LOVELY PROFESSIONAL UNIVERSITY

E-COMMERCE AND E-BUSINESS

Edited By

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SYLLABUS

E-Commerce and E-Business

Objectives: The Objective of this Course is to equip the student with the necessary skills required to view knowledge as the industrial revolution and to provide glimpses of worldwide development.

S. No.	Description
1.	***Introduction to E-Commerce and E-Business:*** Meaning & Concept, E-Commerce vs. Traditional Commerce, Media Convergence Business applications & Need for E-Commerce, E-Business. Basics of E-Commerce: Network and electronic transactions today.
2.	***The Internet environment for E- Commerce:*** B2B, B2C transactions, providers and vendors.
3.	***Electronic Data Interchange to E-Commerce:*** EDI, UN/EDIFACT Standard.
4.	***The Internet & Extranet for E-Commerce:*** Identification & Tracking tools for E-Commerce, Overview of Internet Bandwidth & Technology Issues.
5.	***Security Framework:*** Security Concerns, Security Solutions – Symmetric & Asymmetric Cryptosystems, Digital Signatures, PKCS, Protocol for Secure messaging, key management, X.509 Certificates, SET protocols, E-Cash over the Internet.
6.	***Business Process Reengineering:*** BPR Approach, Strategic Alignment Model, BPR methodology, Rapid Re Methodology & PRLC.
7.	***Legal issues:*** Paper Document vs. Electronic Document, technology for authenticating electronic document, Laws for E-Commerce, EDI interchange agreement, Legal issues for internet Commerce, Cyber Security, Cyber Crimes.
8.	***Management of Change:*** E-commerce in India.
9.	***Case Study:*** Designing and building E-Commerce web site. Managing Products, Database, Shopping cart applications, Integrating mobile E-Commerce, Payment Gateways, Tracking Orders. Eg: Amazon.com, eBay.com.
10.	***Computer Emergency Response Team:*** CERT in objectives, functions, role, CERT – In Activities.

Unit 1: Introduction to E-Commerce and E-Business

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Objectives

Introduction

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1.1.1 Evolution of E-Commerce

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Objectives

After studying this unit, you will be able to:

- Define e-commerce and e-Business
- Compare e-commerce with traditional commerce
- Understand media convergence
- Explain the business applications of e-commerce
- Discuss the need for e-commerce and e-Business
- Describe the basics of e-commerce: network and electronic transaction today

Introduction

Commerce includes purchase, sale, and exchange of commodities. Therefore, it can be defined as an exchange of commodities or all activities involved in transferring goods from producers to consumers. Commerce has been a major part of human lives since the beginning of history. The implementation of the Internet has created a paradigm shift in the way businesses are conducted today. The past decade has witnessed the emergence of a new kind of commerce known as e-commerce.

According to the European Union's Web site, e-commerce is a concept dealing with any form of business transaction or information exchange executed using Information and Communication Technology (ICT), between companies, companies and their customers, or companies and public administrations.

According to IBM's Web site, e-Business is defined as the concept of transforming key business activities through the use of internet technologies.

1.1 E-Commerce and E-Business

Let us first understand the terms e-commerce and e-Business. Electronic commerce, also termed as e-commerce, is a process of buying and selling of goods or services using electronic systems. These electronic systems can either be the Internet or other computer networks. The World Wide Web plays a major role in the implementation of e-commerce in most of the organizations.

Did you know? J.P. Morgan annual forecast report estimates the value of global e-commerce in 2010 at $680 billion worldwide and up to 18.9% in the form of revenue. E-Commerce in the U.S. is expected to increase to $187 billion at 13.2%. J.P. Morgan predicts that global e-commerce revenue will increase to $963 billion by 2013.

Some use the terms e-commerce and e-Business in an interchangeable manner, but these terms refer to different concepts. The concept where ICT is used in buying and selling of goods or services between organizations and in Business-to-Consumer (B2C) transactions is known as e-commerce. On the other hand, the concept where ICT is used to enhance the key business processes through the facilities available on the Internet is known as e-Business. It comprises of any process by which an organization conducts business over a computer network.

The three main processes enhanced in e-Business are:

1. Production processes, which include:
   - (a) Procurement
   - (b) Ordering and replenishment of stocks
   - (c) Processing of payments
   - (d) Electronic links with suppliers
   - (e) Production control processes
2. Customer-focused processes, which include:
   - (a) Promotional and marketing efforts
   - (b) Selling over the Internet
   - (c) Processing of customers' purchase orders and payments
   - (d) Customer support
3. Internal management processes, which include:
   - (a) Employee services
   - (b) Employee training
   - (c) Internal information-sharing
   - (d) Video conferencing
   - (e) Recruiting

E-Commerce generally meets the needs of an organization, retailers and consumers to reduce the costs. It also considers the quality of service and delivery of goods.

1.1.1 Evolution of E-Commerce

A combination of technological innovation and regulatory reform has helped in the evolution of e-commerce. In the early 1970s, e-commerce applications were first developed with innovations like Electronic Funds Transfer (EFT) to electronically transfer funds from one organization to another. However, these applications were used in only a few corporations, financial institutions and other

businesses. Later, Electronic Data Interchange (EDI) was introduced to electronically transfer documents which extended electronic transfers from financial transactions to other types of transaction processing.

E-Commerce of today started with the launch of the World Wide Web (WWW) and browsers in the early 1990s. The relaxation of government restrictions in the telecommunications sector and innovations have helped in the rapid growth of e-commerce. As a result, the barriers to enter and engage in e-commerce have fallen rapidly. The important milestones in the evolution of e-commerce are:

1. Internet/APRAnet emerged in 1969
2. WWW and HTML were invented at CERN in 1989
3. NSF increased the restrictions on commercial use of the Internet in 1991
4. Mosaic browser was invented at the University of Illinois and released to the public in 1993
5. Netscape released the Navigator browser in 1994
6. Dell, Cisco, Amazon.com and others began to use the Internet aggressively for commercial transactions in 1995

Task

Search on Web and prepare a report on the latest developments in e-commerce and e-Business which occurred after the year 2000.

1.1.2 Factors Fueling E-Commerce

The three major factors fueling e-commerce are economic factors, marketing and customer interaction factors, and technology factors particularly multimedia convergence.

1. ***Economic Factors:*** Economic efficiency is one of the most apparent benefits of e-commerce. It can be achieved by decreasing communications costs, faster and more economic electronic transactions with suppliers, lower global information sharing and advertising costs, and cheaper customer service alternatives.

   Economic integration can be either internal or external:

   (a) Internal integration pertains to the electronic communication between various departments, and the networking of business operations and processes within an organization. It helps to store critical business information in digital form that can be recovered immediately and transmitted electronically. A corporate intranet is the best example of internal integration.

   (b) External integration is the electronic communication between corporations, suppliers, customers or clients, and contractors in a virtual networking environment with the Internet as medium.

Did you know? Procter and Gamble, IBM, Nestlé, and Intel are some of the companies with corporate intranets.

2. ***Market and Customer Interaction Factors:*** Organizations are encouraged to use e-commerce in product promotion and marketing to capture international markets. Similarly, the Internet is used as a medium for improving customer service and support. The Internet also helps companies to provide their target consumers with more detailed product and service information.

Example: The best example of successful use of the Internet for enhanced customer service and support is Brazil's Submarino. It is the first largest company to sell books, CDs, video cassettes, DVDs, toys, electronic and computer products in Argentina, Mexico, Spain, and Portugal despite being a local Sao Paulo B2C e-commerce company in Brazil. Submarino has enhanced its customer service to offer logistical and technological infrastructure to other retailers including experience and expertise in credit analysis, tracking orders and product comparison systems.

3. ***Technology Factors:*** The key factor in the growth of e-commerce is the development of ICT. Technology has played a very important role in digitizing content, compression and promotion of open systems for the convergence of communication services into one single platform. This has led to the setup of separate networks for cable television, television broadcast, telephone services, and eliminated the need for Internet access. From the perspective of organizations, having only one information provider implies lower communications costs.

   In addition, technology convergence has helped to achieve the principles of universal access. At present, the costs involved in installing telephone landlines in rural areas has a negative impact on telecommunication companies. Revenues from installing landlines can be more attractive if the landlines include cable TV and the Internet charges, instead of limiting to local and long distance telephone charges. This implementation will help the government in minimizing the cost of installing expensive landlines and providing access to information at a low cost to those in rural areas.

1.2 Comparison of E-Commerce with Traditional Commerce

In spite of the fact that the goals and objectives of both e-commerce and traditional commerce are the same, they can be differentiated based on their business processes. The Web and telecommunication technologies play a major role in e-commerce. In e-commerce there may be no physical store, and in most cases the buyer and seller do not see each other.

In most of the cases, traditional commerce activities are used in business processes very efficiently and these processes do not need improvement with the help of technology. It is very difficult to sell using e-commerce when buyers wish to touch, smell, or examine the products.

Example: Customers might be unwilling to buy high fashion clothing or food products if they cannot examine the products closely before agreeing to purchase them.

On the other hand, retail merchants engaged in traditional commerce have years of experience in creating a store environment that helps to convince a customer to buy. Sales people can develop skills that allow them to identify customer needs, and find products and services that meet those needs. Therefore, the art of personal selling and merchandizing is difficult to practice over electronic medium. Branded products like books or CDs can be effortlessly sold through e-commerce as one copy of a new book or CD is identical to other copies. The advantage of e-commerce over traditional commerce is the ability of a Web site to offer a wider selection of products and services and the facility to browse.

Table 1.1 depicts some examples of business processes that suit e-commerce and traditional commerce respectively.

Table 1.1: Comparison of E-Commerce and Traditional Commerce Based on Business Processes

Electronic commerce	Traditional commerce
Sale/purchase of books or CDs	Sale/purchase of high fashion clothing
Online delivery of software	Sale/purchase of perishable food products
Advertising and promotion of travel services	Small denomination transactions
Online tracking of shipments	Sale of expensive jewelry and antiques

Table 1.2 compares and contrasts traditional commerce and e-commerce. However, it is essential to know that currently many companies are functioning with a mix of traditional commerce and e-commerce.

Example: Gap, Toys-R-Us, Walmart, and Sears are some of the companies that are operating with a mix of traditional commerce and e-commerce.

Table 1.2: Comparison of Traditional Commerce and E-Commerce Based on Activity

Activity	Traditional commerce	E- commerce
Product information	Magazines, flyers	Web sites, online catalogs
Business communications	Regular mail, phone	E-mail
Check product availability	Phone, fax and letter	E-mail, Web sites, and extranets
Order generation	Printed forms	E-mail, Web sites
Product acknowledgements	Phone, fax	E-mail, Web sites, and EDI
Invoice generation	Printed forms	Web sites

1.3 Media Convergence

The electronic marketplace is turning into a reality as many companies are using their resources and talents through mergers with other companies. The term E-Commerce is now irreversibly linked with the idea of convergence of companies centered on information like content, storage, networks, business applications, and consumer devices.

Convergence means merging of consumer electronics, publishing, television, computers, and telecommunications for the purpose of enabling new forms of information-based commerce. The concept may be confusing for the public as the popular press uses the terms multimedia and cross-media interchangeably. Multimedia convergence refers to the conversion of data, voice, text, image, graphics, and full-motion video into digital content. Cross-media convergence applies to the integration of various industries, such as, entertainment, publication, and communication media based on multimedia content. The two types of convergence are closely related to each other.

Example: In the new era of interactive television, the lines between advertisements, entertainment, education, and services often become blurred. While watching a World Cup cricket match between India and Australia, you may develop an urge to know more about Australia. Instead of running to the local bookstore and purchasing a book, you can connect to an online database and search while not missing any part of the match. The information in these online databases is not limited to text but also provides photographs and digital videos (multimedia).

In other words, convergence requires removing the barriers between telecommunications, broadcasting, computing, movies, electronic games, and publishing industries to facilitate interoperability.

Simple technological improvements driving the phenomenon of convergence are as follows:

1. ***Convergence of Content:*** This helps to translate all types of information content, such as, books, business documents, videos, movies, and music into digital information. Once the content is converted into digital form, that information can easily be searched, encrypted, duplicated, and transmitted which suits today's information processing systems.
2. ***Convergence of Transmission:*** This helps to compress and store digitized information so that it can be transmitted through existing phone and cable wiring. New techniques and other technological discoveries modify all types of information. Here, we can notice the convergence of communication systems that provide a medium to transmit voice, data image, and video without rewiring the neighborhood.
3. ***Convergence of Information:*** Some of the information access devices can function as both computers and televisions. For example, a telephone with internal fax machine, modem, and video monitor is capable of receiving fax, e-mail, and video.

Convergence is also being driven by certain market conditions including the following:

1. The availability of low-cost, high-performance enabling component technologies, such as, semiconductors, storage and display devices, communications systems, and operating systems.
2. Entrepreneurs' expectation of end-user demand for new applications—both products and services that rely on the above mentioned enabling technologies.
3. The regulatory actions that are creating competition in monopoly markets, such as, local and long-distance communications, telecommunication and cable equipment, and facilitating the rapid deployment of the new applications.

1.4 Business Application of E-Commerce

There are a variety of e-commerce applications that are constantly affecting the trends and prospects of a business. The primary applications of e-commerce are Business-to-Consumer (B2C), Business-to-Business (B2B), Consumer-to-Consumer (C2C), and Consumer-to-Business (C2B).

Notes

Other Applications of E-Commerce

1. Business-to-Employee (B2E)
2. Government-to-Government (G2G)
3. Government-to-Employee (G2E)
4. Government-to-Business (G2B)
5. Business-to- Government (B2G)
6. Government-to-Citizen (G2C)
7. Citizen-to-Government (C2G)

1.4.1 Anatomy of E-Commerce Applications

Nowadays, effective interactions are happening between businessmen and customers with the help of the Internet. People are comfortable with online buying and selling of products because of the ease with which things get done. The Web sites pertaining to online buying and selling are gaining popularity because of rapidly advancing technology.

E-Commerce applications mainly comprise of multimedia content and multimedia storage servers. It also includes information delivery system, a device that functions as an interface for various e-commerce applications and network service providers that serve as access points.

Multimedia Content for E-Commerce Applications

Multimedia content is believed to be the backbone of electronic commerce applications. Multimedia is defined as the use of digital data in more than one format, such as, the combination of text, audio, video, and graphics in a computer file or document.

Multimedia reflects the natural communication of people. It aims to combine the interactivity of a user-friendly interface with multiple forms of content. Multimedia is linked with hardware convergence happening in the telecommunication, computer, and cable industry. This is because the next generation of digital, interactive home entertainment is approaching technical completion. From this perspective, multimedia refers to the combination of computers, television, and telephone technology in a single device.

Multimedia systems are oriented towards numeric processing; hence they are considered much more accurate than conventional database systems. Business professionals agree that more than 90% of the information that companies use for business operations and decision making exists outside the traditional database systems. This external information is crucial for smooth organizational functioning. External information is in the form of technical manuals, memos, e-mail, problem reports, sales brochures, and product design.

Most business systems use only a portion of the information and communication found in the workplace. Therefore, the aim of multimedia is to increase the usefulness of all information through the processing and distribution of new forms like images, audio, and video.

The traditional, separate business divisions no longer function in the world of multimedia. In other words, every form of information is interrelated to other forms. However, the access to multimedia information relies on the hardware capabilities of the customer. For many years, capability of the computer hardware was well ahead of the requirements of software applications available to run on it.

Example: An electronic book includes photographs, animation, voice, video clips, and a host of other things.

The key elements for the success of e-commerce applications are innovativeness and diversity of multimedia packaging and content. The current providers of multimedia information are profited by broadcasting television productions, traditional print publications, and software and information services. These information providers are supported by a group of small companies or individuals producing content, such as, developing software programs, creating videos, writing articles, and other entrepreneurial activities. However, there are plenty of opportunities for new providers who can offer innovative content that meets consumer requirements which are not being fulfilled by existing providers.

Task

Find the latest technology available for e-commerce and e-Business.

Multimedia Storage Servers

The latest advancement that has happened in the field of communication and technology has made it possible and economical to access a variety of information sources such as, books, magazines, pictures, video clips, and scientific data on the Internet. In order to give such services, multimedia storage servers that are connected to customer sites should be provided with high-speed networks.

Due to some features of digital audio and video, considerable variation has been implemented to the design of multimedia services. The features are:

1. ***Instantaneous Storage and Retrieval:*** Audio and video media are also referred to as "Continuous" Media (CM), since they consist of a string of media quanta. Media quanta like video frames or audio samples communicate the meaning only when accessed continuously in time. Moreover, some media constituents whose playback is temporally coordinated are usually included in a multimedia object.
2. ***Large Data Transfer Rate and Storage Space Necessity:*** The playback of digital video and audio transfer data is at a very high speed. Hence, a useful mechanism has to be provided by multimedia service for storing, recovering, and controlling data in vast quantities at high rates.

The design phase of such multimedia services includes some critical components. They are:

1. Multimedia storage servers that help in supporting constant revival of media information from the storage subsystem.
2. Network subsystems that assure synchronous and proper delivery of media information to the display sites.
3. Images, text, audio, and video are some of the multimedia objects. These multimedia objects can be accessed with the help of multimedia storage servers. There is a difference in the design of such servers as compared to the usual servers. This is because of:
   (a) Real-time storage and retrieval needs.
   (b) Huge storage space and data transfer rate requirements of digital multimedia.

Advancement in the field of communication and technology results in the growth of various multimedia applications.

Example: Interactive multiplayer games, distance education and online virtual worlds are some of the kinds of multimedia applications.

The two main differences when compared to the usual applications are:

1. Multimedia applications provide storage, transmission, and processing of heterogeneous data types, such as, text, image, audio, and video. The size, data rate, real-time requirements of these heterogeneous data can be varied.
2. These applications require diverse performance requirements than conventional applications. For instance, requirements concerning timeliness on the networks and operating systems.

E-Commerce Applications

It is a must for e-commerce applications to have certain capabilities to handle the activities involved in a business. Accepting and managing payments, managing the checkout pipeline, and choosing, collecting and distributing products to customers are some of the capabilities required. E-Commerce applications are also used by companies to improve the online experience of customers and hence boost customer traffic.

Did you know? IBM does business with more than 12,000 suppliers over the Web around the world. IBM uses the Internet and Web technologies as its transaction-processing network, such as, sending purchase orders, receiving invoices, and paying suppliers.

Electronic Payment Systems (EPS)

The method of financial exchange that takes place between buyers and sellers in an online transaction with the aid of digital financial instruments is termed as EPS. These digital financial instruments can be encrypted credit card numbers, electronic checks, or digital cash backed by a bank, an intermediary, or by legal tender.

EPS has a lot to do with billing and payment which are considered as the final activities in any sales transactions. It is a key element in the closure of an e-commerce cycle. The growth of e-commerce in developing countries is affected adversely because of the weak electronic payment systems. Due to the several legal and business issues that exist in these countries, entrepreneurs are not able to receive credit card payments over the Internet. Transaction security is the major concern here.

Notes

Factors to be Considered for an E-Commerce Web site

There are four factors to be considered before having a Web presence for your business.

They are:

1. Content development
2. Research analysis
3. Strategy planning
4. Branding

Task

Search the Internet and discuss how the four factors, such as, content development, research analysis, branding, and strategy planning affect the development of an e-commerce Web site.

Anatomy of an E-Commerce Web Site

E-Commerce Web sites help considerably to foster online business. The main aim of such Web sites is to convert the user to a potential customer. Your Web site must be attractive enough with lots of useful content and products in order to be noticed by various search engines and customers.

An e-commerce site must have some important elements, they are:

1. ***Online Product Catalog:*** This is the place where information about the products is stored and handled.
2. ***Shopping Cart:*** This is an interface that customers apply to pick the products of their choice. It provides necessary information about the product that customers want to buy. It also supports the customers with the checkout process.
3. ***Checkout System:*** This is a method which collects required payment details from the customer. These payment details include shipping and billing addresses, credit card details, or other payment mechanism details. It also presents shipping rates, taxes, vouchers, or estimates other variations to reach at the final cost.
4. ***Payment Gateway:*** This is a service with the help of which payment and credit card details can be sent from the Web site to a merchant account. The account needs to be assigned by a bank or financial organization that deals with online transactions. Payment gateway is a highly protected service. It is also responsible to handle and resolve any feedback or complaints received from the

bank. For example, payment gateway service should handle issues like inadequate funds for customer or the usage of invalid credit card.

5. ***Merchant Account:*** This is considered to be a special bank account. With the help of merchant account, online payments can be done by the Web sites using credit or debit cards. The banks that provide merchant account facility charge fees per transaction and also for transaction types.

1.4.2 E-Commerce Consumer Applications

The global consumer marketplace is spreading at a fast rate, but with its own problems. Consumer applications such as, online stores and electronic shopping malls are fast emerging but access is still inadequate in many cases. Many of the systems are not consumer friendly or well integrated. For example, it may be feasible to browse the site of an e-store via the Web, but there may be no directories or catalogs to search for the specific address of the store. Such lack of integration forces the consumer to spend more time searching for stores and online information. There is no standardization of electronic payment methods on the Web and the security of online payment still remains a major concern. These basic issues need to be resolved.

Some fundamental business issues must be addressed before consumer-oriented e-commerce can become widespread. These are:

1. Establishment of standard business processes for buying and selling products and services in electronic markets
2. Standardization of protocols for order-taking, online payments and service delivery
3. Development of privacy and security methods for secure transactions

In other words, to make consumer-oriented e-commerce more effective, we need to understand the components of the business process, the technology and the integration of the two.

Table 1.3 shows the classification of consumer-oriented e-commerce applications.

Table 1.3: Classification of Consumer-Oriented E-Commerce Applications

Consumer services	Complementary multimedia services
Entertainment	Movies on Demand, video cataloging, interactive ads, multi user games
Financial services	Home banking, financial services, financial news
Essential services	Home shopping, electronic cataloging, telemedicine
Education and training	Interactive education, distance learning
Information	Online databases, directories.

1.4.3 E-Commerce Organization Applications

Organizations implement technology to save money and improve their profit margins. Organizations do not buy information and communications technology simply because it is new or because it is interesting to the employees.

Following are the various organizational applications of e-commerce:

1. ***Adapting to a Changing Business Environment:*** As there is a rapid change in the business environment, the consumers and businesses are looking for flexibility to change trading partners,

carriers, platforms, and networks. Many firms are considering both internal and external factors of an organization when shaping their business strategies. The main focus of an organization is to set up private electronic connections with consumer, suppliers, competitors, distributors, and industry groups. This in turn helps to increase the efficiency of business communications, to expand market share, and to maintain long-term position in today's business environment.

2. ***Marketing and E-Commerce:*** Electronic commerce is forcing companies to rethink their existing ways of doing target marketing (isolating and focusing on a segment of the population), relationship marketing (building and sustaining a long-term relationship with existing and potential customers), and even event marketing (setting up a virtual booth where interested people come and visit).

   Interactive marketing is accomplished in electronic markets via interactive multimedia catalogs. Users find moving images more appealing than still images and listening more appealing than, reading text on a screen.

3. ***Inventory Management and Organizational Applications:*** Inventory management solutions are referred in the manufacturing industry as ***Just-In-Time (JIT)*** inventory systems. In the retail industry, they are referred as quick response programs.

   (a) ***JIT Manufacturing:*** JIT purchasing, which is considered as an integral part of JIT, has received considerable attention in electronic commerce. It allows a manufacturer to incorporate its suppliers' efforts towards eliminating waste in the upstream portion of the manufacturing cycle. JIT purchasing focuses on the reduction of inventories throughout the systems of the manufacturing firms and provides a careful audit of the production process. Basically, it optimizes supplier and customer relations.

