

The e-commerce industry offers a variety of different supply-side e-commerce software and solutions. Approximately 50 to 70 software companies produce supply-side e-commerce applications and systems. These software companies may be grouped into several categories depending on their functionality, level of integration, and software distribution. According to ***software functionality,*** the software may have: (1) a narrow scope of supply-side e-commerce functions, for example RFP/RFQ tools only; (2) a wider scope of functionality like a combination of e-sourcing or e-RA tools; and (3) full supply-side e-commerce functionality that includes e-sourcing, e-RA, e-procurement with catalogs, and electronic exchanges. The ***level of integration*** is defined by stand-alone supply-side e-commerce software packages, and supply-side e-commerce software being a part of an integrated enterprise resource planning (ERP) system. Finally, ***software distribution*** can be done by selling software through the vendor's web site, third party reseller/provider, or as a hosting solution. In the last option, the supply-side e-commerce software is installed and maintained by either the vendor or provider, and the buying organization gets the access to the software functionality via the Internet. Examples of supply-side e-commerce software are presented in Table 4.6.

Future Development

In more than 10 years of evolution, supply-side e-commerce models have become one of the major tools of modern purchasing/procurement systems. From a simple online RFQ or e-RA, supply- side e-commerce has been transformed into more integrated strategic and tactical systems used for a great variety of procurement functions described in this chapter. However today, the information technology, buyers' expectations,

Table 4.6 Examples of popular supply-side E-commerce software

Product/Company	Functionality	Level of Integration	Software Distribution
Ariba	Provides various e-procurement solutions like Procure-to-Pay and Buyer, as well as functional solutions like Travel and Expenses and Contract Compliance	Stand-alone	Sold to the customers via web site or online hosted solution
IBM eProcurement	Contains a wide range of procurement and outsourcing solutions including outsourcing design and personnel	Stand-alone	Mostly sold to the customers via ground distribution or online hosted solution
Oracle iProcurement	Enables a web-based shopping system that allows employees to create, manage, and track their own orders while the purchasing department retains central control	Stand-alone or as an integrated part of the Oracle ERP software	Sold as a part of the integrated Oracle ERP system or as a standalone system. May be also online hosted solution
PurchasingNet	Provides e-procurement and e-payables solutions to financial services, media and publishing, professional services, manufacturing, retail, and other industries	Stand-alone	Sold to the customers via website or as a hosted solution
SAP E-procurement	Execute the operational activities of procurement, including requisitioning, ordering, receiving, and financial settlement. With SAP's Supplier Relationship Management (SRM), the company can integrate catalog-based requisitioning with your traditional procure-to-pay process and gain the benefits of e-procurement without losing your back-end enterprise resource planning processes	Stand-alone or as an integrated part of the SAP ERP software	Sold as a part of the integrated SAP Business Suite or as a standalone system. May be also online hosted solution

and suppliers' capabilities have matured to the point where supply-side e-commerce models require further development for providing more efficient ways of satisfying customer needs in online procurement. Based on several researches and modern practice of supply-side e-commerce[14, 15, and 16], the main directions of modern supply-side e-commerce development can be summarized as following:

- Providing e-procurement with catalogs for direct material procurement as well as for services and other resources in the company, for example, for recruiting employees or procuring information resources.
- Employing ***supply-side e-commerce optimization tools*** used to identify the best utilization of online reverse auction, e-sourcing and e-procurement tools. Optimization is also employed to define the best number of suppliers, procurement spend, and negotiation/approval policies.
- Utilizing ***software as a service (SaaS) technology*** for providing supply-side e-commerce tools and services to the customers according to their demand (on-demand supply-side e-commerce).
- Developing and implementing ***inexpensive supply-side e-commerce solutions for small- and medium-size companies.***

4.8 Chapter 4 Summary: Managerial Aspects of Supply-Side E-Commerce

1. ***Supply-side e-commerce*** or ***e-procurement*** is a growing area of e-commerce models. It provides direct and efficient purchasing process linkages between the requesters (employees) and suppliers, enabled by a new class of internet-networked solutions. Supply-side e-commerce fundamentally restructures the way organizations practice traditional procurement activities in terms of automating and simplifying many buying transactions. These include supplier selection, contact negotiation, price bidding, supplier relations, and others.

2. Supply-side e-commerce, providing direct and efficient procurement linkages between business customers (buyers) and suppliers, is enabled by a group of internet-networked models. ***Many-to-one (company-centric) relationships*** are based on a single buyer's initiative to establish an online procurement site to deal with suppliers. ***Many-to-many relationships*** are organized by several buying organizations (customers) that establish relationships with suppliers via an online exchange.
3. Based on procurement elements and their functionality, there are four main types of supply- side e-commerce (e-procurement) models: e-sourcing, electronic reverse auction (e-RA), e-procurement with electronic catalogs, and electronic exchange (e-tendering).
4. ***E-sourcing*** is the use of Web-based applications, decision-support tools, and associated services to identify, evaluate, negotiate, and configure purchases and supplier relationships that will effectively support supply chain and other business operations. Management of the e-sourcing process involves: (1) ***identifying company's strategic needs*** for outsourcing goods and services; (2) ***evaluating potential suppliers*** using applicable e-sourcing software and online supplier resources; (3) ***negotiating and establishing contracts*** with suppliers using Internet-based software and tools; and (4) ***providing online supplier relationship management*** (SRM) to maintain supplier relationships and measure supplier performance.
5. E-sourcing provides a variety of value-added elements to companies' procurement processes like promoting souring best practices and increasing the efficiency of sourcing processes. Besides the evident advantages, the companies face a number of issues in implementing and using e-sourcing. It remains a fragmented, labor-intensive, and lengthy process for most companies.
6. ***Electronic reverse auction (e-RA)*** is one of the major models of supply-side e-commerce, in which a buyer (buying organization) creates a ***request for quote (RFQ)*** and invites potential suppliers to submit bids. Then, using the online auction process, the buyer selects the lowest-price bidder (supplier) to negotiate the purchasing contract. The e-RA process may be managed from a company's

web site or outsourced from an intermediary e-commerce organization. The bidding process itself may last from half an hour to about an hour. However, the e-RA preparation may take more time usually measured in weeks (sometimes up to 4-6 weeks in a large corporation).

7. Not every product or service can be outsourced through the online e-RA. A company that uses e-RA needs to establish ***biddable requirements for conducting successful e-RAs.*** The main requirements include clear product/item definition, current price is higher than the market price, purchasing in large volumes, and sufficient number of qualified suppliers.
8. e-RAs create substantial value in terms of lowering purchase price, and are among the most cost-efficient e-commerce solutions for buyers (customers). Online e-RAs, however, are not free from a variety of drawbacks. They may be potentially expensive, specifically for small- and mid-size companies. e-RAs focus on price only lowers opportunities to differentiate between suppliers with such intangibles as quality, on-time delivery, and customer service. e-RAs may also be detrimental to suppliers. If suppliers do not do their "homework" and come unprepared for an online e-RA, the competitive and quick bidding may adversary affect their ability to be profitable.
9. ***E-procurement with electronic catalogs*** is the purposeful activity of purchasing materials and other resources online utilizing electronic catalogs. These catalogs contain products for online purchasing from predetermined suppliers. The catalogs' prices are usually fixed, but discount prices are also available, particularly for larger procurement volumes.
10. E-procurement with electronic catalogs consolidates and standardizes multiple applications of purchasing and provides paperless purchasing environment. Customers can quickly identify and select required materials and services for purchase/outsourcing. The e-procurement web site provides full information on policies and procedures of outsourcing. The system facilitates greater empowerment for end users (customers) in terms of doing procurement. Supplier performances are closely monitored and analyzed.

11. Value creation (benefits) of e-procurement with electronic catalogs is associated with lowering the procure-to-order cycle time and cost, reducing prices of materials, and lowering maverick purchase. However, the buying organizations may have problems or delays in changing the procurement structure or modifying the existing procurement processes to fit e-procurement system. The e-procurement software may be expensive for small and mid-size companies and would require a lengthy implementation process.
12. ***Electronic exchange*** is a many-to-may supply-side e-commerce model. It includes a variety of sellers that provide their supplier catalogs to perspective customers, i.e., buyers. Buyers, on the other hand, use the online exchange for sourcing to locate perspective suppliers, and then either organize an online auction, use bid-ask systems, or direct negotiation with suppliers to identify the best supplier for outsourcing. The fundamental exchange functions are: (1) ***matching*** buyers and sellers in a virtual marketplace; (2) ***aggregating*** product/service offerings from sellers; and (3) ***facilitating*** transactions (seller evaluation, information search, additional services, etc.).
13. The ROI analysis of supply-side e-commerce is similar to that of demand-side e-commerce described in Chapter 3. However, the main difference is that the supply-side e-commerce models do not generate profit, but rather reduce costs associated with purchasing/procurement activities. Thus, the main savings will potentially come from reducing a variety of costs like direct and indirect material costs. The financial measurements of supply-side e-commerce like ROI, payback, and IRR are similar to those of other e-commerce models. The ROI analysis of supply-side e-commerce can be effectively used for planning implementation of a new or redesign of existing supply-side e-commerce system.
14. The e-commerce industry offers a variety of different supply-side e-commerce software and solutions. These software companies may be grouped into several categories depending on their functionality (modules like e-sourcing, E-RA, exchanges, etc. used in the software), level of integration (stand-alone or integrated with other applications software), and software distribution (selling software through the web site or hosting it as a service).

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CHAPTER 5

Collaborative Models

Deloitte Consulting conducted a survey of 300 business leaders to identify their companies' results of using e-commerce solutions and, specifically, their intentions to implement and utilize collaborative online solutions[1]. The survey's findings showed that almost 75% of companies considered collaboration as a top executive priority. Companies, which had already linked their business processes with other organizations/partners, were showing 70% higher profitability than those organizations that did not integrate with trading partners. These numbers have jumped by about 20% from a survey of collaborative commerce done less than two years ago. About 33% of large enterprises were conducting pilot programs, and 45% of the surveyed companies were planning for a pilot program in collaborative commerce[1].

The survey findings clearly demonstrated the significance of collaborative commerce as one of the major e-commerce business models. Understanding the management implications of the development and implementation of this model is quite important.

5.1 What is Collaborative Commerce?

Collaborative commerce or ***c-commerce*** is the use of internet-based technologies that enable companies to collaboratively plan, design, develop, and manage products and services through their life cycle. Many companies today establish online collaboration by leveraging their e-commerce technologies in order to facilitate enterprise business processes. Companies participating in collaborative commerce provide new rules of engagement by sharing decisions, capabilities, and information with each other.

Harley Davidson created an e-commerce enterprise portal to provide better collaboration with its suppliers in terms of forecast sharing, standardizing

contract and other documentation, and checking and measuring supplier performance[2]. This is a typical example of collaborative efforts in the supply-side e-commerce realm. However, c-commerce models may also be used for providing collaboration and information sharing between a selling company and its customers. Some demand-side storefronts contain tools for collaborating in real time with customers (e-service collaboration) by answering their direct questions or providing other customer support and service.

In general, companies use the Internet to work collaboratively with suppliers and customers for a variety of processes including: planning and forecasting resources, supply chain management, product design and development, manufacturing, logistics/distribution, and services. Collaboration can be done both externally, i.e., between organizations, and internally or within the divisions of the same organization.

The existing trend of growth and proliferation in online collaboration is based on a driving force (driver) and the enablers of the c-commerce models. They are presented in Figure 5.1.

The ***Driver*** of using c-commerce is simply a set of benefits (value creation) derived through the online collaboration. The c-commerce models may affect all elements of monetary value creation including revenue growth, cost reduction, and asset intensity reduction. The c-commerce model called ***Product Lifecycle Management (PLM)*** can positively influences the product lifecycle value-creation in terms of quicker product introduction (time-to-market), faster recovery of investments, higher returns/profits, and larger market share (see a discussion of PLM in section 5.3 of this chapter).

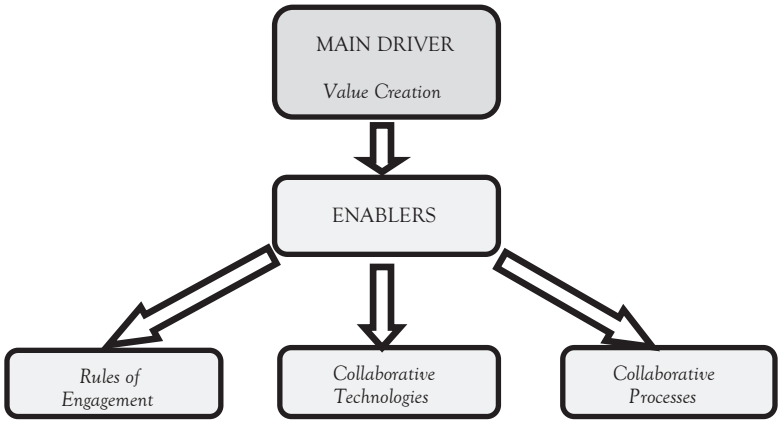

Figure 5.1 C-commerce driver and enablers

The value creation may not be realized without the ***C-commerce Enablers*** including rules of engagement, technologies, and processes. The main ***Rules of Engagement*** in c-commerce are:

- Transferring traditionally disparate data sources related to different organizations into the aligned and linked data sources and linked collaborating partners.
- Establishing common designs and standards for successful linkage and communication between the collaborating partners.
- Providing secure access to the information shared by the collaborating partners. It needs to be clarified that the collaborating participants may not necessarily get access to all online information, but only to the portion that they are associated with or responsible for.