   (b) ***Quick Response (QR) Retailing:*** The process is quite complex, given that a single retailer may purchase merchandise from thousands of vendors in a global market. The failure to stock merchandise that matches customer demand can be extremely costly. To reduce the risk of being out of stock, retailers are implementing QR systems. QR provides for a flexible response to product ordering and lowers costly inventory levels. QR retailing focuses on market responsiveness while maintaining low levels of stocks. It creates a closed loop encompassing the retailer, vendor, and consumer. As consumers make purchases, the vendor automatically orders new deliveries from the retailer through its computer network.

4. ***Supply Chain Management (SCM):*** The SCM process increasingly depends on electronic markets because of global sourcing of products and services. The process helps to reduce costs and product manufacturing life cycles, and provides flexible manufacturing systems resulting in a variety of customizable products.

Task

Discuss the importance of supply chain management in electronic markets.

5. ***Work Group Collaboration Applications:*** Work group applications of e-commerce enable easy and inexpensive connection of various organizational segments to improve communication and information sharing among employees and to gather and analyze competitive data in real-time. E-Commerce also facilitates sales force automation by enabling salespeople to carry product and reference information in one portable device. Other applications such as, video conferencing, document sharing, and multimedia e-mail, are expected to reduce travel and encourage telecommuting.

Caselet

Southampton Supplies Goes Online

Southampton Supplies Ltd. was established as a business in September 2001. Steve Campbell, a member of the United Air Force Reserve, identified an opportunity in the US market for mail-order supplies of garments to the cadets in the military reserve. Steve started running a mail-order business out of a shop in the village at Trunk Bay.

The Web store has been online since January 2003. Search engines take several months to index a Web site, so Southampton Supplies Ltd. used Pay Per Click (PPC) advertising as a method of increasing the Web sites presence in the major search engines. This marketing method proved successful. The partners were surprised as they had previously been doubtful about the prospect of the Internet generating sales in this sector. Within six months of running the Web site, the company had increased its turnover by two-fold, but further advances would result in high advertising cost. Hence, the company implemented search engine optimization and Web site re-design to tackle this issue.

Source: Chaffey Dave, E-Business and E-Commerce Management.

1.5 Need for E-Commerce and E-Business

The following benefits clearly explain the need for e-commerce and e-Business:

Benefits to Organization

1. ***Global Reach:*** E-Commerce extends the market place to local and international markets. Internet and Web-based e-commerce helps to reach a more geographically dispersed customer base and more business partners as compared to the traditional business methods.

2. ***Reduction in Paper Costs:*** E-Commerce decreases the cost of creating, processing, distributing, storing and retrieving information through the use of EDI (Electronic Data Interchange) systems. This decreases the cost of paperwork in terms of the time taken and the manpower required. Also, the data is more secure from theft and destruction. E-payments have also considerably reduced the overhead cost in financial transactions.

3. ***Reduction in Inventories:*** A reduction in inventory is desirable to enable reductions in storage, handling, insurance and administrative costs. Internet commerce can help firms to reduce inventories by electronically linking the suppliers and buyers. The process starts from the customer orders and uses JIT manufacturing. Information on inventory levels and production rate is shared between the manufacturers and their suppliers. Such information keeps the delivery schedules "fine-tuned" for JIT manufacturing, rather than maintaining large inventories.

4. ***Customization of Products or Services:*** The Web-based interactive e-commerce enables the customization of products or services as per the customer needs. This provides a great competitive advantage to business.

Example: An online travel agency may customize the itinerary for customers who wish to travel abroad, or a computer manufacturer may be able to supply a customized computer to a user when compared to traditional commerce.

5. ***Reduced Production Cycle Time:*** The production cycle time is the time taken by a business to build a product, beginning with the design phase and ending with the completed product. The production teams electronically share design specifications and refinement processes over the Internet to reduce the production cycle time.

   The reduction in the production cycle time helps to reduce the fixed overheads associated with each unit produced. This saving in the cost of production can be passed onto the customer or may be used to achieve higher profits.

6. ***Improved Customer Service:*** Customer service can be enhanced using Internet based e-commerce as it helps the customer to access information before, during, and after a sale. Customers may need to retrieve information on product specifications and pricing, on the status of an order, or may need online help in the installation or use of a product that they have purchased. A prompt customer support service can help businesses to earn the goodwill of customers in the long run.
7. ***Lower Sales and Marketing Costs:*** The Internet allows businesses to reach many customers globally at lower costs. Thus, organizations can bring down the marketing overheads by shifting the sales and marketing functions to the electronic processes.

Example: Advertisements on the Internet can cut down the cost of printing and mailing pamphlets or brochures. Any change in product specifications in the case of paper-based advertisements may mean re-printing. However in Web-based advertisements, it may mean changes only in the Web site.

8. ***Lower Telecommunication Costs:*** Before the emergence of the Internet, only a few organizations were using private networks and Value-Added Networks (VANs) for their EDI. The cost of installation and running these systems was very high and beneficial only to the larger firms that had enough business volumes to justify the cost. But now, because of the low cost of connecting to the Internet, small and medium businesses can easily afford to do business on the Internet.
9. ***New Business Partners:*** The Internet based e-commerce enables businesses to find new business partners globally on the Web, thus not restricting themselves to a limited choice of suppliers.
10. ***Faster Access to Information:*** The Internet expedites access to remote information, thus adding speed to transactions and processes.

Benefits to Consumers

1. ***Increased Choice of Vendors and Products:*** Customers can have an increased choice of vendors or products because they are no longer geographically constrained to reach a vendor or a product. A large number of vendors or manufacturers are using the Internet for marketing and selling their products or services.

Example: An NRI settled in the UK may subscribe to an electronic newspaper of India and receive the electronic newspaper on a daily basis.

2. ***Convenience of Shopping at Home:*** E-Commerce allows the consumers to shop when it is convenient for them and not strictly during store hours. Also, for physically challenged or elderly consumers, home shopping on the Internet provides a lot of opportunity and convenience.
3. ***More Competitive Prices and Increased Price Comparison Capabilities:*** The large amount of information available on the Internet is giving more and more power to the consumers. Consumers can make product or service comparisons and price comparisons to enable them to get the best deal on a product or service. This comparison of price and product has increased the competition among the vendors.
4. ***Variety in Products and Services:*** The online retailers have quickly learnt that reliable products and services are also important. Businesses have understood the importance of associated products and services and e-commerce helps in the realization of offering variety of products and services.

Example: Amazon.com does not just sell books and music CDs or DVDs, but also provides books and music reviews, suggests other books that may be of interest based on the books being examined.

5. ***Greater Customization in the Delivery of Services:*** Internet commerce also gives customers a chance to customize many of the products or services offered by the merchants.

Example: The morning paper (www.nytimes.com) allows online users to pre-specify their favorite Web sites. Each morning a morning paper is delivered electronically to the user with updates that have occurred on their favorite Web sites. Customers buying computer over the Internet have the opportunity to "configure" their own computer easily and compare prices of alternative configurations.

6. ***Access to Greater Amounts of Information on Demand:*** Consumers can have access to a large amount of information online on products and services, their features and prices. This further translates into more choice for customers in shopping and greater price comparison opportunities.

Example: The Mobile Store offers a wide range of mobile phones and their accessories, mobile connections, online recharging, Direct-to-Home (DTH) connections, and many more features. On their Web site, a customer can select a particular product to view its features and specifications. This helps the customer to compare a product with other products.

7. ***Quick Delivery of Digitized Products or Services:*** E-Commerce allows quick delivery in the case of digitized products, such as, music, software, etc.
8. ***Virtual Auctions:*** E-Commerce has made it possible for customers to participate in virtual auctions for buying and selling.

Example: On the eBay Web site, bidding is same as an auction. A customer places a bid and can continue bidding against others until the end of the auction, hoping to win the bid.

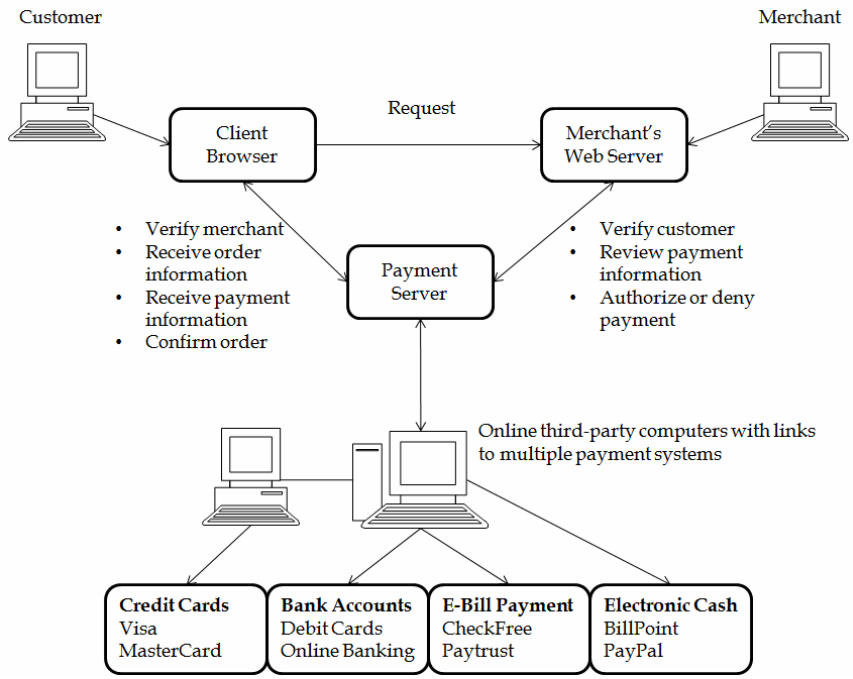
1.6 Basics of E-Commerce: Network and Electronic Transactions Today

Electronic transaction such as payment for the goods and services purchased online is an important step in the e-commerce transaction process. The main business concerns of electronic payments and security include:

1. The unknown networked computer systems used in electronic transactions are sometimes unreliable.
2. The wide range of debit and credit options, financial institutions and intermediaries make electronic transactions a difficult process.

Figure 1.1 shows the network of electronic transaction process taking place between buyers and sellers.

Figure 1.1: Electronic Transaction Process



B2C e-commerce systems on the Web depend on credit card transaction processes. But many B2B e-commerce systems depend on more complex transaction processes based on the use of purchase orders. B2C and B2B e-commerce systems generally use an electronic shopping cart process. This process allows consumers to select various products from a Web site catalog and place them temporarily in a virtual shopping basket. These selected products can later be checked out and processed for payment.

Electronic Funds Transfer

Electronic Funds Transfer (EFT) is the main method of e-commerce transaction systems in banking and retailing industries. Various information technologies are used in EFT systems to process money and credit transfers between banks and businesses and their customers.

Secure Electronic Payments

Network sniffers, software that easily recognize credit card number formats, may capture your credit card information when you make a purchase online. Various basic security measures are being implemented to solve this problem. They include:

1. Encryption of data passing between the customer and merchant
2. Encryption of data passing between the customer and the company to authorize the credit card transaction
3. Taking sensitive information offline

The security methods developed for secure electronic transactions include:

1. ***Secure Socket Layer (SSL):*** It helps to automatically encrypt the data passing between your Web browser and a merchant's server.

2. ***Digital Wallet:*** It is the security software for your Web browser. Digital wallet helps your browser to encrypt credit card data so that only the bank that authorizes credit card transactions for the merchant can see it.
3. ***Secure Electronic Transaction (SET):*** It helps to encrypt a digital envelope of certificates specifying the payment details for each transaction. SET is expected to become the dominant standard for secure electronic transactions over the Internet.

1.7 Summary

- Commerce is defined as an exchange of commodities or all activities involved in transferring goods from producers to consumers.
- E-Commerce is defined as a process of buying and selling of goods or services using electronic systems. E-Business is defined as the use of Internet technologies to enhance the key business processes.
- In the early 1990s, e-commerce emerged with the launch of World Wide Web and Web browsers.
- The three major factors fueling e-commerce are:
  - (a) Economic factors
  - (b) Market and customer interaction factors
  - (c) Technology factors
- The ability of a Web site to offer a wider selection of products and the facility to browse are the major advantages of e-commerce over traditional commerce.
- Convergence is defined as the merging of consumer electronics, publishing, television, computers, and telecommunications for the purpose of enabling new forms of information-based commerce.
- The two types of convergence are multimedia convergence and cross-media convergence. Multimedia convergence refers to the conversion of data, voice, text, image, graphics, and full-motion video into digital content.
- Cross-media convergence refers to the integration of various industries, such as, entertainment, publication, and communication media based on multimedia content.
- Multimedia content is considered to be the backbone of electronic commerce applications.
- Some of the commonly used applications of e-commerce are:
  - (a) E-mail
  - (b) Online shopping and order tracking
  - (c) Online banking
  - (d) Electronic tickets
- Some of the benefits of e-commerce are:
  - (a) Organizational benefits:
    - (i) Global reach
    - (ii) Reduction in paper costs
    - (iii) Customization of products or services
    - (iv) Improved customer service
  - (b) Consumer benefits:
    - (i) Increased choice of vendors and products
    - (ii) Convenience of shopping at home

(iii) More competitive prices and increased price comparison capabilities

(iv) Quick delivery of digitized products or services

1.8 Keywords

Electronic Data Interchange (EDI): It is defined as the exchange of business information between organizations by electronic means.

HTML: It stands for Hyper Text Markup Language. HTML is a combination of words and symbols which provide instructions on how a Web page should appear.

Inventory Systems: It is a process for managing the list of items available in stock.

Just-In-Time (JIT): It is a strategy for inventory management in which raw materials are delivered from the vendor or supplier just before they are required in the manufacturing process.

Supply Chain Management: It is the management of material and information flow in a supply chain to provide customer satisfaction at the lowest possible cost.

Secure Socket Layer (SSL): It is a protocol for managing the security of a message transmission on the Internet.

VAN: It stands for Value-Added Network. VAN is a private network provider which is hired by an organization to facilitate EDI or provide other network services.

1.9 Self Assessment

1. State whether the following statements are true or false:

   (a) E-Commerce enhances key business processes through the use of internet technologies.

   (b) External integration pertains to the electronic communication between various departments and networking of business operations and processes within an organization.

   (c) E-Commerce and traditional commerce can be differentiated based on their business processes and activities.

   (d) The advantage of e-commerce over traditional commerce is the ability of a Web site to offer a wider selection of products and the facility to browse.

   (e) Cross-media convergence refers to the conversion of data, voice, text, image, graphics, and full-motion video into digital content.

   (f) Online product catalog is the place where information about the products is stored and handled.

   (g) Payment gateway is a service with the help of which payment and credit card details can be sent from the Web site to a merchant account.

   (h) Internet based e-commerce enables businesses to find and restrict themselves to a specific choice of suppliers.

2. Fill in the blanks:

   (a) The _____ plays a major role in the implementation of e-commerce in most of the organizations.

   (b) Netscape released the _____ browser in 1994.

   (c) The key factor in the growth of e-commerce is the development of _____.

   (d) _____ means merging of consumer electronics, publishing, television, computers, and telecommunications for the purpose of enabling new forms of information-based commerce.

   (e) Multimedia is linked with _____ convergence happening in the telecommunications, computer, and cable industry.

   (f) Audio and video media are also referred to as _____ media.

(g) The method of financial exchange that takes place between buyers and sellers in an online transaction with the aid of digital financial instruments is termed as _____.

(h) Software that easily recognizes credit card number formats is called a _____.

1.10 Review Questions

1. "E-Commerce and e-Business are different concepts." Discuss.
2. "E-Commerce applications were first developed with innovations like Electronic Funds Transfer (EFT)." Discuss.
3. How does Just-In-Time (JIT) help in inventory management? Discuss how JIT has received importance in e-commerce.
4. "E-Commerce and traditional commerce are differentiated based on their business processes and activity." Discuss with examples.
5. "E-Commerce is irreversibly linked with the idea of convergence." Explain the concept of media convergence with suitable examples.
6. Suppose you are running an online retail store. Analyze how to make consumer-oriented e-commerce more effective. What are the different components of consumer-oriented e-commerce that need to be considered?
7. "Multimedia content is believed to be the backbone of electronic commerce applications." Comment.
8. Suppose you notice that the payment gateway on your business Web site is facing some security issues. What are the different types of security methods you would develop to secure electronic transactions?
9. Suppose you want to extend your business online. How will you convince the business partners to go online? Explain with suitable examples.
10. How will you make the e-commerce Web site user-friendly? What are the important elements that you will keep in mind while developing an e-commerce Web site?
11. "Economic factors, marketing and customer interaction factors, and technology factors are some of the stimulating factors of e-commerce." Discuss.

Answers: Self Assessment

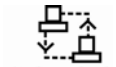
1. (a) F (b) F (c) T (d) T (e) F
   (f) T (g) T (h) F
2. (a)World Wide Web (b) Navigator (c) ICT (d) Convergence (e) Hardware
   (f) Continuous (g) EPS (h) Network sniffer

1.11 Further Readings

Books

Chan. H., Lee. R., Dillon. T., and Chang. E. (2008). E-Commerce: Fundamentals And Applications, Student ed. New Delhi: Willey India (P.) Ltd.

Bajaj. K. K., and Nag. D. (2009). E-Commerce: The Cutting Edge of Business, 2nd ed. New Delhi: Tata McGraw-Hill.


Online link

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Unit 2: Business Models of E-Commerce

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Objectives

After studying this unit, you will be able to:

- Discuss Intra-B commerce
- Describe business-to-business e-commerce
- Describe business-to-consumer e-commerce
- Describe consumer-to-consumer e-commerce

Introduction

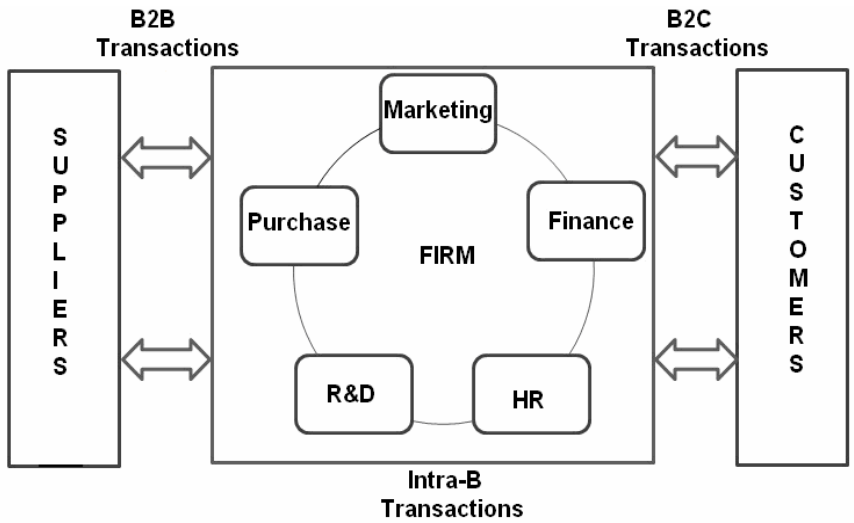
The scope of e-commerce is vast and includes all processes that a business organization conducts over a computer network. The Internet based businesses or the dot-com revolution grew rapidly and comprehensively, almost minimizing the growth and progress of other sectors. Organizations doing business through the Internet have emerged with their own ideas to succeed in the business.

Example: Companies such as, Hotmail and Netscape have made business by offering free products and services. The ideas used by such organizations have helped in building new business models for Internet based business.

The different types of e-commerce business models are Intra-B commerce, Business-to-Business e-commerce (B2B), Business-to-Consumer e-commerce (B2C), and Consumer-to-Consumer (C2C) e-commerce. An Intra-B transaction happens among different departments in a firm, B2B transactions

happens between two businesses and B2C model serves the end consumer. Figure 2.1 shows the functioning of various business models.

Figure 2.1: Business Models



2.1 Intra-B Commerce

Intra-B commerce involves interaction and transactions among various departments and individuals within a firm. Use of computer networks has enabled the firms to establish an interaction between marketing department and production department and to produce the customized products as per the requirements of an individual customer. Intra-B commerce permits better coordination, helps in faster decisions and workflows. Typically, they are built by securing the network from the global Internet through a firewall that limits access to internal or authorized members only.

2.1.1 Importance of Intra-B Commerce

Large corporations consist of independent business units that sell or buy materials, products, and services from each other. These transactions can easily be accomplished over the intranet. Using the advertisements that organizations have on the intranet, employees can buy or sell products and services from each other.

The following are the advantages of Intra-B commerce:

1. Efficient use of inventory and cash management
2. Greater utilization of plant and machinery
3. Effective handling of human resources
4. Effective handling of customers

Example: Employees can use electronic catalogs, order forms, and access inventory information for better interaction with the customers.

2.2 Business-to-Business (B2B) E-Commerce

Business-to-Business (B2B) refers to the transactions between businesses such as, two firms or between a manufacturer and a wholesaler. B2B e-commerce accounts for more than 94% of all e-commerce transactions conducted over networks. It is restricted to business partners and uses secure procedures based on firewall, encryption, and authorization level with payment by predetermined credit terms.

2.2.1 B2B Market Places

Internet based B2B e-commerce is done by large companies through industry sponsored marketplaces and private exchanges. In some cases, organizations sell their products to business consumers through their own Web sites.

According to a survey conducted on 25 Industry Sponsored Marketplaces (ISMs) that was published in the industry, ISMs had only a small percentage of business-to-business transactions. A reason for this is, they had problems in convincing buyers and sellers to use the marketplace. As companies did not prefer customized designs through marketplaces, they made use of such marketplaces to buy products and to manage the supply chains only.

The B2B market has two primary components. They are e-infrastructure and e-markets. E-infrastructure is the architecture of B2B and primarily consists of the following:

1. Logistics such as, transportation, storage, and distribution.

Example: Procter and Gamble provide Logistics as part of their infrastructure management.

2. Application service providers who help in deployment, hosting, and management of packaged software from a central facility.

Example: Oracle and Linkshare organizations provide main application service.

3. Outsourcing of functions in the process of e-commerce such as, Web hosting, security, and customer care solutions.

Example: EShare, NetSales, iXL Enterprises, and Universal Access are some of the organizations that provide outsourcing services.

4. Auction solutions software for the operation and maintenance of real time auctions in the Internet.

Example: Organizations such as, Moai Technologies and OpenSite Technologies provide auction solutions software.

5. Content management software for the facilitation of Web site content management and delivery.

Example: Interwoven and ProcureNet are some of the organizations that provide content management software.

6. Web-based commerce enablers, which provide solution framework and manage dynamic services.

Example: Commerce One is browser-based, XML-enabled purchasing automation software.

E-markets are Web sites where buyers and sellers interact with each other and conduct transactions. The more common B2B examples and best practice models are IBM, Hewlett Packard (HP), Cisco, and Dell.

Did you know? Cisco receives over 90% of its product orders over the Internet.

2.2.2 B2B Exchanges

B2B exchange is an online platform where buyers and sellers communicate, collaborate, and make business transactions. Unlike B2B marketplace, B2B exchange is used by the people at large. The main intention of a B2B exchange is to create a site, filled with features that allow members to efficiently conduct business processes through the Internet.

Features and Benefits of B2B Exchanges

B2B exchange is increasingly becoming one of the fastest growing marketing methods that are used by companies looking to increase their client base beyond their local markets. Any good B2B exchange offers direct contact with thousands of potential buyers in a single location.

B2B exchanges help companies in buying, selling, and streamlining their business processes. The following are the benefits of participating in a B2B exchange:

1. ***Efficient Inventory Management***: Integration of products and services with the electronic catalog of the exchange will help in effective management of inventory.
2. ***Better Customer Relationship Management***: Ability to have constant interaction through the exchange allows companies to serve their customers better. The whole ordering process from payment to delivery can be tracked which helps in building a greater efficiency in customer service.
3. ***New Sales Channel***: By becoming a member of an exchange, a low cost, highly functional, and easy-to-use sales channel can be opened for the company. The sales channel will expose the company to new audience.
4. ***Reduced Paper Works***: Automated supply chain management reduces paper work drastically.
5. ***Eliminating Unauthorized Spending***: Consolidated and automated procurement and approval method prevents unauthorized purchasing in a company.