Collaborative technologies provide an essential backbone to successful online collaboration (see Figure 5.1). They are also a part of c-commerce enablers. The collaborative technologies include a variety of e-commerce software and tools required to establish and maintain appropriate collaborative rules of engagement and associated collaborative processes in the Internet-based virtually distributed environment. These software and tools including groupware, collaborative communication tools, and collaborative suites are described in Section 5.6 of this chapter.

Collaborative processes (see Figure 5.1) represent a part of e-commerce enablers that are actually used to deliver collaboration for the business partners. These processes may include:

- Sharing and negotiating forecasting and replenishment between customers and suppliers.
- Collaborative management of documents and database information.
- Managing change in the database records for collaborating partners.
- Internal collaboration of different divisions in an organization.
- Providing online service and support for customers.

We will discuss these and other collaborative processes in the following sections of this chapter. Also, read the case on ***Boeing's Product Lifecycle Management*** (at the end of this chapter) to understand what specific drivers—rules of engagement, technologies, and processes—were used in this company for collaborative development of a new airplane.

5.2 C-Commerce Models

Collaborative models include different industries and business functions. Despite their variety in business and management today, c-commerce models can be clustered into ***four main c-commerce model groups***: collaborative design and development, collaborative planning and execution, collaborative manufacturing, and collaborative service.

The ***Collaborative Design and Development*** model is based on developing strategic Internet-based relationship, communication, and information/data sharing between a company and its partners on new product design and development. Within this model group, the ***Electronic Design (E-design)*** models provide online tools for collaborative design and development of new products through outsourcing from design firms. In this case, a company that designs a new product outsources elements or complete product design to one or several partners, which may be geographically distributed. At the same time, these partners are directly connected through an online collaborative environment to the main customer that integrates the design elements into the new product. The ***Collaborative Product Commerce (CPC)*** models provide online capabilities for design partners to share information, drawings, configuration, change management, and other capabilities used in new product design and development. CPC may include e-design tools as a part of its online collaborative environment. We will discuss CPC in detail in the next section of this chapter. Finally, the ***Product Lifecycle Management (PLM)*** models enable participants to control, share, and manage product-related data online as part of a product's design, development, and improvement efforts through the entire product's life cycle (see section 5.4 of this chapter).

The ***Collaborative Planning and Execution*** model is associated with tactical (usually, shortterm) collaboration with suppliers and customers in

terms of Internet-based coordination of the company's supply chain. This type of collaboration has several applications:

- ***Collaborative Planning, Forecasting, and Replenishment (CPFR)*** is an Internet-based model that enables suppliers and retailers to collaborate on planning and demand forecasting in order to optimize the flow of materials along the supply chain. A CPFR is used, for example, in Wal-Mart, for on-time product and service delivery to the Wal-Mart stores. Business partners—manufacturers, suppliers, distributors—all have real-time access through CPFR to the point-of-sale (POS) order information (see section 5.5 in this chapter).
- The ***E-fulfillment*** models (discussed in Chapter 3) provide customer order information and associated materials information to suppliers in order to speed up the outsourcing process and for quick delivery of final products to customers.

The ***Collaborative Manufacturing*** or ***C-manufacturing*** model involves using online information technology and communication systems

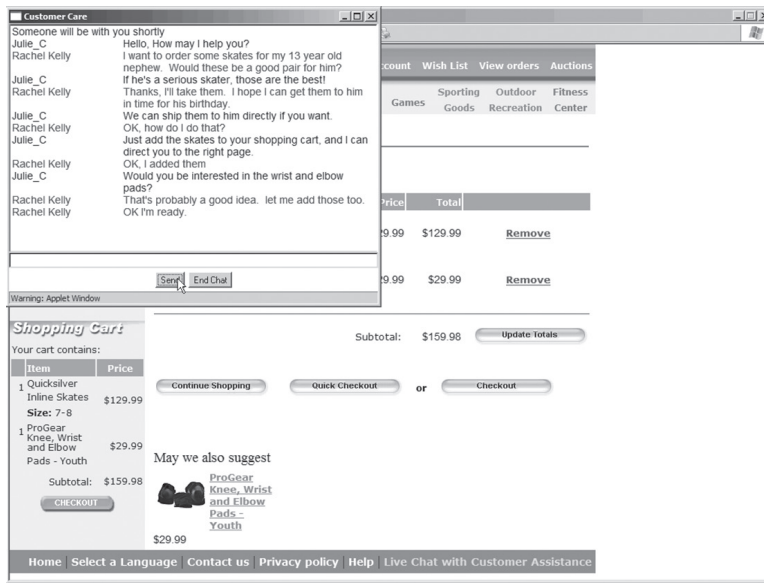

Figure 5.2 Example of C-Service Customer Support

to facilitate sharing of manufacturing expertise, facilities, and resources in order to support an integrated manufacturing environment. Cisco Systems, a leading manufacturer of telecommunication equipment and products (switches, routers, modems, etc.) is a good example of a c-manufacturing company. All of Cisco's production is outsourced through virtual connections with a number of company's suppliers. The company provides an integrated product and process development including customers and suppliers. The established flexible manufacturing system is distributed over networks of cooperating supplier facilities and teamwork among geographically and organizationally distributed teams. In addition, the company implemented a support system for collaboration with business suppliers and customers.

The ***Collaborative Service (C-service)*** model is based on processes for selling, managing, and delivering services and customer support using web-enabled applications. The c-service tools are also used for managing (automating) human resources processes and information in services. The applications of c-service may include customer support in buying products online, service proposal management, service resource allocation and scheduling, project management for service development projects, and even knowledge management online.

An example of c-service customer support is presented in Figure 5.2. It is taken from the IBM's WebSphere C-commerce software tools[3]. A customer wanted to buy a pair of skates online, and, in order to choose the right product, sought help through the online ***Customer Care*** instant messaging tool. Switching to this tool, enabled the customer to have a live chat with a customer care representative who was able to provide service advice for the product selection, prices, complementary products, delivery options, etc. (see Figure 5.2).

5.3 Collaborative Product Commerce

As discussed previously, ***Collaborative Product Commerce (CPC)*** includes the collaborative product design, development, and management over the Internet throughout its lifecycle. This model enables all participants to work together from any geographically distributed location with full data security and control through the role-based workflow. This workflow allows participants to identify their roles in the collaborative efforts and work on their part of the joint projects according to their roles.

CPC is based on a variety of internet-based tools and software. These enable an organization to react more effectively to customers, suppliers, and market dynamics. For example, it may quickly address any change in the original design based on a customer request, and quickly adjust the product to fit this request.

The parameters and elements of CPC have been clearly identified in the article ***Collaborative Product Commerce: Creating Value across the Enterprise***[4]. According to the article, CPC consists of four main elements that are described below.