Task

Find out different companies that provide B2B exchanges. Also, determine the features that need to be incorporated to conduct business transactions effectively.

2.2.3 Benefits and Barriers of B2B E-Commerce

The following are the benefits of B2B:

1. Outsourcing the unprofitable parts of business
2. Speeding up of product development activities which reduces the time to market
3. Improves business and market intelligence
4. Improves the speed of communication
5. Provides the ability to experiment and learn
6. Facilitates communication between customers and suppliers
7. Reduces wastage through additional sales channels
8. Higher customer retention rates
9. Lower customer acquisition cost

The following are the barriers of B2B:

1. ***Costs and Financing of Implementing E-Commerce***: Costs of implementing e-commerce can be a serious barrier for Small and Medium sized Enterprises (SMEs). Costs include planning, procuring hardware and software, maintenance, and telecommunication charges.

2. ***Personal Contact***: Personal contact is important within various industry sectors. Each buyer has a different situation and all special requirements are difficult to include in an e-marketplace.
3. ***Security and Regulations***: Security aspects such as, impact of hacker attacks, thefts of business information and funds, as well as dishonest transactions and conflicts cause uncertainty in organizations willing to use e-marketplaces.
4. ***Technology***: New technologies often emerge and companies that choose to build a certain e-commerce platform will lose out if new standards are adopted.
5. ***Supplier Issues***: Suppliers often avoid e-marketplaces due to the price transparency. Some suppliers are not convinced on sharing inventory and capacity information because they believe that it will affect their sales.

2.3 Business-to-Consumer (B2C) E-Commerce

Business-to-Consumer (B2C) model describes activities of those businesses that serve end consumers with products and services. It includes electronic retailing or e-tailing.

Electronic retailing includes retail sales and makes it easier for the manufacturer to sell directly to a consumer without the help of intermediaries. An electronic store or Web storefront means the Web site of an organization where the products and services are sold. Consumers have the option of browsing the catalogs and electronic storefronts online.

Example: An example of Web storefront is Amazon.com. In this Web site, consumers can browse catalogs and place orders for the products. Once the order is placed, it is delivered directly to the specified address.

According to Turban (2002), the following things are commonly browsed and sold over the Internet:

1. ***Computer Hardware and Software***: Most of the software products are bought online.

Example: The prominent online retailers of software and hardware are Gateway and Dell.

2. ***Consumer Electronics***: Consumer electronic products are the most sold online products.

Example: Some of the commonly purchased electronics items online are digital cameras, scanners, printers, and wireless devices like mobile phones, pen drives, and other such electronic goods.

3. ***Sporting Goods***: Some of the sports accessories that are sold online are cricket bats, tennis bats, golf balls, and golf accessories.

Example: Web site like Summitonline.com provides sports accessories online.

4. ***Office Supplies***: The consumer sales of the office supplies have increased all over the world.

Example: The sales of office supplies through the Officedepot.com Web site crossed $2.3 billion in the year 2002.

5. Other items like, music related products, CDs, toys, beauty and health products, vehicles and apparels are the general things that are sold over the Internet.

According to Bidgoli (2002), the performance of business in consumer e-commerce involves five main activities:

1. ***Information Sharing***: In order to share details with customers, a business-to-consumer e-commerce model can make use of a company Web site, online catalog, online advertisements, e-mail, and message board system and discussion groups.

2. ***Ordering***: To order a service or product, a consumer can make use of electronic forms that are similar to paper forms or an e-mail.
3. ***Payment***: Payment for the product can be made by credit cards or bank checks. Consumers can also make cash payments.
4. ***Fulfillment***: This means delivering the service or product from the retailer to the consumer. This process can be complicated depending upon the products that need to be delivered. The products can be books, videos, CDs, music systems, software, and electronic equipment.
5. ***Service and Support***: This aspect is important in e-commerce as there is no human interaction. The service and support activities are e-mail confirmation, online surveys, periodic news flash, help desks, and online auctions. To make a B2C e-Business successful, the functions of all the five activities have to be tested.

2.3.1 B2C Models

B2C models aim to use and combine the unique qualities of Internet and Web. The different B2C models are portal model, storefront model, content providers, transaction brokers, service providers, market providers, and community providers.

Portal Model

Portal is a major starting site for users when they are connected to the Web. Portals offer powerful search tools plus an integrated package of content and services. There are general portals as well as specialized portals.

Example: Some major general portals include Yahoo, Netscape, CNET, and AOL.com and specialized portals include Garden.com (for gardeners), SearchNetworking.com (for network administrators), and many more.

Storefront Model

The customers and sellers interact directly in this model. Orders are taken directly through the Web site and payments are made in a secured environment. The marketers in this model gain revenue through product sales.

Example: Web sites such as Amazon.com and Dell.com gain revenue through product sales.

Content Providers

Content providers provide digital content on the Web. Digital content includes news, music, video, and artwork. Revenue in this model is generated through subscription fees or advertising.

Example: Web sites such as Rhapsody.com, Espnstar.com and CNN.com provide digital content.

Did you know? Content providers were the second largest source of B2C e-commerce revenue in 2002.

Transaction Brokers

Transaction brokers provide sites that process transaction for consumers. The main advantage of this model is that they help in saving time and money for the consumers. Revenue in this model is generated through transaction fee. This model is used in financial services, job placement and travel services industries.

Example: Web site such as Naukri.com provides job placement services and makemytrip.com provides travel services.

Service Providers

Service providers are companies that make revenue by selling a service instead of a product. These services are available at a lower cost and is time saving.

Example: Web sites such as, Lawinfo.com and myCFO.com make revenue by selling services to the customers.

Market Creators

Market creators create Web sites and make use of the latest Internet technologies to create markets that bring buyers and sellers together for auctions.

Example: Web sites such as Priceline.com and eBay.com create markets for buyers and sellers.

Community Providers

Community providers provide sites where individuals with common interests and common experiences can transact and exchange notes.

Example: Web sites such as About.com and Friendster.com create communities for people with common interest.

2.3.2 Advantages and Disadvantages of B2C Models

The advantages and disadvantages of B2C e-commerce can be considered from the viewpoint of either the consumer or the business.

From the consumer's viewpoint, advantages include:

1. Consumers can shop at any time of the day, from the privacy of their homes or other remote locations.
2. Consumers can have access to a greater variety of goods and services on offer.

From the business viewpoint, advantages include:

1. Business can reach worldwide market with access to more potential customers.
2. B2C can lower transaction costs associated with sales.
3. B2C can display information, pictures and prices of products or services without having to spend much on the advertisement.

The disadvantages from the consumer's viewpoint include:

1. Security issue such as credit card information is very sensitive, and there are chances of scams and frauds.
2. Customer service is compromised as consumers are not always satisfied with their purchases and they often do not get timely answers to their queries.

The disadvantages from the business viewpoint include:

1. The competition is more on the Web and the customer can go to other sites to purchase the same product.
2. There can be technological problems due to which sales might come down.

2.3.3 Differences between B2B and B2C

Business-to-Business e-commerce differs from Business-to-Consumer e-commerce in many ways. Business-to-Consumer merchants sell the products on a first-come, first-served basis and Business-to-Business transactions are performed through negotiated contracts that enable the seller to think and

plan for the quantity the buyer is likely to purchase. Business-to-Business is a matter of making connections with business partners.

Case Study

Web Portal for a Travel and Tourism Organization

A travel and tourism organization decided to introduce a Web portal in addition to the existing set of services. The organization stated the following reasons for taking this decision:

1. The organization wants to stay in the forefront in the technology domain.
2. The organization has to get into Internet servicing if it has to compete with others in the market place.
3. The organization would like to offer all conveniences to its customers.

The organization commissioned an outside agency to design and develop a comprehensive portal.

Objectives of the Program

The organization decided to have an awareness program. The program had the following objectives:

1. Highlight the potential and the challenges of B2C portal
2. Outline the critical tasks that may govern the success of the portal
3. Build in-house momentum for the portal

The awareness program was a huge success. It achieved the following milestones:

1. Formulated the vision for the B2C enterprise which included mission, prospective, and plan
2. Highlighted the need of setting up an independent entity
3. Outlined the key tasks required to be performed
4. Formulated number of options for achieving the end objectives

Conclusion

The various departments have been assigned the additional task of supporting the awareness program. The advertising team has been tasked to integrate portal business with the existing lines of business. The sales team also participates by compiling additional details of the existing and new customers.

Question:

1. What are the objectives of the awareness program?

2.4 Consumer-to-Consumer (C2C) E-Commerce

Consumer-to-consumer (C2C) is also called Peer-to-Peer (P2P) exchanges. It includes all the transactions that happen among consumers. This involves third party sites that can help the market place such as eBay.com. This also includes classified advertisements, music, and file sharing. In consumer-to-consumer networks, consumers sell the services and products to other consumers.

2.4.1 Importance of C2C E-Commerce

C2C e-commerce has created a new dimension in the online shopping business. It provides the small business owners a way to sell their products. Effective consumer-to-consumer businesses include items like handmade gifts, personal artwork and collectables, and apparel design. Among the various business models, C2C e-commerce perhaps has the greatest potential for developing new markets.

This type of e-commerce comes in at least three forms:

1. ***Auctions Facilitated at a Portal***

Example: eBay is an online portal, which allows online real-time bidding on items being sold in the Web. Intermediaries are very important in e-bay because there are millions of consumers to sell and to buy products. Finding each other can be beneficial to both consumers and retailers. The intermediaries act as mediators between the consumers who need to purchase and sell. eBay charges some amount from the sellers' profit as a fee to bring their customers to one marketplace.

2. ***Peer-to-Peer Systems***

Example: Napster model, which is a protocol for sharing files between users, is used in chat forums.

3. ***Classified Ads at Portal Sites***

Example: Excite Classifieds and eWanted are interactive online marketplace, where buyers and sellers negotiate.

Caselet

Trust and Safety Team of eBay

eBay has a Trust and Safety team that is responsible for keeping the marketplace safe for people trading with each other. eBay looks after the safety of its members by enforcing certain rules and policies that also helps in prevention of fraud. In case of any fraud, eBay works with law enforcement and government agencies to enforce its policies.

To ensure the safety of trade and to help build trust, eBay has developed the following programs and resources:

eBay Feedback

Each member of the eBay Web site has a feedback score that is displayed in the seller information box of the item-listing page. The feedback program helps to build trust among the people trading and acts as an incentive to do the right thing.

Spoof Web site Protection

The eBay toolbar enables its members to protect their accounts by warning them when they are on a potentially fraudulent or spoof Web site. EBay provides tutorials to its members on combating fraud and it educates its members on how to report issues to spoof@ebay.com.

eBay Security Center

The eBay security center provides guidance to its members on buying, selling, and paying safely. It is a valuable resource for all the users.

Source: http://www.eBay.com

2.5 Summary

- The different business models for e-commerce are Intra-B commerce, Business-to-Business e-commerce (B2B), Business-to-Consumer e-commerce (B2C), and Consumer-to-Consumer e-commerce (C2C).
- Intra-B commerce involves interaction and dealings among various departments and persons within an organization.
- B2B involves the transactions between businesses. The transactions may be between two companies or between a manufacturer and a wholesaler.
- The B2B market has two primary components: e-infrastructure and e-markets.
- E-Infrastructure consists of logistics, application service providers, Web-based commerce enablers, and content management software providers. E-markets are Web sites where buyers and sellers interact with each other and conduct transactions.
- B2B exchange is an online platform where buyers and sellers communicate to make business transactions.
- B2C e-commerce involves customers gathering information, purchasing physical goods, and receiving products over an electronic network.
- The different B2C models are portal model, storefront model, content providers, transaction brokers, service providers, market providers, and community providers.
- C2C e-commerce includes all the transactions that happen between consumers. In consumer-to-consumer networks, consumers sell the services and products to other consumers.

2.6 Keywords

***Electronic Catalogs*:** Internet-based presentation of a set of items available for purchase, including description, price, and ordering information.

Firewall: A system designed to prevent unauthorized access to or from a private network.

Price Transparency: Price transparency is a term, which describes a situation where both buyer and seller know the pricing.

Small and Medium Sized Enterprises (SMEs): SMEs are companies whose headcount or turnover falls below certain limits.

2.7 Self Assessment

1. State whether the following statements are true or false:
   (a) C2C commerce involves interaction and dealings among various departments and persons within the firm.
   (b) B2B explains the transactions between a manufacturer and a wholesaler.
   (c) E-markets are Web sites where buyers and sellers interact with each other and conduct transactions.
   (d) Service providers provide sites that process transaction for consumers.
   (e) B2C merchants sell the products on a first-come, first-served basis.
2. Fill in the blanks:
   (a) _____ is an online platform where buyers and sellers come to communicate, collaborate, and make business transactions.
   (b) _____ describes activities of those businesses that serve end consumers with products and services.

(c) The customers and sellers interact directly in _____ model.

(d) _____ provide sites where individuals with common interests and common experiences can transact and exchange notes.

(e) C2C is also called _____.

(f) _____ enables a manufacturer to manage the complex network of relationships between a manufacturer and its suppliers.

(g) _____ includes advanced scheduling, demand forecasting, manufacturing planning, and transportation planning.

3. Select a suitable choice for every question:

(a) Which of the following e-commerce model is the largest in terms of revenue?

(i) Business-to-business (B2B)

(ii) Intra-B

(iii) Business-to-consumer (B2C)

(iv) Consumer-to-consumer (C2C)

(b) Which of the following company provides content management software?

(i) ProcureNet

(ii) eShare

(iii) Linkshare

(iv) Procter and Gamble

(c) Which of the following provides a major starting site for users when they get connected to the Web?

(i) Storefront model

(ii) Transaction brokers

(iii) Portal model

(iv) Content providers

(d) Which of the following e-commerce business model includes electronic retailing or e-tailing?

(i) Business-to-business (B2B)

(ii) Intra-B

(iii) Business-to-consumer (B2C)

(iv) Consumer-to-consumer (C2C)

2.8 Review Questions

1. "Intra-B commerce helps in faster decisions and speedier workflows." Comment.
2. "Business to business e-commerce differs from Business-to-Consumer e-commerce." Analyze.
3. "Electronic retailing includes retail sales and makes it easier for the manufacturer to sell directly to a consumer." Explain.
4. "Portal is a major starting site for users when they get connected to Web." Discuss.
5. "C2C e-commerce has the potential for developing new markets." Analyze.
6. "B2C e-commerce is found to be attractive as it saves firms from factoring in the additional cost of a physical distribution network." Discuss.

Answers: Self Assessment

1. (a) F (b) T (c) T (d) F (e) T
2. (a) B2B exchange (b) B2C model (c) Storefront (d) Community providers
   (e) Peer2Peer (P2P) exchanges (f) Supply Chain Management (SCM)
   (g) Supply Chain Planning (SCP)
3. (a) Business-to-business (B2B) (b) ProcureNet (c) Portal model
   (d) Business-to-consumer (B2C)

2.9 Further Readings

Books

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Unit 3: Internet Environment for E-Commerce

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3.1 Internet Environment for E-Commerce

3.1.1 Internet Economy Conceptual Framework

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Objectives

After studying this unit, you will be able to:

- Analyze the Internet environment for e-commerce
- Identify the providers and vendors of e-Business software
- Understand e-Business enabling technologies

Introduction

E-Commerce is associated with conducting any transaction involving the transfer of ownership to use goods or services through a computer network or buying and selling over the Internet.

Internet based e-commerce has introduced revolutionary innovations in businesses, management, and international trade. In particular, information sharing with clients and coordination of business activities with trading partners based on shared information has managed to step up the existing level of business acumen.

Notes

Mobile Commerce

M-Commerce (mobile commerce) is the buying and selling of goods and services through wireless technology such as cellular telephones and Personal Digital Assistants (PDAs).

3.1 Internet Environment for E-Commerce

The Internet is a collection of global networks, connected to share information using a common set of protocols. It allows individuals from all over the world to be connected economically and reliably.

The Internet is a vast network, which helps people to share information around the world. It is an enabler for e-commerce as the Internet allows businesses to showcase and sell their products and services online. The Internet also gives potential customers, prospects, and business partners access to information about the businesses and their products and services that would lead to purchase.

Before the Internet was utilized for commercial purposes, companies used private networks like the Electronic Data Interchange (EDI) to transact business with each other. That was the early version of e-

commerce. However, installing and maintaining private networks was very expensive. With the advent of Internet, e-commerce spread rapidly because of the reasonable costs.

E-Commerce Security Environment

Ensuring security of payments and privacy of online transactions is the most vital aspect of e-commerce. While the appropriate policies are in place to facilitate e-commerce, lack of trust is still a barrier for using the Internet to make online transactions. Moreover, credit card usage in many developing countries is still relatively low. Individuals and firms rarely engage in extensive e-commerce or use of Internet-based technologies because of the following reasons:

1. Tax evasion
2. Privacy and anonymity
3. Fraud adjudication
4. Legal liability on credit cards

3.1.1 Internet Economy Conceptual Framework

The Internet economy is a broader concept and it includes both e-commerce and e-Business. The Internet economy includes all economic activities using electronic networks as a medium for commerce or activities that are involved in both, building the networks linked to the Internet and the purchase of application services. It is made up of three major segments. They are physical infrastructure, business infrastructure, and commerce.

The Center for Research and Electronic Commerce (CREC) at the University of Texas has developed a conceptual framework for the Internet economy, which is depicted in table 3.1. The framework shows four layers of the Internet economy. They are:

1. Internet infrastructure
2. Internet applications infrastructure
3. Internet intermediaries
4. Internet commerce

Table 3.1: Conceptual Framework for The Internet Economy

Internet Economy Layer	Layer 1 – Internet Infrastructure	Layer 2 – Internet Applications Infrastructure	Layer 3 – Internet Intermediaries	Layer 4 – Internet Commerce
	Companies that provide enabling hardware, software, and networking equipment for World Wide Web.	Companies that provide software for Web transactions.	Companies that link buyers and sellers of e-commerce and provide Web content and marketplace.	Companies that sell products or services directly to end users.
Types of companies	Networking hardware and software companies, pc and server manufacturers, Internet service providers, security vendors and fiber optics makers.	Internet consultants, Web development, Multimedia applications providers.	Market makers, online travel agents, online advertisers, portal providers.	Online tickets, fee, subscription based companies.
Examples	Qwest, AT&T, Cisco	Adobe, Microsoft, IBM, Oracle	e-Steel, Yahoo, ZDNet	Amazon.com, Dell

3.2 Providers and Vendors of E-Business Software

Companies such as SAP, Baan, and PeopleSoft are the leading suppliers of Supply Chain Management (SCM) software. Many innovative suppliers are providing more affordable solutions for medium sized enterprises.

Example: i2 Technologies (www.i2.com) is regarded as an innovator in coordinating materials and production throughout the supply chain.

Other vendors provide specific inventory tracking, distribution, and warehousing tools such as the smart tags based on the Radio Frequency Identification (RFID) protocol from Philips and Motorola. Datasweep Inc. (www.datasweep.com) is a developer of supply chain software that uses a Web browser based system to enable companies to track customized products at unit level. It then provides customers, suppliers, and the manufacturer with a real time view into any part of the process. ClearCross, formerly Syntra (www.syntra.com) provides companies and e-marketplaces with the ability to manage the financial aspects and logistics of their e-procurement and fulfillment operations. It sells its supply chain services on a per transaction basis. TheSupplyChain.com (www.thesupplychain.com) is a developer of B2B SCM software that enables companies to handle procurement, fulfillment, and inventory management. The software also supports reverse auctioning, purchase orders, requisitions, invoices, and logistics.

Companies like MicroStrategy (www.microstrategy.com) have developed Customer Relationship Management (CRM) tools that integrate personalization functions with data-mining software, transaction engines, and multimedia broadcast services. The major vendors provide a standard suite of tools that encompass an increasing number of functions. SAP (www.sap.com), Oracle (www.oracle.com), and Siebel (www.siebel.com) are some of the leading vendors of CRM tools.

Web-based tools can have a significant impact on the manufacturer's value chain. Anything that improves a company's efficiency at the front end of the process will have a significant financial impact. Schneider Automation (www.modicon.com) was the first company to incorporate the idea of a Web-based server into automation hardware, when it introduced a Web-based controller in 1998. Most recently, a number of industrial automation software vendors have added Web-based tools for plant floor decision support. Wonderware (www.wonderware.com) and Intellution (www.intellution.com) are expanding from traditional Supervisory Control and Data Acquisition (SCADA) and Manufacturing Execution System (MES) software to decision support tools that look at overall production and quality data in terms of order history and process conditions.

3.3 E-Business Enabling Technologies

E-Business involves communications and doing business electronically through the Internet. E-Business can be significantly improved by strengthening the links in the value chain between businesses (B2B) and consumers (B2C). Today's e-Business environment enables manufacturers to automate and integrate functions as never before - from customer relationship management, to supply chain management to e-manufacturing operations on the production floor. Companies use the Internet to implement Customer Relation Management (CRM) and Supply Chain Management (SCM) capabilities, which enable them to link their operations seamlessly with customers and suppliers. Traditional Enterprise Resource Planning (ERP) systems take care of internal value chain whereas, e-Businesses establishes the value chain across the market and other industries. Organizations construct their systems' architectures by integrating ERP systems with e-Business. They use Web-based interface with outside entities plus add-on modules such as CRM and SCM in the integration.

Notes

Information and Communications Technology

E-Commerce and e-Business are used interchangeably. However, they are distinct concepts. In e-commerce, Information and Communications Technology (ICT) is used in inter-business or inter-organizational transactions and in business-to-consumer transactions. In e-Business, on the other hand, ICT is used to enhance one's business. It includes any process that a business organization conducts over a computer-mediated network.

Customer Relationship Management (CRM)

CRM is the business function that integrates sales, marketing, and customer service. Such integration simplifies customer interaction. Within an integrated enterprise, customer content and contact information are readily available to generate additional sales and service opportunities. Integrated business processes provide consistency and simplicity to access many communication channels available to firms today. Integration enables firms to support issues quickly and efficiently. Traditional CRM techniques use call centers and direct marketing to market goods and services to targeted audience. The Web has expanded the reach of this marketing function by enabling businesses to use software analysis tools, customer interaction data, multi-channel communications, and one-to-one interactions to market.

CRM tools integrate traditional methods of interacting customers with automated online capabilities, including product catalogs, product configuration systems, pricing engines, proposal generators, and sales incentives and commission systems. On the other hand, customer service has a variety of enhanced services incorporated into communication channels, for example, integration of real-time audio and video with Web-based data.

The growth of CRM e-Business may be attributed to the following reasons:

1. Electronic technology is one of the main reasons for the growth of CRM. Availing of CRM e-Business facilities boosts the efficiency of the organization to a great extent. It is also cost effective and requires very little time to implement.
2. CRM is flexible and has the ability to adapt to changing environment.
3. CRM helps in tracking the purchases and in the buying and selling of products. It helps the organization to use electronic chat as a means of technical support and customer support.
4. CRM e-Business solutions give companies a well-planned and easily integrated e-Business strategy that caters to both, the customer needs as well as the corporate needs. Both these need to be adequately catered to, for the company's objectives to be fulfilled. The net result of implementing CRM e-Business strategies is satisfied customers and overall productivity.

Supply Chain Management (SCM)

Supply Chain Management (SCM) is the business function that enables a manufacturer to manage the complex network of relationships between a manufacturer and its suppliers. SCM systems allow the manufacturer to coordinate a series of transactions such as forecasting, purchasing, inventory status, change orders, shipment, and financing. The goal of SCM is increased efficiency through automated business processes that balance supply and demand.

Many enterprises are broadening their supply chain functionality to include Internet enabled transactions because of the global reach of the Internet. The Internet can draw together globally distributed information into a support structure that efficiently handles a variety of inter and intra company operations. Increased efficiency enables firms to effectively handle lower margins, increased customer demands, and unpredictable sales channels.

SCM is composed of two basic processes:

1. ***Supply Chain Planning (SCP)***: This includes advanced scheduling, demand forecasting, manufacturing planning, and transportation planning. All of these are necessary components for the effective coordination of manufacturing and supply efforts based on individual customer orders.
2. ***Supply Chain Execution (SCE)***: This process includes order planning, production, distribution management, and logistics. All these ensure that orders flow smoothly through the system, from the supplier to the manufacturing operation and finally to the end customer.

SCM helps in the coordination of raw materials, intermediate goods, information, and financial transactions among all the organizations involved in producing a finished product. A variety of information and transportation links can be used to connect all these organizations, essentially allowing them to function efficiently as a single organization.

Task

Find the different e-Business tools used for SCM.

3.4 Summary

- Internet is an enabler for e-commerce as the Internet allows businesses to showcase and sell their products and services online.
- The Internet economy is a broader concept and it includes both e-commerce and e-Business.
- E-Business can be significantly improved by strengthening the links in the value chain between businesses (B2B) and consumers (B2C).
- Organizations use the Internet to implement Customer Relation Management (CRM) and Supply Chain Management (SCM) capabilities.
- Organizations use CRM to integrate sales, marketing, and customer service.
- SCM enables a manufacturer to manage the complex network of relationship between a manufacturer and its suppliers.

3.5 Keywords

Electronic Data Interchange (EDI): It is the ordered transmission of data between the organizations by electronic means.

Personal Digital Assistant (PDA): It is a mobile device that functions as a personal information manager.

Proposal Generator: It is a document automation tool that increases the creation of professional, customer-friendly business proposals and submittals.

Radio Frequency Identification (RFID): It is a technology that uses communication with the use of radio waves to exchange data between a reader and an electronic tag attached to an object, for the purpose of identification and tracking.

3.6 Self Assessment

1. State whether the following statements are true or false:
   (a) CRM is the business function that integrates sales, marketing, and customer service.
   (b) Organizations construct their systems' architectures by integrating ERP systems with e-Business.
   (c) CRM is flexible and has the ability to adapt to changing environment.
2. Fill in the blanks:
   (a) _____ is one of the main reasons for the growth of CRM.
3. Select a suitable choice for every question:
   (a) Who among the following helps in deployment, hosting, and management of packaged software from a central facility?
      (i) Community providers
      (ii) Application service providers
      (iii) Transaction brokers
      (iv) Market creators

3.7 Review Questions

1. "The Internet based e-commerce has introduced revolutionary innovations in businesses, management, and international trade." Discuss.
2. "CRM tools integrate traditional methods of interacting with automated online capabilities." Explain.
3. "Enterprises are broadening their supply chain functionality to include Internet enabled transactions." Discuss.
4. "E-CRM has the ability to deliver transparency to its customers." Analyze.
5. Today, "Know thy customer" is the main rule of CRM. Comment.

Answers: Self Assessment

1. (a) T (b) T (c) T
2. (a) Electronic technology
3. (a) Application service providers

3.8 Further Readings

Books

Chan, H., Lee, R., Dillon, T., and Chang, E. E-Commerce: Fundamentals And Applications, Student ed. New Delhi: Willey India (P.) Ltd.

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Unit 4: Electronic Data Interchange to E-Commerce

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Objectives

After studying this unit, you will be able to:

- Explain Electronic Data Exchange (EDI) to E-Commerce
- Understand EDI
- Describe the UN/EDIFACT Standard

Introduction

Electronic commerce which is commonly known as e-commerce consists of the buying and selling of products or services over electronic systems such as the Internet and other computer networks. The business is conducted over the Internet using any application that relies on the Internet such as e-mail, instant messaging, shopping carts, Web services, Electronic Data Interchange (EDI), and so on.

EDI is an important subset of e-commerce. It is a system which allows structured transmission of data between businesses, government structures and other entities by electronic means. It is a set of standards, which creates a cohesive system within which all parties are able to electronically exchange information within a set of protocols, with minimal human intervention. Human intervention in the processing of a received message is typically required in error conditions, quality review and for special situations.

Example: The transmission of binary or textual data is not EDI. It requires human intervention to transmit the data unless the data is treated as one or more data elements of an EDI message.

In the year 1996, the National Institute of Standards and Technology defined EDI as "the computer-to-computer interchange of strictly formatted messages that represent documents other than monetary instruments."

Example: Consider an interchange of messages between a buyer and a seller. Messages from buyer to seller can include Request For Quotation (RFQ), purchase order, receiving advice, and payment advice. Messages from seller to buyer can include bid in response to RFQ, purchase order acknowledgment, shipping notice, and invoice. These messages may simply provide information like receiving advice or shipping notice, or they may include data that may be interpreted as a legally binding obligation like bid in response to RFQ or purchase order.

The EDI standard was created to facilitate the exchange of business communication between enterprises.

Example: The EDI standards define structures that represent documents such as an invoice or shipping order for a company.

Electronic Data Interchange for Administration Commerce and Transport (EDIFACT) is an international standard for EDI trading in a wide range of commercial and non-commercial sectors.

The UN/EDIFACT standards can be used for any application, domestic or international.

Did you know? EDIFACT was developed by the United Nations to facilitate international trade. This is the most common EDI standard which is used outside the United States.

4.1 Electronic Data Interchange (EDI) to E-Commerce

E-Commerce is associated virtually in all industrial sectors. For statistical purposes, the U.S. Census Bureau defines e-commerce as the value of goods and services sold online, whether over open networks like Internet or over proprietary networks running systems like EDI.

E-Commerce payment systems have become very popular majorly due to the widespread use of the Internet-based shopping and banking. EDI is a set of protocols for doing electronic business over computer networks. Initially, these networks were private Value-Added Network (VANs) but EDI is now done over the Internet. EDI supports the electronic exchange of the structured business data like purchase orders, invoices, and shipping notices, between two organizations. The relationship is generally between a vendor and a customer.

Example: Using EDI, based on the re-order levels, a customer can place an order for goods using the vendor's computer. The EDI system coordinates transactions, initiates deliveries, and produces invoices.

4.1.1 EDI vs. E-Commerce

It is very important to differentiate between EDI and e-commerce. Let us understand the difference between EDI and e-commerce.

E-Commerce encompasses all the aspects of electronic business exchange, including person to person interaction, money transfer, data sharing and exchange, Web site merchant systems, and so on.

EDI is a subset of electronic commerce that encompasses the exchange of business information in a standardized electronic form like layout of information for an invoice or purchase order.

EDI can reduce costs, workforce requirements, and documentation errors related to retyping orders, invoices, and other documents. Using EDI, the computer data already entered by an organization is made available to a business partner.

EDI is typically handled by using store-and-forward technologies which is similar to an e-mail. A third party like General Electric Information Service (GEIS) often serves as a middleman to help organizations establish business relationships and handle business transactions.

Notes

There is an interpretation that EDI constitutes the entire electronic data interchange paradigm, including the transmission, message flow, document format, and software used to interpret the documents.

4.2 EDI

EDI is an inter-organizational transmission of business documents in a structured format. Many companies use EDI facility to trade with each other. Important messages related to the trade such as purchase orders, delivery instructions, and remittance advice are the typical messages sent between the trading partners. These messages can be effectively communicated between the user companies because they are structured according to various standards.

Earlier, a particular format of agreement between two trading partners was used for electronic interchange of data. But, the differing document formats made it difficult for companies to exchange data electronically with many trading partners. Therefore, a standard format was necessary to exchange data.

The first attempt to produce a common data format was done in the 1960s by the cooperative effort between industry groups. The format, however, was only for purchasing, finance, and transportation data and it was used only for intra industry transactions. The actual work for national Electronic Data Interchange (EDI) standards began in the late 1970s. The set of standard data format was created by considering both users' and vendors' requirements. The features of the standard data formats are:

1. It is hardware independent.
2. It is unambiguous such that, they can be used by all trading partners.
3. It reduces the labor-intensive tasks of exchanging data.
4. It allows the sender of the data to control the exchange, including acknowledging if and when the receiver received the transaction.

Today, a number of formats are available for EDI. The two most widely recognized and used formats are X12 and EDIFACT.

Some of the essential elements of EDI are the use of an electronic transmission medium rather than using physical storage system such as magnetic tapes and disks. The EDI message is well structured and formatted. EDI enables direct communication between applications and increases the speed of document transfer from the sender to the receiver. It depends on a sophisticated information technology infrastructure that includes data processing, data management, networking capabilities that provide efficient and reliable data transmission between remote sets.

An EDI message can be easily translated into various formats which are suitable for application software right from controlling the production in a factory to giving future orders to the retailers. The structure permits the trade related operations to be automated with data, from serving customer to the relevant department for automatic action.

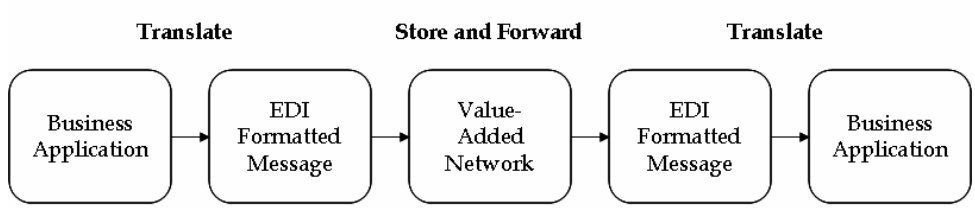
The EDI process is initiated either by downloading a file, or by an operator entering data into a computer with necessary instructions on the screen. The EDI system can send one or more orders at a time and different companies can receive the order at the same time. Once a company sends a message, it is transferred through a telephone line either to a Value-Added Network (VAN) or directly to the

trading partner. VAN stores the received message in an electronic mailbox and simultaneously registers the time and details in a computer. Then, the recipient checks the received message. VAN can also be programed to inform the recipient's computer whenever a new message is received.

The computer which receives the message translates it automatically to the required format. Then, the computer transmits the message to the computer or applications software of the relevant department. EDI automates the business communications between the trading partners.

Figure 4.1 shows a typical EDI system.

Figure 4.1: EDI System



The speed of creating invoices, purchase orders, receiving tickets, and so on has drastically increased with the advent of computers. Although these documents are produced by high speed printers, there still arises a need to burst, insert, distribute (usually mailed), and file copies of the documents. In traditional systems, the original message had to be manually transported to the receiver, opened, carried to the appropriate individual within the addressee organization and processed, which essentially means manually typing the data into a management information system.

The use of EDI removes many of these problems associated with traditional information flow.

Example: Consider a purchase order between a buyer and a seller. By simply placing the order or entering the information into the buyer's computer, the data can be electronically transmitted to the seller's computer without re-typing the information. This process of data transfer is called application to application EDI.

4.2.1 EDI Communication

Data transfer in a one-to-one EDI relationship can be as easy as connecting a modem and transferring a file. This becomes impractical with more number of vendors. If a manufacturer has to send out hundreds of purchase orders each week to hundreds of suppliers, it would require many employees and a very tight schedule to process their purchase orders. Even if the manufacturer had an extensive private network available for successful transmission, it would be necessary that all vendors be linked with the network.

These problems can be avoided by allowing receivers to access the senders' systems and collect the necessary data. However, the process could have a serious security issue. With careful control this method can be adopted, but it will work only on temporary basis by installing the separate hardware to isolate the system being accessed by third parties. Some companies might accept these approaches, but since the process is complex most EDI users would quickly start preparing printed documents, depending on the mail to distribute all their documents.

To overcome these issues, EDI users can make use of third-party network services, commonly referred to as "Value Added Networks" or VANs. The VAN works as a clearing house for electronic transactions, serving as a private electronic mail service. A company can send their purchase order files to a single destination. Each vendor's data is routed to their own electronic mailbox by the VAN. If the recipient of the file does not subscribe to the particular VAN used by the sender, then the transaction can be routed from one VAN to the other.

The security issue is resolved by using a VAN. It allows trading partners to trade information and at the same time avoid giving information away. Although both the parties cannot access each other's

systems, they can still freely exchange agreed-upon information. The implementation process can be made even easier by using a full service VAN, which provides other services, including translation, standards compliance checking, and EDI software.

Example: Assume that some PCs are installed in a company and the information about transactions with other companies are saved into the PCs manually or transmitted from the information system online. Then, PC software products perform the function like format translation and communication.

4.2.2 Components of EDI System

An EDI system consists of all the components necessary to exchange EDI transactions with the EDI capable trading partners. The following components and tools are necessary for performing EDI:

1. ***EDI Standards***: Different industries have developed their own EDI standards. One must first know the EDI standards that their trading party is using before translating the EDI documents. The EDI standards are designed to be independent of communication and software technology. The EDI standard provides details about a particular document like, which piece of information is mandatory for that document and which is optional. It also provides the rules for the structure of the document. Two different EDI documents can follow the same standard and contain different sets of information. EDI standards help EDI by:

   (a) Providing rules of syntax

   (b) Defining the data organization

   (c) Providing editing rules and conventions

   (d) Making available published public documentation

Example: Using the same standard, a food company may indicate a product's expiry date while an apparel manufacturer can choose to display color and size information.

The four major types of EDI standards are:

   (a) UN/EDIFACT standard is the only international standard. This standard is predominant outside of North America.

   (b) ANSI ASC×12 standard is predominant in North America.

   (c) TRADACOMS standard is predominant in the UK retail industry.

   (d) ODETTE standard is used in the European automotive industry.

2. ***EDI Translation Management Software***: EDI transactions are very difficult to read and manipulate. With the help of EDI translation management software, EDI data is translated into a file format which acts as an interface with a company's in-house systems. It also helps to translate the EDI data into the forms that can be used by the users. EDI translation software also supports the development and maintenance of maps. Maps are required to handle each transaction type. Each transaction type with individual partner is formatted differently with the help of a map. It translates the EDI transaction into a useable file format.

3. ***EDI Guides***: EDI trading partners provide EDI guides to communicate about the formatting style of the transaction type. There must be a similarity between the EDI guide and the EDI complaint made with a particular EDI partner. The EDI guides must be similar in order to be compliant with a particular EDI partner. The EDI guides are generally used to develop maps.

4. ***Hardware***: Hardware is needed to run EDI translation software. The computer hardware must be sufficiently powerful and reliable to support the exchange of EDI transactions in compliance with trading partners' transmission schedules all the time.

5. ***Communication Network***: A direct communication link is required to send and receive EDI transactions. Some trading partners offer a direct connection to their EDI computer using a direct AS/2 connection. Trading partners can elect this method of communication instead of using a

third party network provider which is a communications intermediary with other trading partners which is called VAN.

6. ***Inexpensive Microcomputer***: Inexpensive microcomputers are required to bring all potential users into the market. It permits even small firms to implement EDI. Since microcomputers are now easily available, it has become easy for all the firms to deal with each other using EDI maps.

7. ***EDI Experienced Personnel***: EDI experienced personnel are required to implement each of the EDI system components and to maintain the specific data for a company's EDI trading partners.

4.2.3 Benefits of EDI

Replacement of your paper documents with electronic documents has several obvious benefits. Let us take an example of purchase order to understand it more clearly.

Example: While placing the business order, instead of using paper based purchase order you can do it instantly by using EDI system.

Following are the advantages of EDI:

1. ***Reduced Time Delay***: There are principally two reasons for the delay while doing business manually. The first reason is that paper documents may take days to transport from one location to another and the second reason is manual processing delays, which are caused by typing, retrieving files, and comparing data. Manual work can be avoided by using EDI.

2. ***Reduced Labor Costs***: In traditional systems, manual processing is required for typing the data, storing the document, retrieving the data, matching the information, reconciling the data, stamping, signing, and so on. The labor costs for document processing occupies a significant proportion of their overall company's overhead. Labor based processes are more expensive than non-labor-intensive operations which involve computers and telecommunications.

3. ***Error Free***: The non-EDI systems are usually prone to errors as the data is typed multiple times and the documents are easily accessible to people when transported, stored, and retrieved. There is no need for re-entering the data in the EDI system. Thus, it reduces the risk of human error.

4. ***Removes Uncertainty***: In non-EDI processing systems, time delays and uncertainties lead to storage of large amount of documents and paper works. Inventories are often higher than necessary. In a manufacturing firm, it is virtually impossible to do a just-in-time inventory system with the time delays inherent in non-EDI processing systems.

5. ***Reduced Inventories***: In non EDI processing systems, uncertainties and time delays lead to accumulation of large amount of documents and paper work. EDI can help organizations directly or indirectly to improve their inventory control. It helps in reducing the inventory costs through shorter order processing and delivery cycles and by lower inventory levels.

Example: Inventories are usually high in manufacturing industry. It may be practically impossible to accomplish a Just-In-Time (JIT) inventory system with the time delays being natural in non-EDI processing systems.

6. ***Information Access:*** EDI allows users to access a vast amount of detailed transaction data. Since EDI data is already stored in computer-retrievable form, it is subjected to automated processing and analysis.

Task

Do a research on the Internet and discuss the influence of EDI on Indian market.

4.2.4 EDI Transmission

Companies have various ways to send and receive the EDI files through the Internet. The EDI transmission utilizes various software and systems to allow transmission, where more than one document can be transmitted at a time. Let us take an example to understand the working of EDI transmission.

Example: A buyer prepares an order in his acquiring procedure and sends it for approval. After receiving the approval, the EDI order is translated into an EDI document format labeled as 950 purchase order. The EDI 950 purchase order is then securely transmitted to the supplier either via the World Wide Web (WWW) or through VAN.

The working of buyer's VAN is similar to an electronic post office. The buyer's VAN ensures that EDI transactions are sent and received and the supplier's VAN ensures that the buyer receives the order.

After receiving the order, the supplier's EDI procedure processes the order. Data security and control are maintained through the transmission procedure using passwords, user identification, and encryption. Then, both the buyer's and supplier's EDI applications are edited and checked for accuracy.
All the trading partners have different EDI requirements. Based on the requirements, the specific kinds of EDI documents are processed. In fact, most of the enterprise documents that one firm can exchange with another company can be sent via EDI.

Some of the ways of EDI transmission are described below.

1. ***Dial Up:*** In this method, communications generally happen over dedicated lines directly between trading partners or through VAN. This file transmission method uses a computer's modem to send tax return, report and/or payment files to the department's EDI service provider. However, this transmission is very slow and also very expensive, due to the use of several modems and lines to support multiple trading partners. Taxpayers who do not have Internet access on their computer generally use this transmission method. Dial-up transmission was mainly used to send and receive the EDI files before the high-speed Internet became popular.

Notes The Framework EDI component has no dial-up functionalities.

2. ***Simple Mail Transfer Protocol (SMTP) or E-mail:*** According to Bruce Chambers, "There is a significant amount of E-mail activity around an EDI transmission." E-mail over the Internet provides less expensive and simple ways of sending and receiving EDI files. However, the security is less if the files are sent by e-mail over the Internet, and also the size of an account's mailbox limits the size of EDI files that one can send. In addition, as per EDI definition, human intervention is not required to transfer a document, whereas, e-mail generally requires a user to retrieve an attached message.

Example: Large healthcare organizations normally prefer to operate their own e-mail server than to pay a monthly per-employee fee for e-mail to an Internet service provider. For small organizations paying an Internet service provider for e-mail is more affordable than maintaining their own e-mail server.

3. ***File Transfer Protocol (FTP)***: FTP has become one of the popular ways of sending and receiving files. Trading partners can easily create their own FTP server and directly upload their EDI files. However, with this protocol, files can only be sent or received into directories where these files wait to get polled for processing. These files can be processed depending on the polling interval.

This operation is used to send appropriately packaged EDI, Extensible Markup Language (XML), or other business data.

4. ***Hypertext Transfer Protocol (HTTP) or Hypertext Transfer Protocol Secure (HTTPS):*** HTTP server is the most commonly available of all communication servers. Just like FTP, HTTP server is inexpensive but the major advantage of the HTTP server is that, the HTTP protocol directly sends to or receives files from a destination application. Because of this direct process, it is possible to have the destination application run a process immediately once a file is received. This process is used to acknowledge the received files.

> *Notes* HTTP is the foundation of data communication for the WWW.

5. ***EDIINT AS2***: It is sophisticated and a more complicated version of HTTP. It is an Internet based communication protocol which allows sending business data such as purchase orders, invoices, and delivery notes over the Internet regardless of the data format EDI or XML. Since, the transmission of business data using VAN is very costly and the pricing model is very confusing, a company can reduce their ongoing expenses with VANs by utilizing the AS2 solution in the B2B strategy.

Example: SEEBURGER is the first worldwide B2B integration solution provider. It provides the marketplace with an affordable, unlimited usage of AS2module.

4.2.5 EDI Maturity

EDI development follows a fairly standard pattern which is represented as a six stage maturity model.

1. ***Discovery Stage:*** An organization can choose to adopt EDI to gain competitive advantage or to solve an administrative problem. Most of the organizations adopt it in the form of a request from a significant organization that converts its trade transaction to EDI.

2. ***Introductory Stage:*** An organization setting out on the EDI path normally begins with a pilot scheme. Initiators of EDI trading networks select one or two trading partners to do the pilot transaction. Organizations which are not into EDI trading by choice but are forced into EDI trading by an insistent partner starts electronic trading in a similar way. This stage requires investments and does not result in any cost saving or efficiency gain.

3. ***Integration Stage:*** In this stage, the EDI software is interfaced with the business application so that EDI messages are transferred electronically and automatically between the two systems. The work involved in this stage is variable but is also expensive. This stage is very essential for the large users of EDI.

4. ***Operational Stage:*** A significant number of trading partners and/or commonly used trade transactions are converted to EDI. The conversion of the major part of the trade cycle, both in volume of trading partners and in numbers of message types is known as the operational stage.

5. ***Strategic Stage:*** In this stage savings are made by replacing the paper documents with their electronic equivalents. Real opportunities arise in this stage by making changes to established business practices. These opportunities can only arise by making significant changes in the operational stage and the implementation of these changes are done in the strategic stage.

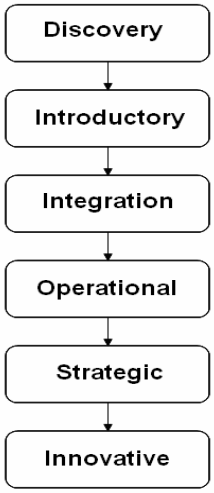
Example: Just In Time (JIT) manufactures now supply products quickly by replacing the paper documents with their electronic equivalent.

6. ***Innovative Stage:*** The establishment of an operational EDI infrastructure gives the possibility of changing the nature of the product or the provision of new services. This development is called the innovative stage in the model where new options for competitive advantage open up.

Example: Rover Cars have stopped producing cars for stock as EDI infrastructure gives the possibility of changing the nature of the product. They only produce cars when there is a requirement from the dealer.

Figure 4.2 shows the stages of EDI maturity model and also some of the opportunities and implications of each stage.

Figure 4.2: EDI Maturity Model



Source: www.doc.mmu.ac.uk/STAFF/D.Whiteley/ecbook/chap10mc.ppt

Task

Do a research on the Internet and find out an organization that has implemented EDI. Try to identify the EDI maturity stages that the organization has undergone.

4.3 UN/EDIFACT Standard

United Nations/Electronic Data Interchange For Administration, Commerce and Transport (Un/EDIFACT) is the International EDI standard. This standard is developed under the guidance of the United Nation. The maintenance and development of this standard is done through the United Nations Center For Trade Facilitation and Electronic Business (Un/CEFACT). Un/EDIFACT standard provides:

1. A set of syntax rules.
2. An Interactive exchange protocol such as data elements, segments, and codes.
3. Messages that allow multi-country and multi-industry exchange.