CPC's ***Document Management and Vaulting*** enables all shared data to be stored in and retrieved from a single repository or ***data vault.*** Figure 5.3 shows that a collaborative repository of data consists of three main blocks: ***bill of materials (BOM)*** with a product development tree, ***computer aided design (CAD)*** graphics files, and ***documents*** with product design and other information. Although elements of product design may be physically separated into different databases (tables), they are logically connected to each other using the concept of a ***relational database***, which makes them work like one integrated data repository. Any new design elements, changes, updates, or modifications are introduced in the integrated data depository and properly filed with respective version numbers and update status.

Internal and external users can check in or modify information of the common data repository based on their assigned privileges and responsibilities (see Figure 5.3). In addition, the data management system allows the internal cross-functional collaboration of marketing, engineering, production, purchasing/procurement and other functional teams as well as external cross-functional collaboration between these teams and external suppliers and customers.

CPC's ***Change Management Tools*** are employed to enable collaborating users and teams to change, modify, and update documents and designated parts in the online product design and development process. These tools are the following:

- ***Electronic Workflow*** is used to automate the routing of changes for approvals. For example, a designer who made some changes in the product design characteristics would be required to send these changes for approval (correction change

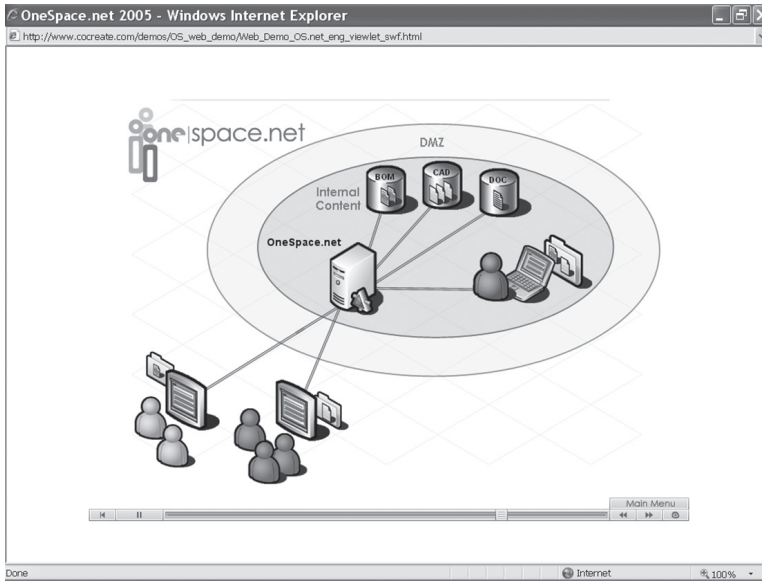

Figure 5.3 Document management and vaulting[5]

request) to the project manager and other collaborating team members working on the product design. Another electronic workflow may include employees seeking approvals for a request for quote (RFQ). This RFQ may be used to find appropriate suppliers. In addition, a workflow may be an engineering change order (ECO) to request changes to an existing product design.

- ***Notification*** is used for letting distributed team members know that an action must be taken for a specific request made by a collaborating team member. In the case of the previous example of the designer who made some product design changes, notification will be sent to all collaborating team members requiring them to review and comment on the proposed changes.
- ***Subscriptions*** connect data objects (drawings, charts, etc.) and documents in the CPC's integrated data depository with specific collaborating users or departments. This association is done according to the users' responsibility and roles in a specific collaborative project.

- ***Visualization*** enables each participant in a collaborating team to view an engineering document or existing document changes.
- ***Red-line Markup*** provides each person or team involved in a collaborative project the capability to add comments to an engineering document.

An example of an online web site with some ***Change Management Tools*** like correction action request, ECO, and RFQ is shown in Figure 5.4.

Product Structure Management enables a structured uniform approach to design and management of a product structure—a sequence and order of materials, parts, and components used to produce a finished product. The product structure is directly associated with a ***Bill of Materials (BOM),*** which is a list of quantities of all subassemblies, intermediate parts and raw materials that go into a finished product. In practice, several functions in an organization, for example engineering, purchasing/procurement, and manufacturing, may establish their versions of the BOM to manage operations within each function. For example, a procurement manager may create a BOM to initiate the ordering of materials, even while a manufacturing engineer is creating a separate BOM to launch the development of prototype tooling. Not surprisingly, this can

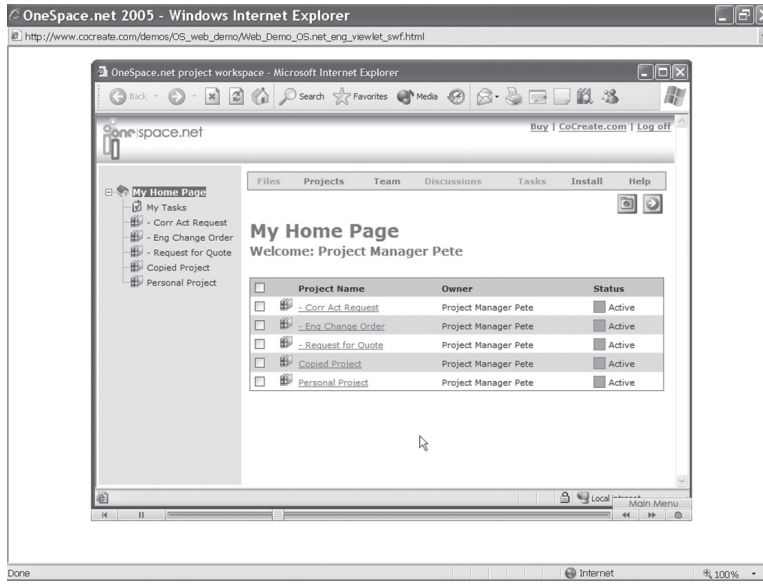

Figure 5.4 CPC's change management tools.[5]

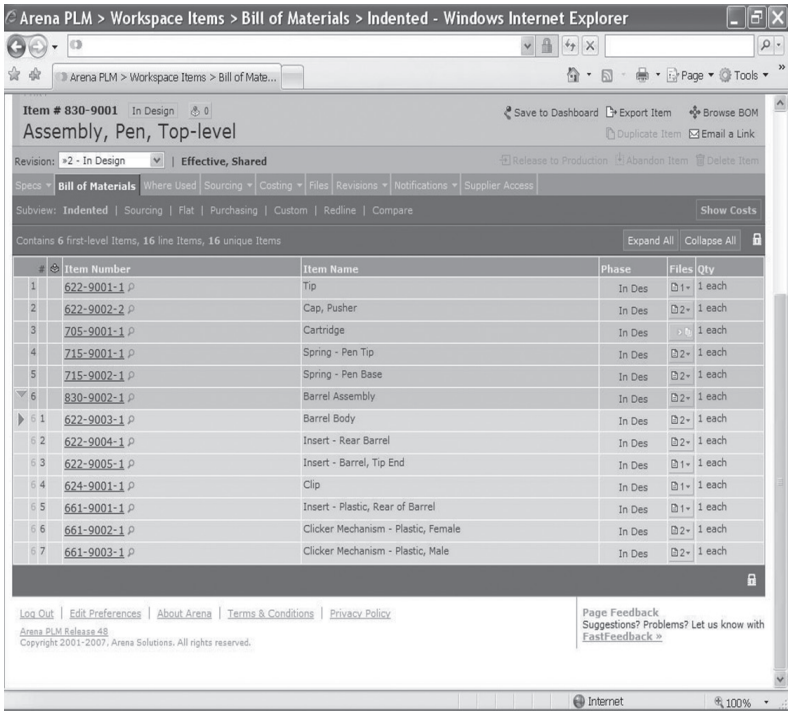

Figure 5.5 Integrated BOM[6]