Did you know?

In 1990, CEFACT had announced the official definition of UN/EDIFACT. As per the definition, the rules for EDI "comprise a set of internationally agreed standards, directories, and guidelines for the electronic interchange of structured data, and in particular that related to trade in goods and services between independent, computerized information systems."

Notes

CEFACT is the UNOs coordinating policies and technical development to support trade and electronic business.

4.3.1 Interchange Structure

EDIFACT consists of a hierarchical structure where the top level is referred to as an interchange structure, and bottom levels contain multiple messages. These messages consist of segments, which in turn consist of composites. This structure indicates the beginning and end of the organizational units of information within the message but does not contain data relevant to the EDI transaction. It indicates the sender of the message, the intended recipient, the date and time of transmission, and so on.

The other type of control segment is connected with the loops of segments that may be repeated within a message. In case of a particular transaction, if the billing address of various parties is different from the shipping address, then a loop may be used to indicate the names and addresses of various parties in that purchase order transaction. The loop header and loop trailer segments indicate the start and the end of the loop. A group or segment can be mandatory (M) or conditional (C) and can be stated to repeat.

Example: C99 indicates between 0 and 99 repetitions of a segment or group, while M99 signifies between 1 and 99 repetitions of a segment or group.

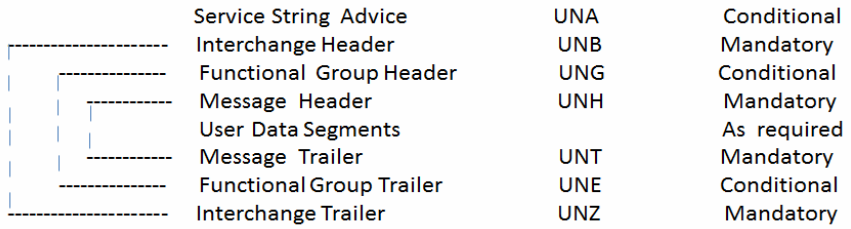
Segments which initialize with the UN are called the service segments. These segments constitute the envelope or the packaging of the EDIFACT messages.

EDIFACT consists of service segments like:

1. Envelopes (UNB-UNZ, UNG-UNE, UNH-UNT)
2. Delimiter String Advice (UNA)
3. Section Separator (UNS)

An EDI message includes a field definition table that gives information about the data elements in the message such as, whether an element is mandatory or conditional, numbers of characters it has, and whether it is numeric or alphabetic. The structure of an EDIFACT message under the ISO standard is shown in the figure 4.3. The UNA segment explains the separator characters used in the transmission. The UNB segment detects the sender and receiver of the transmission and specifies the used character set. The UNG and UNE segments are used only if the transmission carries many groups of messages of various types. UNH and UNT segments are the mandatory segments. These two segments are the collection of other related segments. The UNZ segment ends the transmission.

Figure 4.3: Interchange Structure



Source: http://en.wikipedia.org/wiki/EDIFACT

4.3.2 EDIFACT Message

EDIFACT has an underlying syntax, an ISO 9735 standard, in which the syntax units are described in detail. The syntax consists of the directories of data elements, composite data elements, segments, and messages. There are conventions for placing messages in an "envelope" which detects the sender and receiver and other attributes of a transmission. There is a structure of the control segments like UNH, UNT, and so on, which is considered standard across all messages.

Caselet

Prodigy's EDI System

In the year 1957, Prodigy Industries began to manufacture custom-fabricating kitchen cabinets. At present, it has become the nation's largest manufacturer of cabinets. Today, Prodigy has over 5000 employees and 20 industrial plants manufacturing three distinctive lines of high-quality kitchen and bathroom cabinetry.

Purchase orders received at Prodigy are of different formats, some of the orders are placed electronically and some as a spreadsheet attachment. It is critical to maintain every detail of the spreadsheet order's physical integrity as it passes through Prodigy's manufacturing plant. The original electronic order even reflects the order in which shipments are loaded into Prodigy's delivery fleet. Complex orders are still being manually entered into Prodigy's Purchase Order system. Hence, it is very time consuming and requires more human effort.

DMX is one of the leading providers of EDI based solutions. DMX got an opportunity to develop business with prodigy. DMX explained to Prodigy the various benefits of using an EDI system such as, reduced time delay, reduced labor cost, reduced uncertainty, and so on. Prodigy liked the idea and asked DMX to help them in installing an EDI system. DMX prepared electronic document and translated it into a standard format. Communicated this information to the vendors of prodigy and came with their approval, DMX set up a system to translate the standard format into a format vendors wanted. Prodigy found the new system to be convenient and error free.

4.4 Summary

- EDI is an important subset of e-commerce. It is a system which allows structured transmission of data between businesses, government's structures and other entities by electronic means.
- For statistical purposes, the U.S. Census Bureau defines e-commerce as the value of goods and services sold online whether over open networks like Internet, or over proprietary networks running systems like EDI.
- An EDI message can be easily translated into various formats which are suitable for application software right from controlling the production in a factory to giving future orders to the retailers.
- The VAN works as a clearing house for electronic transactions. It serves as a private electronic mail service.
- The EDI standard provides details about a particular document like which piece of information is mandatory for that document and which piece is optional. It also provides the rules for the structure of the document.
- With the help of the EDI translation management software EDI data can be translated into a file format which can be an interface with a company's in-house systems.
- The EDI transmission utilizes various software and systems to allow transmission. The content of an EDI transmission can be one electronic document, or it can be more than one electronic document.
- United Nations/Electronic Data Interchange For Administration, Commerce and Transport (Un/EDIFACT) is the International EDI standard.

- EDIFACT consists of a hierarchical structure where the top level is referred to as an interchange structure, and bottom levels contain multiple messages.
- EDIFACT has an underlying syntax, an ISO 9735 standard, in which the syntax units are described in detail.

4.5 Keywords

Extensible Markup Language (XML): It is a set of rules for encoding documents electronically.

Just-In-Time (JIT) Inventory System: It is a system in which materials are purchased and units are produced as needed to meet the actual customer demand.

Request For Quotation (RFQ): It is a standard business process whose purpose is to invite suppliers into a bidding process to bid on specific products or services.

Value-Added Network (VAN): It is a communication network that has additional functions like error correction, protocol conversion, and message storing.

4.6 Self Assessment

1. State whether the following statements are true or false:
   (a) EDI is a system which allows structured transmission of data between businesses, government's structures and other entities by electronic means.
   (b) The UN/EDIFACT standards are used in the European automotive industry.
   (c) E-Commerce payment systems have become very popular majorly due to the widespread use of the Internet-based shopping and banking.
   (d) EDI is typically handled by using store-and-forward technologies.
   (e) The first attempt to produce a common data format was done in the 1970s by the cooperative effort between industry groups.
   (f) Software is needed to run EDI translation software.
2. Fill in the blanks:
   (a) _____stores the received message in an electronic mailbox simultaneously registers the time and details in a computer.
   (b) _____standard is the only international standard.
   (c) _____ transmission method is very slow and very expensive.
   (d) Segments which are initializing with the UN are called the _____.
   (e) EDIFACT has an underlying syntax, an _____standard, in which the syntax units are described in detail.

3. Select a suitable choice for every question:
   (a) Which of the following is the only international standard?
      (i) TRADACOMS
      (ii) ANSI ASC×12
      (iii) UN/EDIFACT
      (iv) ODETTE
   (b) Which of the following is required to bring all potential users into the market?
      (i) Hardware
      (ii) EDI translation management software
      (iii) Inexpensive microcomputer
      (iv) EDI guides
   (c) In which of the following method, communications happen over dedicated lines directly between trading partners or through VAN?
      (i) SMTP
      (ii) Dial-up
      (iii) FTP
      (iv) HTTP
   (d) In which of the following stage, savings are made by replacing the paper documents with their electronic equivalents?
      (i) Discovery
      (ii) Integration
      (iii) Strategic
      (iv) Operational
   (e) Which of the following segment explains the separator characters used in the transmission?
      (i) UNA
      (ii) UNB
      (iii) UNE
      (iv) UNH

4.7 Review Questions

1. "EDI is an important subset of e-commerce." Discuss.
2. Discuss the difference between EDI and e-commerce.
3. "EDI enables direct communication between applications." Comment.
4. Discuss the features of EDI.
5. "The EDI process is initiated either by downloading a file, or by an operator entering data into a computer with necessary instructions on the screen." Discuss.
6. "The VAN works as a clearing house for electronic transactions." Discuss.
7. "An EDI system consists of all of the components necessary to exchange EDI transactions with the EDI capable trading partners." Describe all the components of EDI system.

8. "Replacement of your paper documents with electronic documents has several obvious benefits." Discuss.
9. Describe some of the ways of EDI transmission.
10. "EDI development follows a fairly standard pattern which is represented as a six stage maturity model." Discuss.
11. "Segments which are initializing with the UN are called the service segments." Describe the service segments of EDIFACT.
12. "EDIFACT has an underlying syntax." Comment.

Answers: Self Assessment

1.	(a) T	(b) F	(c) T	(d) T	(e) F	(f) F
2.	(a) VAN	(b) UN/EDIFACT	(c) Dial-up	(d) service segments	(e) ISO 9735	
3.	(a) UN/EDIFACT	(b) Inexpensive microcomputer	(c) Dial-up	(d) Strategic		
	(e) UNA					

4.8 Further Readings

Books

Chan, H., Lee, R., Dillon, T., and Chang, E. (2008). E-Commerce: Fundamentals And Applications, Student ed. New Delhi: Willey India (P.) Ltd.

Bajaj, K. K., and Nag, D. (2009) E-Commerce: The Cutting Edge of Business, 2nd ed. New Delhi: Tata McGraw-Hill.

Online link

http://www.articlealley.com/article_1379061_22.html?ktrack=kcplink

http://www.edidev.com/EdiTransmit.htm

http://www.mbaknol.com/management-information-systems/electronic-data-interchange-edi-standards-and-specifications/

http://www.scribd.com/doc/38679311/19-EDI

Unit 5: Intranet and Extranet for E-Commerce

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Objectives

After studying this unit, you will be able to:

- Explain intranet and extranet of e-commerce
- Analyze identification and tracking tools for e-commerce
- Provide an overview of internet bandwidth and technology issues

Introduction

We all know that the Internet is a wide area network that connects many people around the world. The Internet has enabled organizations to participate dynamically in the market and not just function as stand-alone enterprises. E-Commerce on the Internet is enabling many industries to improve their business performance.

Example: Steel Authority of India (SAIL) adopted e-procurement. Primarily, input materials were acquired from techno-commercially acceptable bidders through on-line reverse auction. SAIL has initiated steps to create Internet-based e-procurement modules to achieve complete paperless transaction and carry out the entire process online.

NII (National Information Infrastructure) is the successor of the Internet for commercial applications. NII provides new methods of learning and working with others. The NII plans to bring networking and

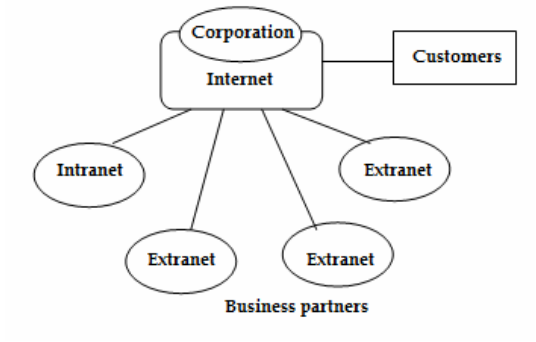
related applications to the public, thereby facilitating information access and communication in an easy and reliable way. This enhances the performance at work, education, and entertainment. The initiative for NII and the Global Information Infrastructure (GII) was taken up by the US government.

An intranet is a network within an organization, which is similar to the Internet and helps in sharing information, communication, and supporting business processes. An intranet uses the Internet technologies such as Web browsers, servers, TCP/IP network protocols, HTML publishing, and so on. An intranet is a private network with a similar network interface as the Internet. It consists of many linked local area networks and is connected to the Internet.

Extranet is an extension of the intranet and allows access to customers and users outside the company. Extranet allows a company to provide services to outside users.

The Internet, extranet, and intranet are all different types of networks. All three serve a common purpose of connecting a group of people in a network. All three of them allow data to be uploaded into a network and downloaded from a network. The Internet, extranet, and intranet use software and hardware to share data between users who have access to the network. The figure 5.1 represents the extranet-intranet-Internet relationship.

Figure 5.1: Extranet-Intranet-Internet Relationship



The way of accessing the Internet, intranet, and extranet may differ from one user to another. An important issue in any organization for network administrators is access. To implement proper access, network administrators must know who has authorization to the Internet, intranet, and extranet. The organizational decision makers must be conversant with policy issues to make sure that unauthorized people do not gain access to the confidential information of the organization.

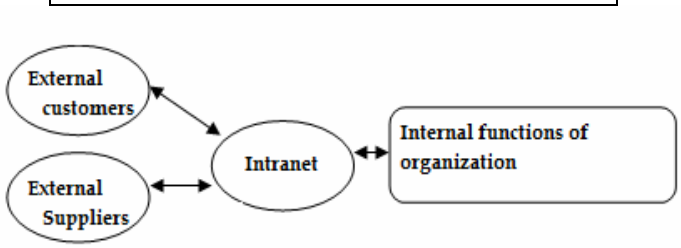
5.1 Intranet and Extranet for E-Commerce

Electronic commerce or e-commerce deals with a wide range of online business activities for products and services. It involves any form of business transaction in which the parties interact electronically rather than by direct physical contact. E-Commerce includes conducting both internal and external business over the Internet, intranet and extranet. It includes buying and selling of goods and services, transfer of funds and simplification of business processes through computer-mediated networks. E-Commerce enables the interaction between a supplier and a manufacturer, customers and sales representatives, and carriers with distributors. E-Commerce applications can be classified as B2C, B2B, C2B, and so on.

The e-commerce exchange transactions include information sharing that supports business transactions. This includes all transactions internal to the business organizations and the external transactions with customers and government agencies. It also integrates the electronic business (e-business). E-Business deals with the use of the Internet and digital technology for managing the business processes internal to the organization.

The figure 5.2 depicts the use of intranets.

Figure 5.2: Extranet and Intranet



As shown in figure 5.2, the intranet connects internal organizational functions together for efficiency and timeliness within the firm. The internal functions include accounting, inventory, purchasing, shipping, and so on. When intranets are expanded to include external organizations as authorized users of an organization's intranet, they create extranets.

The new business standard is based on the virtual corporation model which is attained through a combination of intranets and extranets. The universal access to information which is facilitated by the Internet, intranet and extranet is the basis of new business models for e-commerce.

Notes

1. Business transactions which are internal to an enterprise are also considered as e-commerce.
2. Internet sales, order processing, fund transfer for accounting purposes, and intra company charging and billing are some of the transactions which can be very large dependent on the size and nature of the corporation.

The intranet promotes the management of internal corporate information that may be interconnected with a company's e-commerce transactions (or transactions conducted outside the intranet). The intranet allows direct flow of internal information. Therefore, important information can be processed and matched with data flowing from external e-commerce transactions. This allows the efficient integration of the corporation's organizational processes.

EDI capabilities can be added to the existing business applications of organizations which can be enabled on the Web for e-commerce. The intranets and extranets are contributing to the growth of e-commerce through provision of secure transactions on the open Internet paths.

Did you know?

The Enterprise Resource Planning (ERP) system vendors like Baan, PeopleSoft, SAP and Oracle are trying to integrate e-commerce solutions into their products.

5.1.1 Intranet Services

An intranet provides Internet services within an organization. The intranet client is a universal browser that uses TCP/IP protocol. There may be many servers in the organization that support many services on any operating system. These servers are considered to be a part of the intranet as long as they support TCP/IP protocol stack.

An intranet has to be designed for the specific functional requirements of an organization. The services may include the following:

1. Mail services
2. File transfers

3. Web services
4. Audio services
5. Video services

The e-mail services must be provided from a standard-based server, i.e., SMTP mail server with the client using the browser to retrieve mail from the mail server. The easiest way for setting up a server is by installing a UNIX system which has built-in free SMTP mail server software. UNIX is available for free, and Linux comes complete with a SMTP mail server. The essential components of an intranet include a network, TCP/IP on servers and clients, hardware for hosting intranet services, software for the Web server hosting Web pages, mail servers, and browsers. The optional components include HTML editors, e-mail Remote User Agents, proxy servers, and CGI. The productivity tools include Web-aware, Java and ActiveX.

The essential components make the intranet operational and the optional elements make it useful by delivering most of the intended intranet services. The tools facilitate Web services, database linkages, and graphics.

An organization can obtain the following benefits by using an intranet:

1. Easier and faster access to information
2. Reduced costs
3. Easier and faster access to remote locations
4. Latest research base
5. Easier access to customers and partners
6. Increased accuracy
7. Timeliness of information

Example: El Dorado Holding Company purchases auctioned homes, remodels them, and sells them. El Dorado Holding Company had an existing PHP Web application that included a customer Web site and the intranet. They required a company with good programmers to pick up where their previous developer had left off. Inspironix stepped in and helped them expand their public Web site to allow visitors to easily see the homes on sale.

The management analyzes the business problems or the issues that are being addressed through the intranet. The focus must be on business needs that drive the intranet. Thus, the intranet provides the organization with the essential tools for operational efficiency, enhanced knowledge base, and more productivity to survive in the market.

Intranets have a number of advantages over the traditional network communications. Intranets provide a common communication platform for the sharing of private corporate information. They give the business the opportunity to take advantage of all the functions that the Web performs such as e-mail, chat, mailing lists, experts systems, calendars and searching, and discussion forums. The information can be given in multimedia format that increases the communication power and effectiveness of intranet. Intranets also provide a communication channel for e-commerce by connecting to the Internet thus, making it an extranet.

Example: Sikorsky Aircraft Manufacturers designed a single electronic interface to facilitate the 250-member design team to share resources and work interactively on the design and development of the new Comanche helicopter for the US Army. Thus, intranet ultimately reduced the design time by 30 percent.

The major application of intranets is the sharing of expert information inside the company. Over the years, most businesses have collected valuable data about their processes, customers, products, and

competitors. Applications can be developed to assist the sharing of these data for the people who require this information for decision-making.

Example: AskMe Enterprise has developed an application on the basis of following assumptions:

1. Employees do not know who can help them solve their business problems.
2. The exchange of workplace knowledge takes place by means of e-mail, phone calls, or meetings. As most of the resulting knowledge stays undocumented, it is unusable by others.

A company is expected to have the following business benefits by using AskMe Enterprise's application:

1. Share best practices across the organization
2. Improve business skills
3. Respond faster to key business issues
4. Replace reinvention with innovation
5. Make better decisions
6. Increase productivity

E-Commerce applications help in managing customer information, product inventory and invoicing.

Task

Visit any organization and analyze the key benefits that the intranet has brought to the organization.

5.1.2 E-Commerce over Extranets

An extranet can be defined as a shared Internet connection with other companies and business partners. Some parts of an intranet are made available to the customers for specific applications. The links between an intranet and its business partners are attained through TCP/IP, the standard Internet protocol. Extranets provide the security of an intranet while maintaining the global reach of the Internet. The major feature of the extranet is that it extends the intranet from one location to another across the Internet by securing data flows using cryptography and authorization procedures. This way, intranet of business partners, distributors, financial services, material suppliers, and customers are connected to extranets by an agreement between collaborating parties. The business model which is established through the combination of intranets and extranets has become significant for e-commerce as it enables the corporations to utilize market opportunities and offer customized services and products. Business-to-business e-commerce is emerging on extranets. The companies gain advantage through quick transactions and access to newer markets by faster and simplified distribution of information, products, and services.

Businesses are trying to develop secure links with trading partners and customers for years. The use of IP to support secure intercompany virtual private networks has led to the creation of extranets. Thus, access privileges and routing tables are overlaid on existing intranet and Internet infrastructure. The security of transactions with permitted corporate Web sites and databases is then enabled on the extranet. In addition to simple commercial transactions of sale-purchase, joint activities between business partners on the extranet are enabled at lower costs over VANs.

The business uses of extranet are wide and very similar to that of intranets.

Example: UPS Logistics helped Ford Motor Company to put up a system for tracking individual vehicles throughout the shipping process by integrating the intranets of both Ford and UPS to set up a unit called UPS Autogistics. Ford contributed 27 employees to a UPS staff of 120, using their automotive industry expertise and collaboration of systems and resources. One year after the launch of Autogistics, Ford revealed a 25 per cent cut in delivery times, US$125 million savings in annual carrying costs and US$1 billion a year in inventory reductions.

Case Study

Customer Extranet (ABC)

ABC Auto Company had a remarkable success in using the Web to serve potential customers through its Web sites. ABC accepted that the Web could also be utilized to offer services to current product owners in order to meet the company goals.

The company goals include increasing lifetime owner loyalty and establishing a channel of communication with customers throughout the ownership life cycle.

Overview

XYZ Software Services worked with ABC Auto Company to plan an effective online strategy for enhancing its relationship with current customers. With this plan, XYZ Software Services designed and developed a Web site that provides a full suite of product-specific information and services for the owners of ABC cars.

XYZ Software Services had to create an Internet solution that would accommodate all of ABC Auto Company's product groups while maintaining a distinction between the multiple brands. To achieve the desired level of personalization, perfect integration with existing business systems was necessary. In addition, participation by dealers and the primary point of contact with new customers were also instrumental in achieving this goal.

Solution of XYZ Software Services

To create a strong foundation for this initiative, a team from XYZ Software Services and ABC Auto Company completed a broad strategic assessment. Following wide-range of customer research, dealer interviews, industry research and a detailed analysis of ABC Auto Company's business requirements, the team planned out X&Z's design, functionality, and an implementation plan.

To provide a unique experience for each user, XYZ Software Services designed and built a dynamic site that delivers content that is customized to the user's products. The services available on the Web site include maintenance plans.

Results

The extensive services of the Web site were very helpful to the customers of ABC Auto Company. Site navigation and accessible content improved the customer satisfaction. Moreover, the site enabled ABC to capture useful data and communicate with its customers in a centralized, online location.

Questions:

1. What was XYZ Software Services' initiative to create an Internet solution that could accommodate all of ABC's product groups?

2. What were the benefits derived by the customers of ABC Auto Company through its Web site?

Source: http://www.calcuttawebdevelopers.com/ecom-case-studies-cars.htm

Task

Find out the trend towards open systems, connectivity, and interoperability related to business use of the Internet, intranets, and extranets.

5.2 Identification and Tracking Tools for E-Commerce

It is very important to organize the information regarding the movement of goods that are being traded, in order to maximize the benefits of e-commerce. The goods need to be tracked and identified to provide information to the agencies involved. This is achieved by the integration of EDI and identification/tracking tools.

5.2.1 EAN System

EAN system is an international trading language used to identify items, processes, and services. The acronym EAN is derived from the system's name - European Article Numbering. It is the only system used at a retail point of sale and in commercial and industrial sectors for identifying consumer goods, textiles, automotive parts, books, transport units, locations, and many other utilities.

Did you know?

EAN is managed internationally by EAN International which was established in Brussels in 1977.

The EAN system in India is administered by EAN INDIA. EAN International believes that the wide acceptance of the EAN system, both internationally and across industry sectors, makes it a perfect basis from which organizations and industry groups can migrate to full electronic trading.

Did you know?

EAN organizations in over 85 participating countries operate on a non-profit basis, funded by fees from participating companies. The services of EAN are free for its members.

EAN system is voluntary, operating on the basis of co-operation between manufacturers, retailers, and distributors. The major retailers across all parts of the world purchase products which are identified by EAN numbers and bar codes. EAN system also consists of a set of messages for EDI transactions.

The EAN system is "open". Anyone who wishes to use it can communicate and trade with anyone else who is using it, as long as they abide by the international standards. The internationally defined standards permit multiple suppliers to expand software and hardware equipment, assuring a competitive market for products and services.