result in serious problems with accuracy, reconciliation, and version control. It could also result in a significant waste of money and effort. CPC's ***Product Structure Management*** allows several BOMs to be consolidated into one master document and making configuration management easier and substantially more accurate.

An example of an integrated BOM is shown in Figure 5.5. This includes the BOM structure as well as other capabilities associated with the product structure management like sourcing, purchasing, cost accounting, custom modifications, supplier access to the BOM file, and others. Thus, the BOM web site may serve as an integrated BOM environment for managing different functions including engineering, purchasing/procurement, and manufacturing.

Configuration Management creates associations between components and assemblies, and allows customization of products according to specific customer needs. It also mandates the development of a portfolio management strategy focused on the joint development of product and process strategies. CPC addresses the challenge of configuring products

Table 5.1 CPC value-added offerings and value creation

Value-Added Offerings	Value Creation
Integrated environment with one online data repository Collaborative processes that reduce product development cycle and associated costs Establish collaborative processes that improve design quality and customer satisfaction Online cross-functional collaboration Add, modify, and update data online that will be immediately visible to all collaborative elements Real-time collaboration with partners Establish a consolidated product structure document	Lower overall supply chain costs Faster time to market Improved quality of design and reduced level of design errors and defects More satisfied customers Improved management of product design and development

to specific market needs. Essentially, the CPC-based Configuration Management system creates associations between components and assemblies, which help determine the range of permutations that a product can have.

Configuration Management capabilities also help to minimize nonstandard product configurations and help control component proliferation. Configuration Management is particularly powerful when deployed in conjunction with a portfolio management strategy. These are used to:

- Define the approval rules associated with new products.
- Promote standard product configurations that leverage existing product platforms.
- Introduce ways of shortening development times.
- Identify ways of reducing the development cost of derivative products.

The presentation of CPC elements demonstrates the significant capabilities of this c-commerce model. We summarized CPC value-added offerings and potential results (value creation) in Table 5.1.

5.4 Product Lifecycle Management

Product Lifecycle Management (PLM) represents an integrated c-commerce model and software system that enables product management throughout its life cycle from product design and development to

Figure 5.6 PLM and CPC

product "demise" and discontinuation. As an integrated model, PLM is built around the collaboration of product-related information both internally in companies, and with collaborating suppliers and customers. As a software system, PLM includes a variety of software tools and applications used in managing products through their lifecycle. PLM incorporates the previously discussed systems and tools of e-design and collaborative product commerce (see Figure 5.6).

In the words of one of the VPs from Dassault Systèmes, a major PLM vendor, "PLM is really what we call the relational design. It is the fact that each time you make one modification, you are able to propagate the change along the lifecycle of the product and also able to measure the real impact of the change you are making."[7].

PLM as a c-commerce model and software system consists of a number of modules:

- ***Collaborative Product Design*** is a set of c-commerce solutions that enable collaboration for new product design and development (e-design), product configuration and customization, product change management and, finally, integrated product structure and BOMs. All these solutions represent the elements of CPC discussed in the previous sections of this chapter.
- ***Direct Material Sourcing*** solutions include managing input from and communication with suppliers in terms of a new product's parts and components throughout the product lifecycle. These applications may incorporate identifying and negotiating with suppliers (e-sourcing), outsourcing materials through electronic reverse auctions (e-RA), or e-procurement with catalogs (see Chapter 4).

- ***Customer Needs Management*** is a set of c-commerce solutions used to assess customer demand and customer requirements for the new product design, customer service and support. They are based on a ***Customer Relationship Management (CRM)*** module, which includes ***Order Management, Sales Management, Customer Management, Customer Service and Support***, and others. Information obtained from customers will be transferred to other PLM systems, for example, ***Collaborative Product Design*** **and** ***Direct Material Sourcing.***
- ***Product Data Management (PDM)*** may be a separate system of solutions that is concerned with maintaining a logical history and data repository of all product information, including product design requirements, changes, updates, and modifications. These solutions include a ***Product Design and Development Database, Product Structure Management,*** and ***Product Change Management.*** PDM could also be a part of a CPC system.
- ***Product Portfolio Management*** is a system of analytical tools and solutions that optimize and facilitate the decision-making process in collaborative product design, development, and maintenance through the lifecycle. The system includes applications of ***Project Management*** associated with scheduling, budgeting, and controlling new product design and development. The system also provides a variety of tools for analyzing and improving current design and development like ***Business Analytics, Knowledge Management,*** and ***Business Intelligence.*** Finally, the system includes a ***Quality Management*** system used for identifying, controlling, and continuously improving quality during the product lifecycle.

What are the value-added offerings provided by this and other PLM systems to the customers? Why is this system more advantageous and popular today than CPC? Besides the traditional collaborative design (e-design) and product structure and change management used in CPC, PLM provides a completely new environment and set of processes for collaborative commerce. These environment and processes include managing

the entire lifecycle of a product through design, introduction, growth, and demise. PLM is a systems approach that establishes the integration with customers and suppliers in terms of collaborative design, development, maintenance, and improvement of products. PLM additionally provides processes and tools for effective and efficient management of the product lifecycle by incorporating project management, analytical/business intelligence, and quality improvement.

The rising interest in PLM and the resulting increase in the number of PLM systems and software are associated with a significant value creation it offers. In general, companies pursue PLM for revenue/profit growth and faster time-to-market. However, they also seek efficiencies through PLM in areas like faster engineering changes, design cost reduction, and accurate order taking with minimum errors. Figure 5.7 depicts results of a survey, in which managers involved in implementation and utilization of PLM identified important PLM performance measurements[8].

The successful implementation of PLM can lead to the following benefits:

- ***Reduced time to market***—by reducing design errors and by using state-of-the-art capabilities for virtual development and testing.
- ***Lower total development cost***—by cutting non-value added time that highly trained professionals spend chasing down information and through the appropriate reuse of existing parts, assemblies, and tooling.

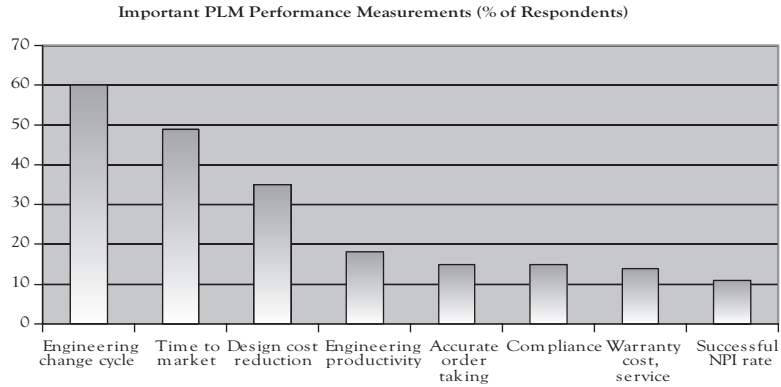

Figure 5.7 Survey results of PLM value creation[8]

- ***Better cost at launch***—by more effectively involving key influencers of product cost, such as manufacturing and suppliers.
- ***More appeal for customers***—by including customer requirements and market performance in product development and improvement processes.
- ***Fewer unexpected and costly surprises***—by providing the visibility that comes from connecting supply chain partners, often in real-time, to change and issue management systems, companies can sharply reduce the number of unexpected delays and cost overruns.
- ***Improved service/service parts profitability***—by including service sooner in the product development and change processes.
- ***Optimized IT spending***—by rationalizing the myriad systems that have evolved to manage specific aspects of the product lifecycle.

Besides the evident benefits, PLM is not free from limitations and problems. Among the most common problems in implementing and using PLM are the following:

- Lack of defined and universally agreed-upon standards
- Technical problems involving integration with the internal systems
- Security and privacy concerns (lack of trust) over who has access to and control of information stored in a partner's database
- Internal and external resistance to information sharing and to new approaches
- Lack of internal skills to conduct collaborative commerce
- Cost of implementing c-commerce software

Examples of popular PLM software companies and their respective products are listed in Table 5.2. The evaluation of these and other PLM companies, and their applicability for specific customer needs may be

Table 5.2 Examples of PLM vendors

Company	Product
Oracle Corporation	Agile PLM Solutions
IBM	IBM PLM Solutions
IFS	IFS PLM
Dassault Systemes	ENOVIA-Collaborative PLM
Arena Solutions	Arena PLM
SAP AG	SAP PLM

found in several sources including online web sites like PLM Evaluation Center, www.plmevaluation.com.

Most of these solutions are being used by large companies involved in new product design and development and PLM. However, many small and mid-size enterprises (SME) also use PLM. The major PLM attraction for SME customers stems from the rapidly growing variety of solutions specifically designed for fast and easy deployment and rapid ROI. Even small, family-run firms find easy justification. One of the common ways of implementing PLM in a small or mid-size company is to utilize PLM-in-a-box—modular prepackaged solutions that target specific PLM type functions and are quick and easy to install. These modular solutions, typically designed to facilitate collaboration and data access, help support business process issues in outsourcing design and development from globally distributed suppliers.

5.5 Collaborative Planning, Forecasting, and Replenishment

Collaborative Planning, Forecasting and Replenishment (CPFR) is a business practice that combines the intelligence of multiple trading partners in the planning and fulfillment of customer demand. CPFR enables all partners in the supply chain to communicate forecasts using information-sharing collaborative applications, ensures the right amount of raw materials from suppliers, and provides on-time delivery of finished goods to the customers. In contrast to PLM, which is predominantly long-term collaboration through the product lifecycle, CPFR is a tactical short-term decision making process. It provides integration of suppliers, producers,

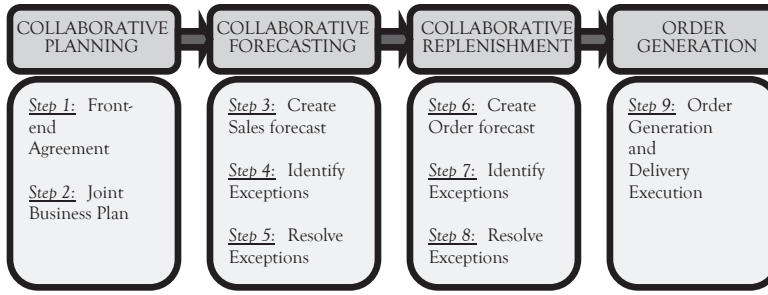

Figure 5.8 CPFR process steps

and customers in a supply chain in terms of tactical planning, forecasting, and replenishment of goods and services.

A core assumption of CPFR is that each organization will enter the details of the joint business plans into their online planning systems, and then share the results on a regular basis as market conditions change and logistical problems occur. Each company may manage thousands of products distributed across thousands of locations, and thus it is not feasible for planners to compare these plans manually and determine which changes are significant. Instead, an online CPFR system exchanges and compares each value using thresholds that planners have set. If changes in one plan or differences between them exceed the threshold, the CPFR system alerts the planner to the problem. Forecast revisions are exchanged on a regular—usually weekly—basis.

Trading partners share their plans for future events, and then use an exception-based process to deal with changes or deviations from plans. By working on issues before they occur, both partners have time to react. A supplier can build inventory well in advance of receiving a promotional order and carry less safety stock at other times. A retailer can alter the product mix to reduce the impact of supply problems. In short, both sides win, and the consumer ultimately benefits from lower prices.

Since the publication of the ***Voluntary Inter-industry Commerce Standards (VICS)*** Association guidelines for CPFR in 1998 and their revision in 2004 (see www.vics.org) as well as ***Universal Code Council (UCC)*** standards, a huge number of companies have implemented the process. One of the first companies to implement CPFR was ***Wal-Mart.*** Other retailers including *Target, Best Buy, Home Depot,* and others followed the retail market leader. Besides the retail industry, CPFR has been

implemented in manufacturing and service companies ranging from high technology home appliance and chemical industries to banks and insurance companies.

The CPFR process is divided into nine steps[9] (see Figure 5.8):

Steps 1–2 ***Collaborative Planning:*** Participating companies identify executive sponsors, agree to confidentiality and dispute resolution processes, develop a scorecard to track key supply chain metrics relative to success criteria, and establish any financial incentives or penalties. These activities are usually done on a yearly basis and are subject to periodic revision. The project teams develop plans for promotions, inventory policy changes, store openings/closings, and product changes for each product category. The plan is usually developed on a quarterly or semi-annual basis.

Steps 3–5 ***Collaborative Forecasting:*** Trading partners share consumer demand forecasts, and identify exceptions that occur when partners' plans do not match, or change dramatically. They resolve exceptions by determining causal factors, adjusting plans where necessary. All these steps are done on a monthly and weekly basis.