The EAN system provides a common language for trade and commerce worldwide and is applicable to all industrial and commercial sectors. All member countries of EAN accept to operate their national numbering system within the EAN rules, so the articles numbered and bar coded in one country can be uniquely identified in all other countries and scanned using similar equipment.

Did you know?

EAN number and symbols can be used anywhere in the world except in North America where the system is different for some EAN symbols. U.S.A uses the UCC system (Uniform Code Council).

The EAN system is recognized at all points in the supply chain, from the handling of raw materials to the customer checkout. It allows automated collection of valuable information like sales volumes and item location. It supports automated stock control systems which reduce scope for human error. EAN system is the basis for electronic trading systems such as electronic data interchange (EDI).The EAN system is a stable, world-wide system with an expanding range of users.

Notes

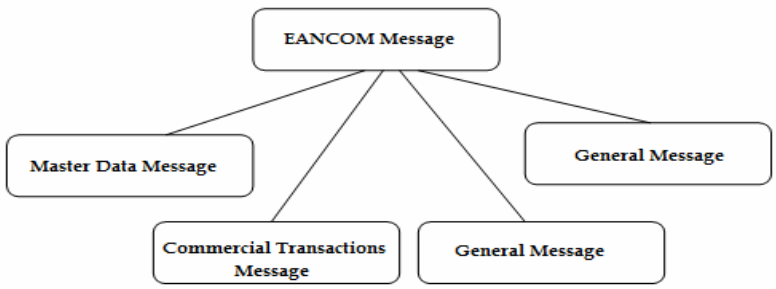
The EAN system enables automation of stocktaking and inventory control thereby, reducing the time taken to order, receive, and dispatch goods.

5.2.2 EANCOM

The EAN label is used to integrate the physical flow of goods using bar codes and the business document flow using EDI. The information contained in the EAN label is transmitted using the EANCOM EDI messages. Clear explanations help trading partners to exchange commercial documents in an accurate and cost-effective manner resulting in well-organized transaction processing.

EAN and its Numbering Organizations develop and maintain EANCOM messages. The figure 5.3 depicts the different types of EANCOM messages.

Figure 5.3: Types of EANCOM Messages



The different types of EANCOM messages are:

1. ***Master Data Messages:*** Master data messages contain data which does not change frequently. These include information such as names, addresses and production information.
2. ***Commercial Transactions Messages:*** Commercial transactions messages deal with the complete trading cycle and include quotation, transport and logistics related messages, and purchase orders.
3. ***Report and Planning Messages:*** Report and planning messages include general trading reports that assist the users in developing business plans. It also contains acknowledgement messages.
4. ***General Message:*** The general message provides data transmission for which there is no specific standard message.

5.2.3 Article Numbering

The EAN numbering system assures unique and clear identification of articles. These numbers can be used by manufacturers, wholesalers, exporters, and retailers to communicate information regarding the traded goods or services.

The EAN numbers do not contain any product information and it is the key to access a database.

The EAN system uses unique numbers to identify items, locations, or services. Most of the items manufactured for sale through retail outlets bear a number and a bar code symbol. The whole number is made of two sets of digits and a check digit.

EAN Prefix: In India, the EAN prefix is allocated by EAN INDIA. It enables EAN organizations throughout the world to identify the customer and customer's country of EAN membership. This prefix provides the seven or eight of the 13 digits which is required to identify each item.

Item Number: The EAN member uses these digits to number each product and product variant in their range.

Check Digit: This number is produced by calculating the preceding twelve digits. Whenever a computer decodes the bar symbol, it repeats the calculation and checks its answer against the check digit to verify that the symbol has been correctly scanned and decoded.

EAN numbers are structured with 14, 13 or 8 digits as EAN- 14, EAN- 13, or EAN-8 as shown in table 5.1. EAN-13 is used to identify the consumer items sold at the point-of-sale. EAN -14 is used to identify trade units like packages where the content items are identical to each other. When an item is very small, EAN-8 is used.

Table 5.1 EAN Numbers

EAN-8	0000001234567C
EAN-13	0123456789012C
EAN-14	V123456789012C

V is used in EAN-14 and represents the logistic variant assigned by the manufacturer for trade items. It is a number between 1 and 8. It is chosen by the manufacturer based on specific needs for representing a packaging configuration.

C is the check digit that checks whether the preceding code is correctly captured. It is calculated using the previous digits.

The 12 digits in the EAN code (other than the logistic variant and the check digit) have the structure as shown in table 5.2.

Table 5.2 Structure of EAN code

First 3 digits	Next 9 digits
PPP	XXXXXXXXXX

PPP: EAN International allocates a prefix to the EAN Numbering Organization of a country or region.

XXXXXXXXXXX : The EAN Numbering Organization allocates these 9 digits to member organizations. These digits contain the number allocated to the company and also the number assigned by the company to an item. Each member company allocates an item number to identify each item.

5.2.4 Bar Coding

Bar codes represent EAN numbers used for identifying the items. Bar codes encode the numbers in machine-readable form. The numeric value of the code is printed underneath the bar code symbol which can be read by a scanner. Figure 5.4 depicts EAN-13 number represented by bar codes.

Figure 5.4 depicts the barcode representation of EAN-13 number.

Figure 5.4: Barcode Representation of EAN-13 Number

Bar codes can take different forms. Each form is called a symbology and is designed for a particular purpose. The equipment used to print or read bar codes must have the correct software for the EAN symbology being used. Most organizations which use the EAN system to keep track of items use the numbering and bar code system together with scanning devices, appropriate software, and a computer.

The size and the light margins at each end of the bar code are the components of a bar code. The Interleaved Two of Five (ITF) methodology of bar code symbols is suitable for lower quality of packaging materials which are used for trade items. The ITF symbol is used in the shipping and warehousing industry and can be read by fixed and portable bi-directional scanners.

Example: When you are in an online store and if you like a product and want to add it in a wish list for future purchases, then you can just open the shop application and add it to a shopping list. The barcode of the item is stored in the shopping list.

5.2.5 EAN Location Numbers

We know that the EAN system works by identifying each item with a code comprising of two main parts, a number and a barcode symbol. The number uniquely identifies the item and is encoded into a bar code symbol which is placed on the item with the corresponding number underneath. Light and dark parallel bars of differing widths form the bar code symbol and allow electronic reading by a wide range of scanning devices.

Did you know? The EAN location number is recognized by the United Nations working party responsible for UN/EDIFACT and by the International Standards Organization.

EAN location numbers identify any location within an organization. This includes companies, their subsidiaries and divisions, and departments. Each location is allocated a unique 13-digit identification number with 3-digit prefix. The last digit is the check-digit which is calculated based on the first 12 digits and provides security from wrong data capture.

Example: The table 5.3 shows an example of EAN location number 3451523457896.

Table 5.3 EAN Location Number

345 - EAN prefix	523457896 - Company prefix and number allocated by the company	1 - Check digit
EAN prefix	EAN numbering organization	
Company number	Assigned by numbering organization	
Check digit	Calculated based on the first 12 digits	

The information about different locations is communicated only once between trading partners and then queried by referring to the unique standard location number.

5.3 Overview of Internet Bandwidth and Technology Issues

Bandwidth is defined as the rate at which data is sent to or received from the Internet. Bandwidth is used to measure Internet traffic. It is measured in terms of megabits per second (mbps). Bandwidth represents the number of bits per second of data sent to or received from the Internet. Several factors need to be considered while choosing the necessary bandwidth for a business. Bandwidth management involves monitoring and managing available resources and optimizing the resources to ensure value for money.

E-Commerce on the Internet faces a number of challenges. These challenges can be technological, legal, or regulatory.

The legal and regulatory challenges include:

1. Role of governments and nations
2. Customs and tax uncertainties
3. Lack of consistent rules and policies

The growth of e-commerce depends on the reliability, bandwidth, and security of the Internet. The countries are moving at great speed to solve the problems of bandwidth and technology, in order to improve Internet commerce.

Let us discuss the Internet bandwidth and technology issues in detail.

5.3.1 Bandwidth Issues

Bandwidth is a resource that is expensive, in demand, and therefore must be managed accordingly.

Some of the technological challenges are:

1. Available bandwidth is limited and insufficient to meet demand
2. Interoperability of technology
3. Bandwidth is expensive
4. Lack of standards
5. Expanding bandwidth capacity is limited due to finances, supply, and technology

The bandwidth issues related to Internet are managed by networking standards such as Asynchronous Transfer Mode (ATM) and TCP/IP suite of protocols for interconnection.

ATM Technology

The use of networks has undergone major changes. Asynchronous Transfer Mode is the technology that serves to solve the bandwidth and network problems. By means of ATM, data is broken into small constant sized byte packets and sent over the network through a series of switches. ATM is the statistical multiplexing of the data packets. The small and constant packet size allows switching to be carried out in hardware, rather than implementing the routing in software.

A virtual circuit is set up, which reserves a fixed bandwidth for the duration of the communication. This assures that bandwidth is available when required. The ability of ATM to reserve dedicated amount of bandwidth for individual connections allows better management of different types of traffic going over the network. Network management software permits small amounts of bandwidth to be put aside for simple transactions, like e-mails, while allowing more bandwidth for resource demanding multimedia applications.

The prominence of various technologies has made ATM more attractive to network administrators.

Example: The technologies that are included in ATM are video conferencing, multimedia presentations and remote lecturing.

ATM's ability to provide the required bandwidth makes it the evident choice. ATM has the ability to scale from the desktop to LAN to WAN effortlessly. ATM's virtual circuits can reserve bandwidths for different protocols. Each protocol can therefore have a fair access to any free resource that is available. ATM is structured to have a long architectural life.

ATM is a new technology that is based on standards which make sure its interoperability and thus solve the problems that will arise in the future.

ATM/Fiber-optic Networks

Optical fibers facilitate high bandwidth in communication. Optical networks together with copper cables create information and data highways. NIIs have become prominent by using optical fiber to deliver high bandwidth for various applications. Optical networks vary depending upon the distance between transmitters and receivers, type of information carried, and the application.

ATM transmission over the optical fibers is considered as the key technology for delivering the NII services requiring high bandwidths. ATM equipment which was initially developed for single-mode networks is now being integrated into the existing LAN environments. There are problems related to capacities at the interface.

Example: The Fiber Distributed Data Interface (FDDI) networks which utilize ring topology to connect users and route transmission with improved reliability over point-to-point network architecture can carry a maximum of 100 Mbps capacity over its backbone. ATM transmissions, on the other hand, can currently operate at 100-155 Mbps speeds. There are problems due to this mismatch that are solved by vendors from both the fields. This results in fiber optics equipment that is used to optimize and enhance ATM transmission capabilities.

Optical switches, wave division multiplexors, optical cross-connect systems, and fiber optic test equipment can enhance electronic switching and monitoring routines to provide physical layer network management. In addition, they can compress signals using multiple wavelengths to allow duplex transmission over a single fiber. This results in improved network efficiency, increased network capacities and reduced costs.

5.3.2 Technology Issues

The computer-based processing of information takes place at multiple sites in large interactive networks of computers. The organizations are dependent on new kinds of information utilities helping individuals and organizations. The technology vision of NII is based on the Internet. The main goals of the Internet/NII are interconnection and interoperability. Interconnection is a need from telecommunication whereas interoperability is a need of computer industry. The idea of interconnection is easy and represents the global telephone system while interoperability demands universal adoption of common standards. Interoperability can be achieved by allocating functionality to different layers and indicating the interface between layers.

We need to build an infrastructure that is rapidly scalable across the local and wide areas for e-commerce business models. The technology required for this task is a combination of load balancing, and high availability including IP-based services such as intranet, extranet and the Internet services. The load-balancing is done across servers for the Web, for secure e-commerce, file transfer, and mail servers.

The quality of the technology for balancing the loads at all levels has to be capable to monitor and route traffic around server and software failure. File replication and synchronization is required to manage content across globally distributed installations.

Example: The major causes of technological issues include software failure, server failure, content failure, network unavailability, and excess traffic.

High Capacity Storage Systems

Information stored in a computer is moved between disk storage and main memory based on the requirement. As the movement of data to and from the disk is relatively slow compared to the CPU

speed, it is important that the database system organizes the data to minimize the need to move the data between the disk and main memory. Storage is one of the core technology issues for NII/GII. Applications and services predicted on the GII/NIIs include voice, video, and data. This increases the demand for data storage, given that the information content is not only created, processed, and communicated, but also stored on the NII.

The network storage system is classified into the following categories:

1. The main or central server
2. The local or distributed server
3. The client storage on the workstation

The capacity requirement of the main server is in the range of terabyte depending upon the application. The local server may require 10-100 GB of storage systems. The local server restores its contents from the main server via the networks. The issues of network interface components which deals with the main server in the terabyte range include, transmission of retrieved data over a wide range of communication protocols to client and local servers, and the requirement of delivering multimedia content as uninterrupted data stream to the client in order to provide isochronous delivery.

Task

Examine the importance of security in ensuring the development of e-commerce.

5.4 Summary

- The Internet is a wide area network that connects a large amount of people around the world. It consists of network cables across the world allowing everyone to access it.
- An intranet is a network within an organization, which is similar to the Internet and helps in communication, sharing information, and supporting business processes.
- Extranet is an extension of an intranet to allow access to customers and users outside the company. Extranet allows a company to provide services to outside users.
- E-Commerce involves any form of business transaction in which the parties interact electronically rather than by direct physical contact. It includes conducting both internal and external business over the Internet, intranets, and extranets.
- The intranet services include the mail services, file transfers, Web services, audio services, and video services.
- The information regarding the movement of goods that are traded needs to be tracked and identified in order to maximize the benefits of e-commerce. This is achieved by the integration of EDI and identification/tracking tools.
- The growth of e-commerce depends on the reliability, bandwidth, and security of the Internet.
- The bandwidth issues related to the Internet are managed by networking standards such as Asynchronous Transfer Mode (ATM) and TCP/IP suite of protocols for interconnection.

5.5 Keywords

CGI: The Common Gateway Interface (CGI) is a programming interface that enables a Web browser to be an interface to information services other than Web sites.

Cryptography: The conversion of data into a secret code for transmission over a public network.

HTML: Hypertext Markup Language (HTML) is the predominant markup language for Web pages.

Isochronous: Happening at regular intervals.

POP3: PostOfficeProtocol3 (POP3) is a standard interface between a user's e-mail program and the mail server.

SMTP: Simple Mail Transfer Protocol (SMTP) is a protocol for sending mail messages between servers.

TCP/IP: Transmission Control Protocol/Internet Protocol (TCP/IP) is a protocol for communication between computers and is used as a standard for transmitting data over networks. It is the basis for standard Internet protocols.

VAN: Value Added Network (VAN) refers to a private network provider that lets out communication lines to its subscribers. VANs provide specialized services such as assisting with EDI (Electronic Data Interchange), extra security, message delivery, or access to a particular database.

5.6 Self Assessment

1. State whether the following statements are true or false:

   (a) An intranet uses Internet technologies such as Web browsers, servers, TCP/IP network protocols, HTML publishing, and so on.

   (b) Interoperability can be achieved by allocating functionality to different layers and indicating the interface between layers.

   (c) The numeric value of the bar code is printed above the bar code symbol which can be read by a scanner.

   (d) The EAN numbers contain any product information.

   (e) An extranet can be defined as a shared Internet connection with other companies and business partners.

   (f) The bandwidth issues related to the Internet are managed by networking standards such as Asynchronous Transfer Mode and TCP/IP suite of protocols for interconnection.

2. Fill in the blanks:

   (a) The _____ provides a common language for trade and commerce worldwide, and is applicable to all industrial and commercial sectors.

   (b) _____ represent EAN numbers used for identifying the items.

   (c) The _____ is used to integrate the physical flow of goods using bar codes and the business document flow using EDI.

   (d) EAN and its Numbering Organizations develop and maintain _____ messages.

   (e) _____ is an extension of an intranet to allow access to customers and users outside the company.

3. Select the correct option for the following questions:

   (a) _____ is the successor of Internet for commercial applications.

      (i) NII

      (ii) TCP

      (iii) HTML

      (iv) CGI

(b) _____ include general trading reports that assist the users to develop business plans.

(i) Commercial transactions messages

(ii) Report and planning messages

(iii) Master data messages

(iv) General messages

(c) _____ represent EAN numbers used for identifying the items.

(i) EANCOM

(ii) EAN location number

(iii) Bar codes

(iv) Article numbering

(d) The _____ enables automation of stocktaking and inventory control thereby reducing the time taken to order, receive, and dispatch goods.

(i) Intranet

(ii) Check digit

(iii) Internet bandwidth

(iv) EAN system

(e) _____deals with wide range of online business activities for products and services.

(i) Internet

(ii) Extranet

(iii) Electronic commerce

(iv) Intranet

5.7 Review Questions

1. "E-Commerce on the Internet faces a number of challenges." Discuss.
2. "Intranets have a number of advantages over the traditional network communications for a business." Justify.
3. "EAN and its Numbering Organizations develop and maintain EANCOM messages." Analyze.
4. "An intranet has to be designed for the specific functional requirements of an organization." Discuss.
5. "The growth of e-commerce depends on the reliability, bandwidth and security of the Internet." Justify.
6. "The EAN numbering system assures unique and clear identification of articles." Discuss.
7. "The bandwidth issues related to Internet are managed by networking standards such as Asynchronous Transfer Mode (ATM) and TCP/IP suite of protocols for interconnection." Justify.
8. "An organization can obtain numerous benefits by using an intranet." Justify.
9. "An intranet promotes the management of internal corporate information that may be interconnected with a company's e-commerce transactions." Analyze.
10. "Bar codes represent EAN numbers used for identifying the items." Justify.
11. "The EAN system uses unique numbers to identify items, services, or locations." Discuss.

12. "E-Commerce on the Internet faces a number of challenges." Explain.

Answers: Self Assessment

1. (a) T (b) T (c) F (d) F (e) T (f) T
2. (a) EAN system (b) Bar codes (c) EAN label (d) EANCOM (e) Extranet
3. (a) NII (b) Report and planning messages (c) Bar codes (d) EAN system (e) Electronic commerce

5.8 Further Readings

Books

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Unit 6: Security Framework

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Objectives

After studying this unit, you will be able to:

- Discuss security concerns
- Understand the security solutions
- Explain e-cash over the Internet

Introduction

In software industry, security is defined in two different perspectives, one from the viewpoint of software developers and the other from the customers. The main concern for software developers is to ensure that the system comprises certain security features to safeguard it. For example, many software products ensure the password to be at least six characters long and have a capability of encrypting sensitive data. For customers using software product, the main concern would be to obtain protection against virus attacks.

Example: If your system is not safeguarded by antivirus software, then it is prone to get affected by virus when you download games or other files from the Internet. Here, your system is an example of insecure system.

A secured system functions without displaying unintentional bugs. Let us now focus on the likely attacks that can take place in an e-commerce system. We shall also consider the preventive strategies to be implemented.

6.1 Security Concerns

In e-commerce, all the transactions are carried out over the Internet. Though the process seems to be interactive and convenient, there are certain risks inherent to the process such as, duplication of bills are difficult to detect and the transaction information can be altered without leaving any hint. Whereas, when the transactions take place using paper, the purchase documents cannot be modified as there would be some evidence such as signatures and trademarks that are left behind to trace it down.

Example: Anup and Asha are the transacting partners in an online trading site, who are aware of each other's identity. When Anup sends a confidential document such as a purchase order to Asha, Anup must make sure that, the purchase order is receivable only by Asha and not by any other third party.

An efficient e-commerce system should bring in reliability in identifying and tracing any modifications done to transaction documents such as bank cheque, purchase order, and replacement bills.

Whether the transactions are carried out using paper documents or electronic media, they should ensure that the information is not destroyed, and any other third party user or hackers do not use it inappropriately. An efficient e-commerce system should guarantee:

1. ***Confidentiality:*** The transaction information should be protected from unauthorized access by internal users and hackers, as it is vulnerable to be intercepted during transmission over several networks. The information should be encrypted to make it difficult for attackers to trace the algorithm.

Example: If your friend reads mails that are sent to you, then it is a breach of your confidential information and privacy.

2. ***Integrity:*** The transaction document when retrieved from any communication network must be reliable and should resemble the transmitted document without any addition, deletion, or modification.

Example: If a vendor adds extra amount to the bill in addition to your purchase price, then the vendor has violated integrity with respect to bill charges.

3. ***Availability:*** The transaction information communicated across several networks should be available when required. There are several reasons for the unavailability of transaction information such as, virus attacks, abrupt shutdown of systems due to electricity failure, network errors, and errors in product software and hardware.

Example: When your friend sends an SMS and you do not receive it or it may be delivered to you after a day, then it is termed as unavailability of information at the right time.

4. ***Authenticity:*** The retrieved transaction information needs verification to check whether it was sent by the sender or by any other source claiming to be the sender. Likewise, it is also essential to check if the information was delivered to the intended recipient.

Example: When you forget your e-mail password the server asks for your e-mail ID and few security questions that you had answered while creating an account. This process is carried out to check whether you are the authenticated person to access the account.

5. ***Non-repudiability:*** The sender and the recipient should not deny about the transactions made earlier. The communicated transaction information and its acknowledgement must synchronize with the sender and receiver.

Example: Consider that you make a call to a list of five people from your phone. When the service provider sends the bill and you deny making any such calls, then it is termed as non-repudiability.

6. ***Auditability:*** The information about the transactions made must be constantly reviewed to check if they comply with the information confidentiality and integrity requirements.

6.1.1 Types of Security Vulnerabilities in E-Commerce Systems

Today, almost all transactions are carried out online. This has resulted in a sharp increase of virus attacks and information hacking in online payment systems. The hackers utilize vulnerabilities published in reusable third party components such as, shopping cart software commonly used by online shopping Web sites. Other hackers make use of possible vulnerabilities that commonly occur in Web applications like Structured Query Language (SQL) injection or cross-site scripting.

Following are some of the security vulnerabilities that occur in e-commerce systems:

1. ***SQL Injection:*** This is a type of security vulnerability wherein the attackers insert certain SQL Meta characters in the user input. Generally, attackers check if a site's security features are weak enough to get affected. They perform this check by sending a single quote character (') embedded in the user input. When the site responds, the attacker's queries execute in the back-end database. Then, the attackers modify the query to a Boolean value that is always true and thus, gain access to the restricted areas of the site.

Example: E-Commerce Web sites such as Guess.com and PetCo.com were found more vulnerable to SQL injection attack. A 20-year old programmer in Orange County, California, found that it is possible to access highly sensitive data such as, credit card numbers and transaction details from these Web sites using specially created URLs consisting of SQL Meta characters.

The Web sites are attacked using SQL injection technique depending on the type of back-end database being used for the site. SQL injection technique on an Oracle database can be attacked using the UNION keyword. Attacking an application that uses Oracle as back-end is very difficult when compared to attacking an application that uses MS SQL Server as back-end. In MS SQL server, the queries are terminated with a semicolon and hence, it makes easy for the attackers to insert a Meta character in the query.

Example: SQL injection vulnerabilities were discovered in shopping cart software like VP-ASP Shopping Cart, iGeneric Free shopping cart, Web Merchant services, and Storefront shopping cart. It was found that in Storefront shopping cart, the SQL injection vulnerability was detected in login.asp page allowing the attacker to execute malicious database queries without authenticating the Web site.

2. ***Price Manipulation:*** This type of security vulnerability is common in online shopping Web sites and payment gateways. When a consumer purchases a commodity online, the price is stored dynamically in a HTML hidden field. An attacker can modify the payable amount by using a Web application proxy when information flows from the user's browser to the Web server. When the number of transactions is more, the modification made to the price often goes unnoticed. Frequent attacks of this type will reduce the credibility of online merchant.