Steps 6–8 ***Collaborative Replenishment:*** Based on the established sales forecast, trading partners create and share order forecasts, i.e. replenishment plans for bringing items to stores (in the case of retail collaboration) or other business organizations or customers. Results data (orders, shipments, on-hand inventory) is shared, and forecast accuracy problems, overstock/understock conditions, and execution issues are identified and resolved. All these steps are performed on a weekly or daily basis.

Step 9 ***Order Generation and Delivery Execution:*** The final step in the CPFR process is to generate new purchase orders from customers (retailers), and control their on-time delivery by all trade partners.

Step 1 ensures that each company has an adequate commitment to collaboration, and that all parties are aligned around common goals. The front-end agreement might be reviewed on an annual basis. *Step 2* applies good category management principles to create a joint plan for going to market. This would typically be revised quarterly, or semi-annually. What makes CPFR unique is that this joint business plan is used to control the day-to-day activities of manufacturing, delivering, and selling products. That is where Steps 3–9 come in.

CPFR is a visionary framework for aligning supply and demand across a network of trading partners. However, many companies have found it difficult to implement the full scope of the CPFR model. Most successful projects have focused on just one part of the CPFR model at a time–the one that offers the highest ROI for the particular trading relationship. There are three variations on this "CPFR Lite" approach[9]:

- Manufacturers and retailers in highly promoted channels have zeroed in on collaborative planning to synchronize supply and demand where the volatility (and opportunity for out-of-stocks or overstocks) is greatest. European retailers across many channels have adopted this model.
- Manufacturers and retailers in everyday low price channels who have access to high quality POS forecasts have adapted their demand planning processes to support collaborative forecasting initiatives. Discounters and hypermarkets have primarily adopted this model.
- Manufacturers, retailers and suppliers who have relied on continuous replenishment program processes in the past are evolving to collaborative replenishment initiatives, such as co-managed inventory. Grocery stores have primarily adopted this model.

Based on the CPFR principles and applications, we can now summarize its main value-added offerings. The CPFR system enables the trading partners in the supply chain to use the information-sharing environment, match demand forecast with supply capabilities, provide visibility of customer demand and supplier capacity, and, finally, develop common planning and replenishment forecasts for all members of the supply chain.

Table 5.3 Examples of CPFR vendors

Company	Product
i2 Technologies, Inc.	i2 Supply Chain Collaboration
JDA Software Group, Inc.	Marketplace Collaborative Planner
Logility, Inc.	Voyager Collaborate
SAP AG	SAP Advanced Planner and Optimizer (APO)
Manugistics (Now part of JDA Software Group)	Manugistics NetWORKS Collaborate

The CPFR value creation (benefits) is usually associated with an increase in sales of a product category, reduced store-level inventory, increase in forecast accuracy, better communication with suppliers and customers, and the ability to optimize production and capacity. Numerous case studies of CPFR projects document in-stock percentage improvements from 2–8% for products in stores, accompanied by inventory reductions of 10–40% across the supply chain[10]. For example, CPFR at Nabisco noted over a 50% increase in category sales. Wal-Mart and Sara Lee reported a 14% reduction in store-level inventory with a 32% increase in sales[10].

Examples of popular CPFR software companies are listed in Table 5.3.

5.6 Collaboration-Enabling Software Tools

Besides PLM and CPFR collaborative models, the industry today provides a variety of electronic software tools to facilitate collaboration between business partners. ***Groupware*** is a collaborative software system that integrates work on a single project by several concurrent users at separated workstations. Groupware supports collaboration over the Internet and among groups of people who share a common task or goal; it provides a way for groups to share resources and information.

The groupware systems tools may be divided into three categories depending on the level of collaboration. ***Electronic Communication Tools*** facilitate sharing information by providing a common environment to send and receive information using electronic tools like ***e-mail, faxing,*** and ***voice mail***. These tools also incorporate an ***Online File System*** that allows collaborating on various document and graphics files, their development, changes, and modifications. The system allows collaborating

team members to retrieve and modify file information according to the role in collaboration. Another tool that may be used for collaborative communication is ***Screen-Sharing*** software that enables group members, even in different locations, to work on the same document, which is shown on the PC screen of each participant.

Electronic Conferencing Tools also facilitate the sharing of information, but in a more interactive way. One of these tools is ***Web Conferencing,*** which is conducted on the Internet with as few as two and as many as thousands of people. It allows users to simultaneously view the subject of the conference like documents, graphics, video, etc. Interaction takes place via messaging or a simultaneous phone teleconference. ***Data Conferencing*** is a virtual meeting, in which geographically dispersed groups work on documents together, and can exchange computer files during videoconferences. ***Video/Audio Conferencing (Instant Video)*** is a video chat room that allows users to chat in real time, seeing and hearing each person communicating. Among other electronic conferencing tools are ***Online Discussion Forums,*** and ***Electronic Meeting Systems (EM***)—a conferencing system built into a room.

Collaborative Management Tools facilitate and manage group activities. The ***Group Decision Support System*** is an interactive computer-based system that facilitates the solution of semistructured and unstructured problems by a group of decision makers. The ***Project Management System*** is an online system that schedules, tracks, and charts the steps in a project. The ***Workflow System*** is used for collaborative management of tasks and documents within a knowledge-based business process. Finally, the ***Knowledge Management System*** is associated with collection, organization, management, and sharing of information between collaborating partners.

The groupware market is well represented by a variety of software products. Among the most popular groupware applications are: Microsoft Windows Meeting Place, Microsoft SharePoint, GoToMeeting, Novell GroupWise, WebEx, and Oracle Collaboration Suite on Demand. For example, Oracle Collaboration Suite consists of groupware applications used for:

- ***Content Service***–which is a secure content management solution that extends the value of content by making it

accessible to all workers while reducing business risk and facilitating regulatory compliance

- ***Real-time Collaboration***–an integrated solution for the enterprise. Real-Time Collaboration accelerates business processes by enabling individuals, teams and entire organizations to detect presence and collaborate instantly
- ***Unified Messaging***–a unified inbox for email, calendar, voicemail, faxes, and threaded discussions helps users manage information overload and increase productivity. Enterprise-wide Web and mobile access supports today's diverse work styles and information needs
- ***Workspaces***–a team-based view to track and manage content and communications in the context of the business process. Workspaces provide a single place to capture, organize and view documents, meetings, tasks, email, discussions and announcements related to any project or process.

The main value-added offerings provided by the groupware software are enabling business customers to establish direct business communication/collaboration and access to the information sources (documents, graphs, meetings, etc.). The groupware tools create the environment and processes for online management of distributed team members, knowledge management, sharing of information, and e-training. The groupware tools also establish direct customer relationships and loyalty, and generate sales leads.