Example: 3D3 ShopFactory Shopping Cart experienced price manipulation vulnerability, where product and price information stored in client-side cookies was easily manipulated by an attacker.

Did you know? Smartwin Technology's CyberOffice Shopping Cart 2.0 was attacked by price manipulation technique. It happened when an attacker downloaded the order form from a local machine and resubmitted the form to the target server by modifying the hidden fields to arbitrary values.

3. ***Buffer Overflow:*** This type of security vulnerability involves overloading a Web application by sending data in larger volumes than its actual capacity. When this happens, the back-end of the application may not be able to process the large data and hence, would display a fatal error message showing the location of the functions. This would allow the attacker to access the confidential information.

Example: In PDGSoft Shopping Cart, multiple buffer overflows were discovered that allowed the execution of attacker's code by over-writing the saved return address.

Notes Error pages act as a source for confidential information. The errors appearing in the error pages can be added in Web applications that possess weak input validation techniques. For example, an application that is designed to recognize the numeric inputs would fail when alphabets or other special characters are provided as input.

4. ***Cross-site Scripting:*** This type of security vulnerability is also known as XSS attack. The XSS attack targets a Web page that uses a 'form' field to input the data from the user, processes the entered data and displays the result on the Web page along with the user input.

   XSS attacks can be commonly found in 'search' option of a Web site. When a user enters a keyword for search, the search option prints the result with a line - 'Results for <user_supplied_input>'. In case the user input is not displayed within a quote, then an attacker can create a JavaScript as a part of user input and embed it with the URL. This script begins to execute when a common user who is not aware of the scripting language clicks on the link. This way an attacker can steal the user's cookies, which contains the session ID and other confidential information.

Example: Consider a scenario where Citibank's Web site was targeted by an attacker. The attacker had created two windows to open on the user's system. The first window was the original Citibank Web site and the other was a pop up window that requested the user's debit card number, PIN number, and card expiration date. When a user entered this information, the site redirected the Web page to the attacker's server and a tricked e-mail was sent to the Citibank account holders to verify their details. Thus, the attacker gained access to users account and the money was stolen.

5. ***Remote Command Execution:*** This type of security vulnerability takes place when there is a weak input validation technique used in Web sites. If a Web site includes Common Gateway Interface (CGI) scripts, an attacker can easily execute operating system commands. This vulnerability is found in Web applications that are designed using Perl and PHP scripts that use the 'system' call command.

Example: In case of Hassan Consulting's Shopping Cart, an attacker could execute remote command execution because the software did not reject the usage of shell Meta characters such as, |, ; ,&.

6.2 Security Solutions

Today, setting up a secured e-commerce system comes with an unexpected cost for online merchants and business owners. E-Commerce Web sites that run on Web applications have become an easy target for theft on information and burglary. Attackers come up with new hacking techniques to steal credit cards and other sensitive customer information. Hence, it is essential to establish strict security features in e-commerce systems for Web site owners to maintain the consumer trust.

Cryptography techniques can be used to safeguard the e-commerce Web sites. Cryptography consists of encryption and decryption techniques. Encryption converts the confidential information into a coded language that is difficult to understand by unauthorized users. Decryption, also known as reversing encryption decodes the coded information and translates back into its original form.

While encrypting a password, each alphabet or numerical character contained in the password should be shifted by a specific number of positions so that it becomes difficult to trace it.

Example: Consider you have to encrypt a password that is eight characters long and you decide to shift each character by six positions. The encrypted scheme for such an example is as shown below:
C - I
O - U
N - T
S - Y
T - Z
A - G
N – T
T – Z
This way the word "CONSTANT" would look like "IUTYZGTZ" which is not easily understandable.

Cryptographic systems are categorized into symmetric and asymmetric cryptosystems. In Symmetric cryptosystems, only a single secret key is shared by users engaged in secure communication. Whereas, in asymmetric cryptosystems two keys namely, private and public key are used for communication.

6.2.1 Symmetric Cryptosystems

Symmetric cryptosystems make use of a single key to establish communication between two users. Hence, every time a new pair of users engages in a secured communication, a new key has to be generated.

Did you know? Cryptosystems were used commercially in the year 1977, when the Data Encryption Standard (DES) was accepted as a United States Federal standard.

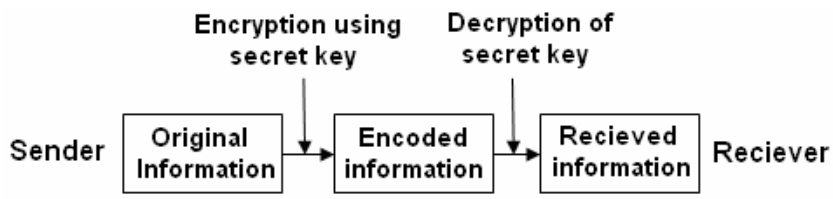
Symmetric systems function in two modes:

1. ***Block Cipher Mode:*** In this mode, the information is divided into fixed size blocks. These blocks are encrypted and communicated to the receiver. On the receiving end, the encrypted information is decrypted and the original information is retrieved.
2. ***Stream Cipher Mode:*** In this mode, the information is encrypted and sent to the receiver. The information is not divided into blocks, as this mode is capable of operating on information of any size. Upon decryption, information of the same size is retrieved as a plain text.

The strength of the information encrypted depends on the length of the secret key. A secret key is formed by making different combinations of the characters present in the information. The encryption strength increases if you increase the key length. However, it is very difficult to process the key if it is too lengthy and also the cost involved in employing such a technique requires more resources.

Figure 6.1 depicts a symmetric cryptosystems. The sender enters the information to be communicated at the sending end. The information is encrypted using a secret key and sent over the communication network. When the transmitted information reaches the receiving end, it is decrypted and delivered to the receiver. Hence, the receiver gets the original information transmitted by the sender. The information is not modified or deleted when communicated over the network as the information is secured and requires time and cost to decode by any other source that tries to attack the system.

Figure 6.1: Symmetric Cryptosystem



Source: Bajaj. K., Nag. D. (1999). E-Commerce Security Issues. New Delhi: Tata McGraw-Hill Publishing Company Limited. Page 202.

Example: In a typical DES cryptosystem using block cipher mode, the information is encrypted in 64-bit blocks using a 56-bit key. The information bits are broken down into blocks and a permutation of these information bits are carried out. Then, the obtained result is processed using the 56-bit key. The original information is then extracted at the receiving end.

Symmetric cryptosystems provide information integrity and authentication by generating a checksum from the transmitted information. The checksum is transmitted along with the original information. The receiver will know any modifications made to the information as the modified checksum will not match with the original checksum.

Did you know? In 1986, an integrity checksum named Message Authentication Code (MAC) was generated using DES for the usage in banking and financial sectors.

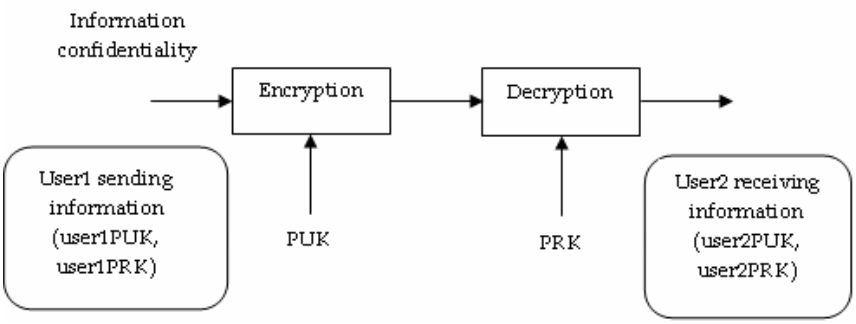
6.2.2 Asymmetric Cryptosystems

Asymmetric cryptosystems use a pair of keys - private and public keys for establishing a secure communication between two users. Both the keys are related to one another. The owner of the information owns the private key. The algorithm designed to generate the private and public keys involves the use of one key to encrypt the information and the other key to decrypt the information on the receiving side.

Figure 6.2 depicts asymmetric cryptosystems algorithm 1. Consider user1 sends confidential information to user2. User1 does this by encrypting information using user2's public key (user2PUK). After the information is delivered to user2, it is decrypted using user2's private key (user2PRK). This technique ensures information confidentiality as the private key is protected by user2 and any third party cannot access the private key. An attacker will not be able to decode the encrypted information without the knowledge of user2's private key.

Figure 6.2 depicts asymmetric cryptosystems algorithm 1.

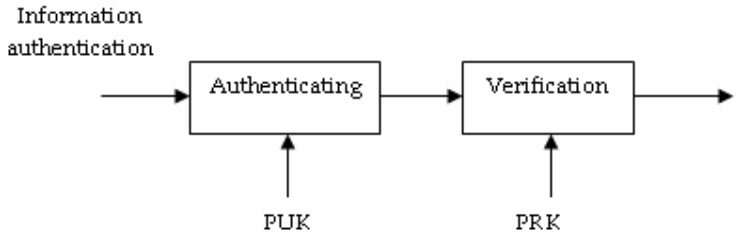
Figure 6.2: Asymmetric Cryptosystems Algorithm 1



Source: Bajaj. K., Nag. D. (1999). E-Commerce Security Issues. New Delhi: Tata McGraw-Hill Publishing Company Limited. Page 204.

Figure 6.3 depicts asymmetric cryptosystems algorithm 2. Suppose user1 has to authenticate user2 about the transmitted information, then information is encrypted using user1's private key (user1PRK). The encrypted information is then decrypted at the receiving end using user1's public key (user1PUK). The user1 protects the private key thereby, authenticating the acknowledgement sent to user2.

Figure 6.3: Asymmetric Cryptosystems Algorithm 2



Source: Bajaj, K., and Nag, D. (1999). E-Commerce Security Issues. New Delhi: Tata McGraw-Hill Publishing Company Limited. Page 204.

The RSA Algorithm

RSA algorithm is a cryptosystem that uses public key for achieving confidentiality and authenticity of the information. It was developed by Ron Rivest, Adi Shamir, and Len Adleman in the year 1978.

Let **a** and **b** be two prime numbers. The result of their product is assigned to **L.**

L=a*b

Two random numbers **p** and **q** are chosen from the product of two prime numbers - **(a-1) * (b-1)**.

Both **p** and **q** are relatively prime to **(a-1)** and **(b-1)**, i.e., both **a** and **b** do not have any common factors with **p** and **q**.

Now, **p** and **q** are written as:

pq= 1 mod (p-1)(q-1)

Here,

pq-1 is divisible by **(a-1)** and **(b-1)**.

The public and private keys are thus formed, **(L, p)** is the public key and **(L, q)** is the private key.

In order to encrypt an information **I** using the public key **(L, p)**, calculate the value $I^p \bmod L$

This gives the encrypted information say **E**.

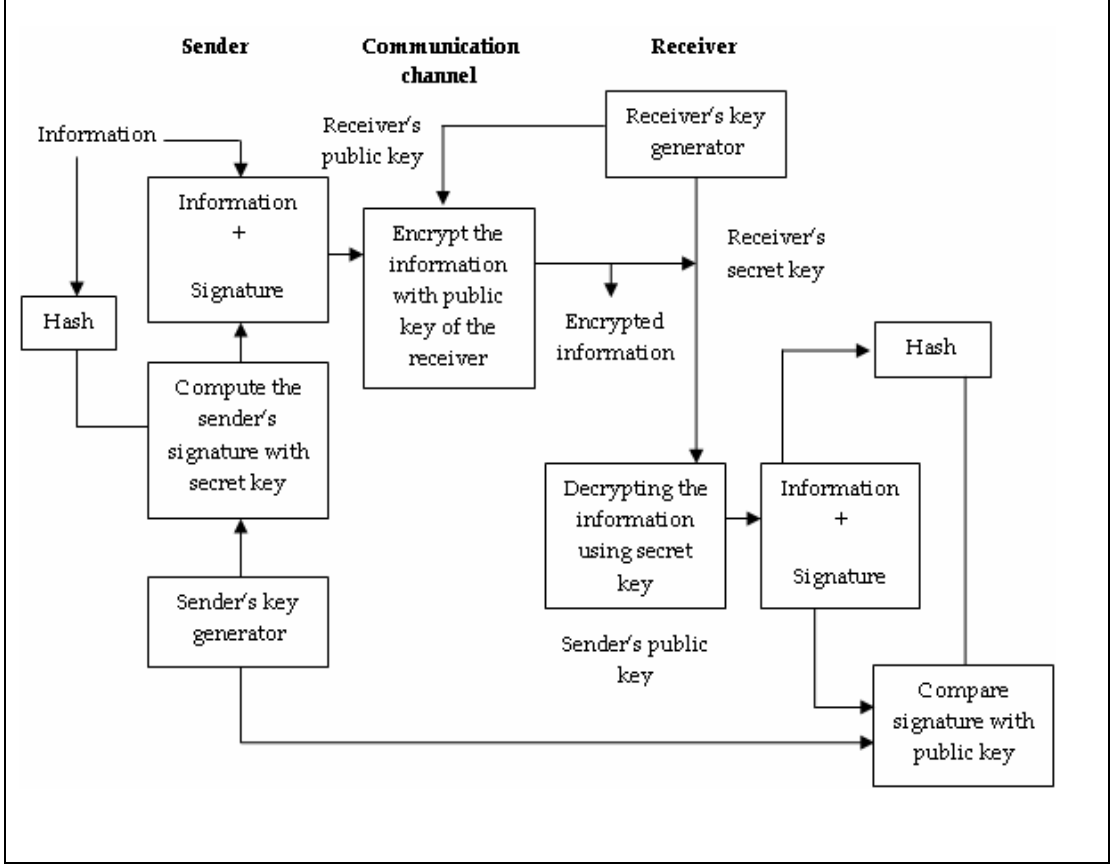
To decrypt information, calculate $E^q \bmod L$. This gives the original information **I**.

6.2.3 Digital Signatures

Digital signatures are used for verifying both authenticity and integrity of the information. When an information transfer occurs over a communication network, care should be taken to prevent the (misuse of the signature) receiver from using the sender's signature to send the information to other sources on behalf of the sender.

Figure 6.4 depicts the representation of digital signatures. RSA cryptosystem encrypts the information to be transmitted with sender's private key to create a 'signature'. The information is then transmitted to the receiver with the signature attached to it. This signature is decrypted at the receiving end using the sender's public key. The receiver compares the decrypted signature with the transmitted information. If there is a match, then the receiver will recognize that the original sender sent the information.

Figure 6.4: Representation of Digital Signatures



Source: Bajaj. K., Nag. D. (1999). E-Commerce Security Issues. New Delhi: Tata McGraw-Hill Publishing Company Limited. Page 207.

Since the signature size is same as the information size, the size of the total information transmitted is large and hence requires more time to process the data.

To overcome information processing overhead, hash functions are used. Hash functions have the capability to handle information of any size. They break down the information into fixed size bits that are of small size. The generated information bits are then encrypted with the private key to create the sender's digital signature. At the receiving end, the encrypted information is decrypted using the sender's public key and the information bits are recomputed and verified with the original information bits. If the match is found, then the receiver is assured of the sender's authentication and integrity of the information.

A useful advantage of using hash functions is that, any modification made to the original information will alter the information size and thus, result in an entirely different information bits.

Did you know? The hash functions used for implementing digital signatures include algorithms such as Secure Hash Algorithm (SHA) combined with Digital Signature Algorithm (DSA), Message Digest Algorithms 4 (MD4), and Message Digest Algorithms 5 (MD5) from RSA Data Security Inc.

6.2.4 Public Key Cryptography Standards

Public Key Cryptography Standards (PKCS) designed a standard format to transmit data over the network using public key cryptography technique. PKCS is compatible with the Open System Interconnection (OSI) Model standards and includes various aspects like RSA encryption, Diffie-Hellman key exchange agreement, private key information syntax, and so on.

PKCS consists of various components designated as PKCS #1, PKCS #2, PKCS #3, PKCS #4,…… PKCS #10.

1. ***PKCS #1:*** Defines a standard for RSA Cryptography Specifications.
2. ***PKCS #2:*** It is incorporated into PKCS#1.
3. ***PKCS #3:*** Defines Diffie-Hellman key agreement standard.
4. ***PKCS #4:*** It is incorporated into PKCS#1.
5. ***PKCS #5:*** Defines a standard for Password-Based Cryptography Specifications.
6. ***PKCS #6:*** Defines extended-certificate syntax standard.
7. ***PKCS #7:*** Defines a Cryptographic Message Syntax for information that has cryptography applied to it such as, digital signatures and digital envelopes.
8. ***PKCS #8:*** Defines private-key information syntax standard.
9. ***PKCS #9:*** Defines selected object classes and attribute types.
10. ***PKCS #10:*** Defines Certification Request Syntax for public-key certificates. The certification request consists of a Distinguished Name (DN), public key, and other attributes signed by the entity making the request. The request is sent to a Certification Authority (CA), who in turn converts the request to an X.509 public-key certificate and returns it in PKCS #7 format.

6.2.5 Protocols for Secure Messaging

Security protocols form an important basis for sending information over communication networks. They provide security for the transmitted information and assure secured communication without any addition or deletion.

The various messaging protocols used for establishing a secured communication are:

1. ***Privacy Enhanced Mail (PEM):*** It is an Internet standard established to provide secure transfer of electronic mail. PEM uses various cryptographic techniques to ensure confidentiality and integrity of information. The integrity feature ensures a user that the transmitted information is not modified. The authentication feature verifies that the PEM information received by the user is sent by the original sender and not from any other source that claims to be the sender. The confidentiality feature ensures that the transmitted information is not made available for

unauthorized users and attackers. The security protocols are defined in RFC 1421 and RFC 1422. However, PEM was not entirely accepted and used, as it was not compatible with Multipurpose Internet Mail Extensions (MIME).

2. ***MIME Object Security Services (MOSS):*** It is a protocol that uses signed and encrypted framework to apply encryption services and digital signatures to MIME objects. The services are applied using end-to-end cryptography between the sender and receiver at the application layer. The signed framework applied to the MIME objects consists of two parts – MIME content and signature. MOSS was developed to handle the MIME messages that were not possible by PEM protocol. However, MOSS was not properly deployed and is not widely used now due to the popularity of Pretty Good Privacy (PGP) protocol.

3. ***Secure MIME (S/MIME):*** It defines a standard for public key encryption and MIME data signing. S/MIME was developed by RSA Data Security Inc. The main difference between S/MIME and MOSS is that S/MIME is based on PKCS standard whereas, MOSS is not based on any security standard.

4. ***Pretty Good Privacy (PGP):*** It was created by Philip Zimmermann in the year 1991. PGP aims at providing data encryption and decryption services that ensure cryptographic privacy and authentication of transmitted information. Application of PGP involves encrypting, decrypting, and signing e-mails, files, texts, and directories to establish secured e-mail communication. PGP encryption uses techniques such as hashing, symmetric-key cryptography, public-key cryptography, and data compression to maintain the authentication and integrity of information. PGP handles MIME messages in the same way as MOSS. However, PGP is widely accepted and used as it is easily available for non-commercial use. In PGP, each public key is assigned a user name or an e-mail address and the certification of information is done by the users themselves through a Web of Trust.

Task

Research on the Web and analyze the various authentication mechanisms used for establishing secure communication.

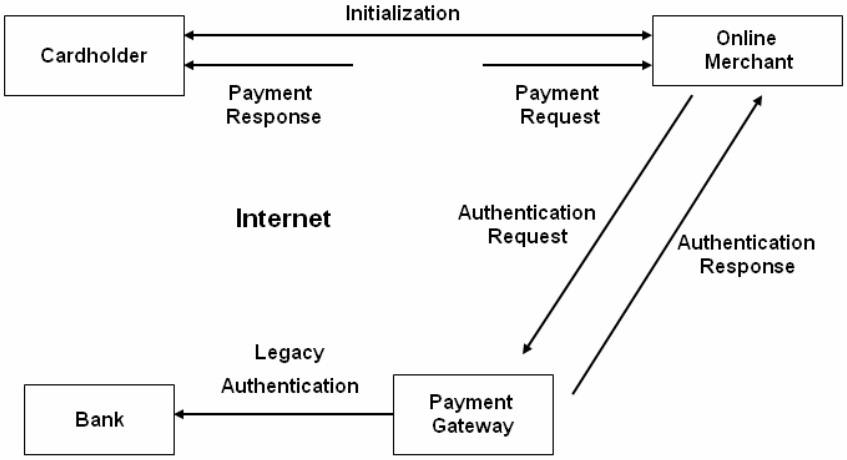
6.2.6 SET Protocols

Secure Electronic Transaction (SET) protocol was developed in late 1990s. It was created by a group of credit card providers and software developers to ensure secure credit card transactions over the Internet. The SET algorithm does not disclose account numbers of the cardholders during the transaction process as it replaces the credit card information with a certificate identifier. This ensures security for the merchant and the cardholder. Although SET protocol had some beneficial features, it did not succeed to become a standard protocol.

As shown in figure 6.5, a cardholder purchases goods from an online merchant, the card holder sends a payment request to the online merchant. The merchant then forwards an authentication request to the payment gateway, which authorizes the online transactions. The payment gateway then seeks confirmation about the cardholder from the concerned bank that provides Visa or Master Card. If the cardholder is found to be genuine, the payment gateway sends an authentication response to the online merchant. The merchant in turn sends a payment response to the cardholder and the transaction is completed.

Figure 6.5 depicts SET Protocol.

Figure 6.5: SET Protocol



Source: Bajaj. K., Nag. D. (1999). E-Commerce Security Issues. New Delhi: Tata McGraw-Hill Publishing Company Limited. Page 217.

SET protocol uses public key cryptography to encrypt the transaction information. Thus, credit card information is hidden and is not accessible by any third party source. The online merchant, payment gateway, and cardholders are authenticated to each other. Hence, information integrity is established.

Task

Find out how a X.509 certificate in an E-wallet hides the credit information of the cardholder. Also, analyze the benefits of using X.509 certificates in credit card transactions.

6.2.7 Public Key Certificates

Certification Authorities (CA) issues public keys, which are in the form of certificates. These certificates are signed by the CAs and are then legally bound with the owner of public key. This prevents an attacker from gaining illegal access to the information claiming to be an owner.

Public key certificates do not share the private key with anyone as it is held privately by the information owner. Public key is not held in private since it is an entity with which a user engages in the secured communications. The public key is made available to anyone who wants to establish a secured communication with the owner possessing a corresponding private key.

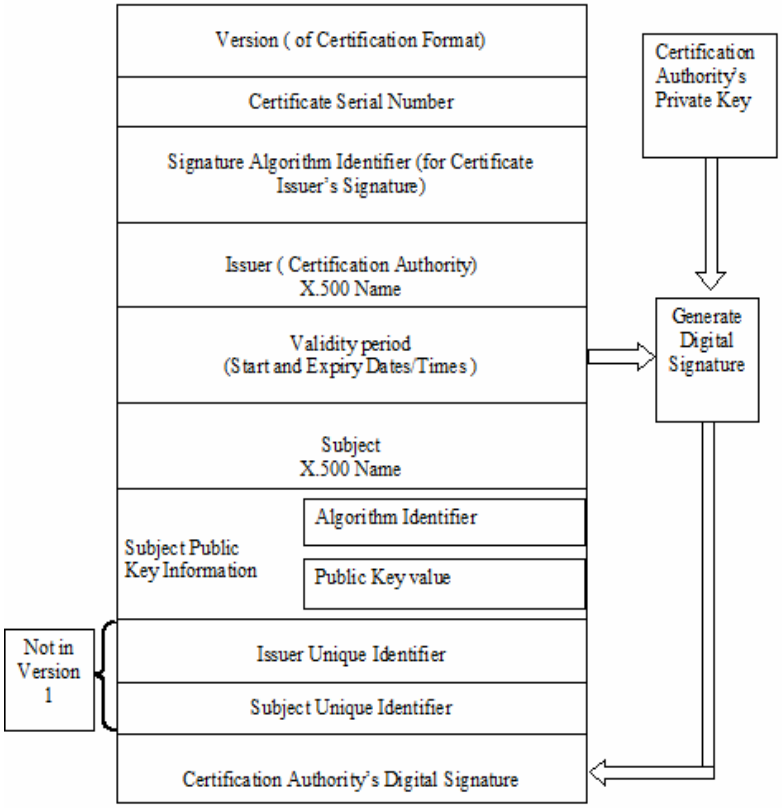
X.509 certificate is the standard certificate format contained in the Authentication Framework of the X.500 directory. Figure 6.6 depicts versions 1 and 2 of the X.509 certificate format.