The value creation with the groupware applications may be derived from saving time and money by reducing or eliminating travel requirements, shortening product development and sales cycles, and improving the project's productivity. An example of calculating savings from installing a groupware application with web meeting is presented in Table 5.4. In this table, we assumed that only 20% of all meeting participants needed to travel to other company sites. We also assumed that, after the web meeting application is implemented, 40% participants of those who traveled before will still continue to travel, and 60% will use the Internet meeting tool.

The ROI analysis of the web meeting implementation (similar to those done in Chapters 3 and 4) is presented in Table 5.5.

Table 5.4 Web Conference Savings

Conference Costs (Without Web Meeting):	
Number of meeting participants	30
Average meetings per month/per participant	2
Number of participants traveling, %	20%
Cost of travel (average travel of 3 days):	
Hotel ($120/day *3 days)	360
Air fare	550
Per-diem ($60/day*3 days)	180
Car rent ($30/day*3 days)	90
Misc.	100
Total cost per travel, $	1,280
Conference costs per months, $	15,360
Annual conference costs, $	184,320
Conference Cost (After Implementing Web Meeting):	
Proportion of travel remained, %	40%
Annual conference travel costs, $	73,728
Net savings on conference costs, $	110,592

Table 5.5 ROI Analysis of Web Meeting

	2007	2008	2009	2010
Investment and costs, $				
Software licensing fees	7,500			
Hardware and infrastructure (server equipment)	3,500	700	700	700
Installation and consulting fees	3,000			
Additional staff (systems administration)	65,000	65,000	67,500	69,500
Customer support		1,500	1,700	2,000
IT overhead costs (5% of all other costs)		3,360	3,495	3,610
Total investment and costs	79,000	70,560	73,395	75,810
Income and savings, $				
Net savings on conference costs		110,592	110,592	110,592
Savings on admin support (10% of costs)		11,059	11,059	11,059

(*Continued*)

Table 5.5 ROI Analysis of Web Meeting (Continued)

	2007	2008	2009	2010
Total income and savings		121,651	121,651	121,651
Annual profit, $	-79,000	51,091	48,256	45,841
Period, years	3			
Required rate of return, %	5%			
Average income per year, $				**48,396**
Payback, years				**1.6**
ROI, %				**61%**
Net present value (NPV), $				**50,502**
Internal rate of return (IRR), %				**39%**

5.7 Chapter 5 Summary: Managerial Aspects of Collaborative Commerce

1. ***Collaborative commerce*** or ***c-commerce*** is the use of Internet-based technologies that enable companies to collaboratively plan, design, develop, and manage products and services through their life cycle. Many companies today establish online collaboration by leveraging their e-commerce technologies in order to facilitate enterprise business processes. Companies participating in collaborative commerce provide new rules of engagement by sharing decisions, capabilities, and information with each other.
2. The main ***driver*** of using c-commerce is simply a set of benefits (value creation) derived through the online collaboration. The c-commerce models may affect all elements of monetary value creation including revenue growth and cost reduction. The value creation may be realized with the ***c-commerce enablers*** including rules of engagement, collaborative technologies, and collaborative processes.
3. The ***Electronic Design (E-design)*** contains online tools for collaborative design and development of new products through outsourcing from design firms. Using this model, a company that designs a new product outsources elements or complete product design to one or several partners, which may be geographically distributed. These

partners are directly connected through an online collaborative environment to the main customer that integrates the design elements into the new product.

4. The ***Collaborative Product Commerce (CPC)*** models provide online capabilities for design partners to share information, drawings, configuration, change management, and other capabilities used in new product design and development. CPC may include e-design tools as a part of its online collaborative environment. The CPC applications consists of four main elements: ***(1) Document Management and Vaulting*** that enables all shared data to be stored in and retrieved from a single database (data vault); ***(2) Change Management Tools*** that allow collaborating users and teams to change, modify, and update documents and designated parts in the online product design and development process; (***3) Product Structure Management*** that facilitates a structured uniform approach to design and management of a product structure—a sequence and order of materials, parts, and components used to produce a finished product; and ***(4) Configuration Management*** that creates associations between components and assemblies, and allows customization of products according to specific customer needs
5. ***Product Lifecycle Management (PLM)*** represents an integrated c-commerce model and software system that enables product management throughout its life cycle from product design and development to product "demise" and discontinuation. As an integrated model, PLM is built around the collaboration of product-related information both internally in companies, and with collaborating suppliers and customers. As a software system, PLM includes a variety of software tools and applications used in managing products through their lifecycle. PLM incorporates tools of e-design and collaborative product commerce.
6. PLM provides a completely new environment and set of processes for collaborative commerce. These environment and processes include managing the entire lifecycle of a product through design, introduction, growth, and demise. PLM is a systems approach that establishes the integration with customers and suppliers in terms of collaborative design, development, maintenance, and improvement

of products. PLM additionally provides processes and tools for effective and efficient management of the product lifecycle by incorporating project management, analytical/business intelligence, and quality improvement.

7. The rising interest in PLM and the resulting increase in the number of PLM systems are associated with a significant value creation it offers. In general, companies pursue PLM for revenue/profit growth and faster time-to-market. However, they also seek efficiencies through PLM in areas like faster engineering changes, design cost reduction, and accurate order taking with minimum errors.
8. ***Collaborative Planning, Forecasting and Replenishment (CPFR)*** is a business practice that enables all partners in the supply chain to communicate forecasts using information-sharing online collaborative applications. It ensures the right amount of raw materials from suppliers and provides on-time delivery of finished goods to the customers. In contrast to PLM, which is predominantly long-term collaboration through the product lifecycle, CPFR is a tactical short-term decision making process. It provides integration of suppliers, producers, and customers in a supply chain in terms of tactical planning, forecasting, and replenishment of goods and services.
9. The CPFR value creation (benefits) is usually associated with an increase in sales of a product category, reduced store-level inventory, increase in forecast accuracy, better communication with suppliers and customers, and the ability to optimize production and capacity.
10. ***Groupware*** is a collaborative software system that integrates work on a single project by several concurrent users at separated workstations. Groupware supports collaboration over the Internet and among groups of people who share a common task or goal; it provides a way for groups to share resources and information. The groupware market is well represented by a variety of software products including popular applications like Microsoft Windows Meeting Place, Microsoft SharePoint, GoToMeeting, Novell GroupWise, WebEx, and Oracle Collaboration Suite on Demand.
11. The groupware applications enable business customers to establish direct business communication/collaboration and access to the information sources (documents, graphs, meetings, etc.). The groupware

tools create the environment and processes for online management of distributed team members, knowledge management, sharing of information, and e-training. The groupware tools also establish direct customer relationships and loyalty, and generate sales leads. The value creation with the groupware applications may be derived from saving time and money by reducing or eliminating travel requirements, shortening product development and sales cycles, and improving the project's productivity.

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Business Models for E-Commerce

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BUSINESS EXPERT PRESS

cognella academic publishing
www.cognella.com 800-200-3908

e-ISBN 978-1-63157-208-1

9 781631 572081 90000