The fields contained in the X.509 certificate format are as follows:

1. ***Version:*** It defines the version of the certificate (either 1 or 2).
2. ***Certificate Serial Number:*** It defines a serial number issued by the CA.
3. ***Signature Algorithm Identifier:*** It defines the Signature Algorithm used by the CA for signing the certificate.
4. ***Issuer:*** It defines the CA's name as per the information available in the X.500 directory.
5. ***Validity Period:*** It specifies the validity period for the certificate.

6. ***Subject Name:*** It is the subject containing the X.500 name of the owner of the corresponding private key.
7. ***Subject Public Key Information:*** It defines the key value and the algorithm to be used while encrypting with the public key.
8. ***Issuer Unique Identifier:*** It is used for unique identification of the CA (not in version 1).
9. ***Subject Unique Identifier:*** It is used for unique identification of the subject (not in version 1).

Figure 6.6: Versions 1 and 2 of the X.509 Certificate Format



Source: Bajaj. K., Nag. D. (1999). E-Commerce Security Issues. New Delhi: Tata McGraw-Hill Publishing Company Limited. Page 214.

Notes

Version 1 of X.509 certificate was developed in the year 1988 and version 2 was developed in the year 1993. Initially, when the trial version was launched and used in the year 1993—94, it was found that X.509 was deficient in supporting multiple certificates for an individual user. It also lacked to identify users by any other means other than X.500 name for example, e-mail address. In order to overcome this issue, version 3 was developed. The new version contained extension fields along with the information contained in version 2 of the X.509 certificate format.

6.3 E-Cash over the Internet

Electronic cash also known as e-cash is an advanced technology of making cash payments over the Internet.

Consumers can make online transactions by installing software on their computers. The cash withdrawn or the payment made online is stored in the computer's hard disk in an electronic wallet. Consumers can use the cash stored in the electronic wallet to make any purchases from the online shopping Web sites that accept e-cash. E-cash is also useful for transferring cash between two entities.

Example: NEFT transfer is a best example for transfer of cash between two entities using e-cash.

When a consumer enters a shopping site, the products for sale are displayed on the Web page. Once, the products are identified, the consumer sends a request for e-cash to the bank server where the consumer has an account. The bank server sends the e-cash stored in the electronic wallet. After obtaining the e-cash from the computer, the consumer sends a purchase order to the online merchant's server with the quantity of the purchase, e-cash required for purchase, and the billing address. The online merchant then sends a purchase receipt to the consumer and transfers the e-cash to the bank server where the merchant has an account.

The online merchant's bank sends the purchased e-cash packet amount to the consumer's bank. The consumer's bank, after verifying the consumer's public key with the received e-cash packet, releases the purchase cash to the merchant's bank. The merchant sends the product for delivery to the mentioned shipping address.

Since all the transactions are carried over the insecure network, security becomes an important concern. Security of the transaction information can be maintained by using encryption, decryption, digital signatures, and password techniques.

While carrying out transactions a consumer can opt for privacy of disclosure of identity. Thus, the online merchant will not be aware of the consumer's identity.

6.3.1 Elements in Electronic Cash Flow

The various elements necessary for using e-cash in online transactions are:

1. ***Client Software:*** Software provided from various vendors run on windows XP, 2007, Macintosh, and UNIX. Whereas, some Web sites just require normal Web browsers for reading and sending encrypted information.
2. ***Merchant Server Software:*** Some merchants prefer custom application software for their Web sites whereas, others use Web servers. Some applications require Netscape Commerce server whereas, others provide free software library.
3. ***Payment by Consumer:*** The consumer can make transactions through credit cards, use e-cash through bank, or use Automated Clearing House (ACH).
4. ***Payment to Merchant:*** When the transactions are made through a debit card, the merchant gets the cash immediately from the consumer's bank, ACH, or if the bank transfers the money, it happens within a day. If the transactions are made through a credit card, then the merchant gets money through bank transfer.
5. ***Transaction Cost:*** Every transaction made by the consumer is charged and this charge varies depending on the type of the transactions made - credit or debit. Some service providers charge per transaction while others charge a percentage amount for the transaction.
6. ***Risk:*** There is certain amount of risk associated with the transactions. The consumer is at loss if there is a disputed transaction or if the merchant does not deliver the purchased products. In addition, if the consumer loses e-cash, the bank asks for serial numbers of the e-cash to make a refund. If no details are provided by the consumer, then the bank does not refund the cash.
7. ***Applications:*** E-cash applications involve debit cards, telescoping, public transit systems, phone cards, parking systems, tele-banking and automatic toll collection.

Caselet

Establishing a Secure Communication for a Leading Stock Exchange Company

This case study is of a leading stock exchange that covers major cities and towns across India. The stock exchange has an automated online trading system within national reach. This stock exchange has reformed the Indian securities market to establish a better microstructure, trading volumes, and market practices.

The challenge is the exchange of data between the stock exchange and a member stock broking company. The stock exchange communicates its business information to other member companies and receives information from them. The stock exchange requires this communication to be authenticated, automated, and secure. To achieve this, the stock exchange must use a secured e-commerce system that will:

1. Get the PDF documents digitally signed by multiple authorities at the server end.
2. Get the HTML forms digitally signed at the client end and verify the signed data at the server end, after filling the data.

The stock exchange's challenge was taken up by E-Lock Solutions and they designed a SuperSigner SDK (Java version) which satisfied the requirement. The system was able to authenticate the transmitted information between the two entities. It reduced the overheads caused due to the use of paper communication and established a faster and reliable exchange of information.

Source: http://www.elock.com/nse-casestudy.html

6.4 Summary

- An efficient e-commerce system should guarantee confidentiality, integrity, availability, authenticity, non-repudiability, and auditability of information.
- SQL injection, price manipulation, buffer overflow, cross-site scripting, and remote command execution are some of the vulnerabilities found in e-commerce systems.
- To ensure secured communication cryptosystems are used. They involve encryption and decryption methods to ensure confidentiality, and integrity of information.
- Cryptosystems are classified into symmetric and asymmetric cryptosystems. Symmetric cryptosystems make use of a single key to establish communication between two users. They operate in block cipher mode and stream cipher mode. Asymmetric cryptosystems use private and public keys for establishing a secure communication between two users.
- RSA algorithm uses public key for achieving confidentiality and authenticity of the information.
- Digital signatures prevent a receiver from using the sender's digital signature to 'sign' information on behalf of the sender.
- Public Key Cryptography Standards (PKCS) defines a standard format to transmit information over the network using public key cryptography technique.
- Privacy Enhanced Mail (PEM), MIME Object Security Services (MOSS), Secure Multipurpose Internet Extensions (S/MIME), and Pretty Good Privacy (PGP) are the protocols used for establishing secured communication.
- Public key Certificates define a standard certificate format for establishing secured communication using private and public key.
- Electronic cash over Internet allows a consumer to use e-cash to do online shopping and transfer money.

6.5 Keywords

Cross-site Scripting: It is a type of computer security weakness usually found in web applications that enables attackers to infuse client-side script into web pages viewed by other users.

Private Keys: These keys are associated with the original sender and are private to that particular sender. They are used to compute signatures.

Public Keys: These keys are the numbers associated with a particular user. They are known to everyone who wishes to establish a secured communication with the corresponding user. They are generally used to verify signatures.

Web of Trust: It is a concept used in PGP to establish the authentication between a public key and its owner.

6.6 Self Assessment

1. State whether the following statements are true or false:

   (a) The disadvantage of an e-commerce system is that when the purchase order is duplicated, it cannot be easily identified.

   (b) Confidentiality feature ensures that the retrieved transaction information is reliable and resembles the transmitted document without any modification.

   (c) Cross-site scripting involves overloading a Web application by sending volumes of data larger than its actual capacity.

   (d) In stream cipher mode, the information is transmitted without dividing into fixed blocks, as it is capable of handling data of large size.

   (e) Symmetric cryptosystems use private and public keys to establish a secure communication.

   (f) Price manipulation vulnerability is also known as XSS attack.

2. Fill in the blanks:

   (a) _____ is the vulnerability technique that attacks Web sites based on the type of back-end database used.

   (b) When a consumer purchases a good online, the price of the good is stored dynamically in a _____ field.

   (c) In _____ mode, the transmitted information is divided into fixed size blocks.

   (d) The strength of the information encrypted depends on length of _____.

   (e) _____ functions have the capability of handling information of any size.

3. Select a suitable choice for the questions given below:

   (a) Which of the following protocol uses signed and encrypted framework to apply encryption services and digital signature to MIME objects?

      (i) PEM (ii) MOSS (iii) PGP (iv) S/MIME

   (b) Which of the following protects information from unauthorized access by internal users and hackers?

      (i) Authenticity (ii) Integrity (iii) Non- repudiability (iv) Availability

   (c) Which of the following converts the confidential information into a coded language that is difficult to understand by unauthorized users?

      (i) Decryption (ii) Encryption (iii) Auditability (iv) Availability

   (d) Which of the following have the right to own the private key?

(i) Receiver (ii) Sender (iii) Merchant (iv) Cash issuing bank

(e) Which of the following issues the public keys?

(i) Certification Authorities (ii) Banks (iii) Payment gateway (iv) Online merchant

6.7 Review Questions

1. "PGP protocol is widely used when compared to MOSS protocol for secured communication." Discuss.
2. "Are e-commerce systems safe for engaging in online transactions?" Analyze.
3. "SET protocol is considered as the secure protocol for transactions involving credit cards." Discuss.
4. "Privacy Enhanced Mail is not compatible to handle MIME messages." Analyze.
5. "Attacking an application that uses Oracle as back-end is very difficult when compared to attacking an application that uses SQL server." Comment.
6. "Is encrypting information in stream cipher mode better than block cipher mode?" Validate with appropriate examples.
7. "The technique of generating checksum from the transmitted information and rechecking the same at the receiving provides better data integrity." Explain.
8. "Why do Web applications set the user password to be at least six characters long?" Comment.
9. "Is it possible to create a Web application that overcomes the buffer overflow vulnerability?" Comment.
10. "The MOSS protocol is not based on any security standard for establishing secured communication." Discuss.
11. "Symmetric cryptosystems are better than asymmetric cryptosystems as they are capable of handling data of any size." Analyze.
12. "Are money transactions carried out by using paper documents safer than online transactions?" Discuss.

Answers: Self Assessment

1. (a) T (b) F (c) F (d) T (e) F (f) F
2. (a) SQL injection (b) HTML hidden (c) Block Cipher (d) Secret Key (e) Hash
3. (a) MOSS (b) Availability (c) Encryption (d) Sender (e) Certification authorities

6.8 Further Readings

Books

Bajaj, K K. and Nag, De. (2005). E-Commerce: The Cutting Edge of Business, 2nd ed. New Delhi: Tata McGraw-Hill.

Joseph, P.T. (2008). E-Commerce – An Indian Perspective, 3rd ed. New Delhi: PHI Learning Private Limited.

Online link

http://download.oracle.com/javase/1.5.0/docs/guide/security/cert3.html

http://tools.ietf.org/html/rfc1422

http://www.ehow.com/about_6748970_set-protocol_.html

Unit 7: Basics of Business Process Reengineering

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Objectives

After studying this unit, you will be able to:

- Define Business Process Reengineering (BPR)
- Discuss the BPR approach

Introduction

Business Process Reengineering (BPR) is a concept that helps in bringing significant improvements in the key processes of an organization. It plays a vital role in the business world today.

BPR is also known as Business Process Change Management and Business Process Redesign.

Hammer and Champy in 1993 defined Business Process Reengineering as "the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical contemporary measures of performance, such as cost, quality, service and speed."

Along with that, Davenport points the major variations between Business Process Reengineering and other kinds of organizational development approaches, when he describes, "Today organizations must seek not fractional but multiplicative levels of improvement – 10x rather than 10%."

Did you know? BPR as a terminology and practice has a tarnished history. In the early 1990s, reengineering became popular but the approach and methodology was not understood completely nor appreciated. Most of the times, improvement projects that were labeled "BPR" were poorly planned and executed. The term BPR itself was less used or altered to ensure that they were not linked with the BPR of the past. Despite this kind of abuse of practice, the redesigning practice for business processes and its associated technology is becoming more popular today than before. Organizations continue to fundamentally alter the way they conduct trade. Hence, reengineering remains an effective tool for organizations that strive to function as efficiently and effectively as possible.

7.1 Business Process Reengineering (BPR)

Business Process Reengineering (BPR) is a management approach that aims at enhancements to increase effectiveness and efficiency of processes:

1. Within the public organizations
2. Across the public organizations
3. From public organizations to businesses
4. From public organizations to citizens

BPR came into being in the early 1990s when James Champy and Michael Hammer published their best-selling book named "Reengineering the Corporation". Both the authors promoted the concept that reorganization and radical redesign of an enterprise was essential to bring down the cost and enhance the quality of service.

Champy and Hammer felt that the workflow design in almost all large corporations was based on assumptions about organizational goals, people, and technology that were no longer valid. They suggested seven values of reengineering to streamline work processes and achieve significant improvement in time management, quality, and cost.

The seven principles of reengineering suggested by Champy and Hammer were:

1. Organize outcomes and not tasks.
2. Determine all the organizational processes and prioritize them in case of redesign urgency.
3. Integrate the information processing task into real work to produce the information.
4. Consider geographically the dispersed resources as centralized ones.
5. Establish relationships between parallel activities in workflow instead of combining their results.
6. Consider the task performed as decision point and build control into that process.
7. Capture details once.

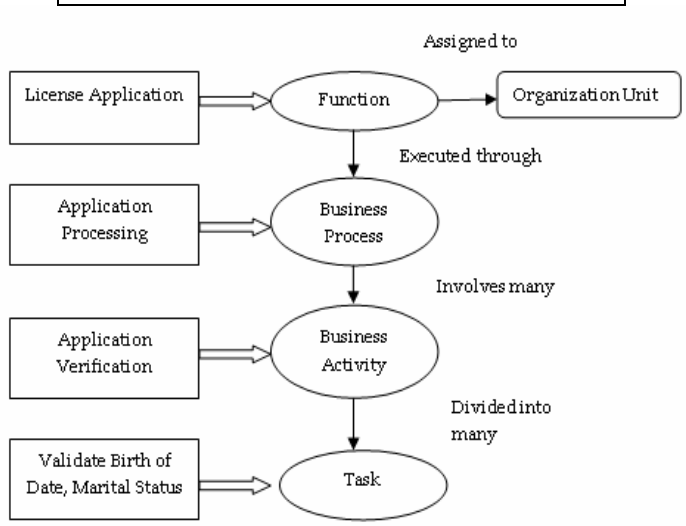
By mid 1990s, BPR was popularly considered a good way of "downsizing". Hammer considered lack of leadership, sustained management commitment, and unrealistic expectations as the factors that were the main causes for the abandonment of BPR. This prompted businesses to embrace the methodology named Enterprise Resource Planning (ERP).

Apart from managing a business process in any of the business information systems, it is essential to improve the value of the process and the methods used in enhancing the process. Business process consists of the tasks that make up a business activity.

Example: Business process involved in license application.

Let us analyze the business process involved in license application as depicted in Figure 7.1.

Figure 7.1: Business Process Related Concepts



The business processes involved in license application are: application processing, application verification, and validation of date of birth and marital status. License application is a function assigned to organizational unit. The license application function is executed through a business process termed as application processing. Business process involves several business activities like issue of application, application verification, and so on. Finally, the business activity is divided into many tasks like the validation of birth date, verification of photo, and so on.

A license can be obtained only after processing, verification and validation of the application.

BPR is a major innovation that alters the way firms conduct their business. Alterations are necessary for survival and profitability. Reengineering comprises changes in organizational structure, processes and culture. Most of the BPR concepts alter the organizational structure.

Example: Telecommuting, empowerment, mass customization and team based organization are the organizational structures where BPR concepts bring in change.

Support system in any organization plays a vital role in BPR. Reengineering is done to attain cost reduction, enhance quality, service, and speed. BPR enables a firm to be more competitive in the market. Employees function in a team along with the engineers and managers to develop a product. This results in formation of interdisciplinary teams that work better than functional teams. Hence, coordination becomes faster and easier and help to achieve results. The overall business process to develop a product gets a new dimension.

BPR focuses on simplifying and eliminating wasted efforts. The main idea of BPR is that all activities that do not add value to a service or product should be eliminated.

Example: Moving large batches of task in process from one workstation to the other is a non-value added activity.

Reengineered Telephone Service

Case Study

GTE, one of the largest telephone service providers in USA with its customer bases in Texas, Florida and California, reengineered its repair and maintenance process of phones to achieve dramatic enhancements in customer service.

Previously, when the customers faced problems with the functioning of the phone, they would contact the organization, and the maintenance and repair process used to take place in this sequence:

1. Check whether the customer was connected to the repair clerk. The job of the repair clerk was to note down the complaint. They were not authorized or qualified to do anything more.
2. Check whether the customer conveyed the details to the line tester. The line tester helps locate the origin of the problem that may be at the GTE's central office or in the customer's line.
3. Pass the problem details to either the despatcher or the central office technician of GTE.
4. Advice the service technician to visit the customer to undertake necessary repairs.

Such an elaborate procedure was not helpful to attain customer satisfaction. Therefore, the process was reengineered to bring in the following changes:

1. Just one individual called the Customer Care Advocate (CCA) is provided a dual responsibility of repair and maintenance.
2. The customer contacts the CCA directly who is qualified and authorized professionally to:
   (a) Test the line
   (b) Alter the central office software, if required or
   (c) Provide a clear picture about the issue on the network
3. In many instances, CCA resolve the issue while the customer is still on the call.
4. In case immediate rectification is not possible, CCA acts as the despatcher to check the schedules of service technicians and notify customer of the time of visit.

Thus, the benefits of business process reengineering derived by GTE are:

1. The CCA helped solve forty percent of the issues while the customers are still on line.
2. The repair time reduced from hours to just minutes.

Questions:

1. Discuss the sequence followed by maintenance and repair process when the customer's phone is not functional.
2. Explain the benefits of business process reengineering derived by GTE.

Source: http://www.doc.ic.ac.uk/~nd/surprise_95/journal/vol2/tmkl/article2.html

BPR is used by organizations during periods of recession to reduce costs and regain profitability. The danger in this process is that the organization can reduce its capacity for any future growth.

Example: Star Vault, Inc., a mid-sized entertainment organization illustrates the danger of being slashed of its future growth due to the use of BPR.

Star Vault gained short-term profitability after sacrificing their internal production ability to create new products. Senior management discovered that the library in the organization started becoming overexposed and competition for the most attractive product acquisitions became intense. Hence, they were forced to reevaluate their strategic direction. Instead of enhancing the processes, the company started eliminating the non-value added expenditures and evaluating the organization's elements that were relevant to the strategy. Due to this, the organization now has the opportunity to increase and sustain its market share.

Notes

To achieve lasting benefits, organizations must be willing to examine how well strategy and reengineering complement each other. For this, companies must quantify strategy, accept ownership of strategy within the organization by assessing the organization's current processes and capabilities realistically, and associating strategy to the budgeting process.

7.1.1 Concepts of Reengineering

In a world that is driven increasingly by the three Cs namely, customer, competition, and change, organizations are constantly searching for innovative solutions for their business issues. Business Process Reengineering (BPR) has emerged as a solution for resolving business issues.

Reengineering is the radical design and fundamental rethinking of business processes that help attain dramatic enhancements in critical measures of performance like cost, service, quality, and speed. Hence, BPR is the redesign and analysis of workflow done within and among enterprises.

BPR does not believe in small enhancements, instead they aim at an overall reinvention. Clearly, BPR is not for organizations that need short-term enhancement. It is for them that require a long-term growth. According to Champy and Hammer, the most essential keyword is the term 'process'. BPR emphasizes on processes and not on people, tasks, or jobs.

Reengineering focuses on processes as the effectiveness of organizations depend on their processes. A Business process consists of many steps that are designed to produce a service or a product. It comprises all the activities that help deliver specific results. Currently, processes are unnamed and invisible as people think about individual departments often, rather than the processes with which they are involved. Thereby, instead of thinking in terms of departments like manufacturing and marketing, organizations must identify the processes to express their start and end states. The names assigned to the processes should signify all the tasks that are done between the start and end of the process.

Example: Order fulfillment can be termed as Order to payment process.

Just as organizations have organization charts, they must also have process maps that depict how job cycle flows within the company. Process mapping offers proven methodology and tools to determine the present business processes and may be used to offer a roadmap for reengineering the service and product business enterprise functions. Organizations cannot reengineer all their business processes simultaneously. Often, they make choices based on the following three criteria:

1. ***Dysfunction***: Identify the processes that are functioning badly.
2. ***Importance***: Identify the processes that are most influential and critical.
3. ***Feasibility***: Identify the processes that are likely to be reengineered successfully.

7.1.2 Technological and Organizational Enablers of BPR

According to the empirical study of 1993, most of the business processes achieved better performance through cross-functional BPR than the projects related to traditional functions. Merely augmenting or automating the existing procedures does not hold much assurance as the procedures involve several movements of details and approvals within many functional areas that slows down the process significantly. To assist cross-functional co-operation, the traditional organization structure based on the functional specialization could be modified through structural enablers like process generalists, case managers, and cross-functional teams.

Cross-functional teams have played a crucial role in several reengineering efforts. These teams facilitate parallel design activities and functional interfaces.

Example: At Modicon, Inc., manufacturing automation control devices in Massachusetts, product development is not the sole responsibility of engineering function. During the past, manufacturing was not involved in the engineering procedure until design was transported into the factory. But now, a 15 member team of managers from finance, sales, marketing, manufacturing, and engineering work together on this process. The process which was a serial one, traditionally in both structure and task now involves cross-functional association and has eliminated several costly changes and delays. This helped to bring six products into the market in 1/3rd of the time taken otherwise.

Team based structures enable lateral movement in process change model by enhancing coordination within functional components of a process. Along with the telecommunication technologies, these teams can collaborate synchronously in remote locations.

The other structural enabler for reengineering is to establish a case manager for a cross-functional process. The cross-functional process provides access to the new status information on the given transaction and serves as a single point of contact for customers.

Example: At Pacific Bell, the case managers have been used in accordance to its BPR approach. Before reengineering, offering a customer a Centrex telephone service took 11 jobs and more than five business days. The service representatives had to update nine or more computer systems to make frequent reworks and consult the customers several times. Now, the Centrex service coordinators handle the entire interface with the customers. With the help of a computer workstation that interfaces with nine systems, they now provide service on the same day (Nohria and Davenport, 1994).

While the case managers coordinate tasks performed by various functional specialists, a generalist performs their task and eliminates the requirements for a specialist altogether.

Both process generalists and case managers are the powerful organizational innovations that assist vertical movement in process change model. These structures are useful in organizations with complex processes to bring services and products to the customer.

It should be noted that such technological and structural enablers need to be consistent with organizational culture, design, and orientation. As mentioned by sociotechnical research, all the enablers should be in balance and aligned with other essential aspects of the organization. Failure to consider aspects like existing structures, training, and incentive systems can greatly constrain the process innovation and their success.

Information Technology (IT) helps make changes promoted by reengineering and is an enabler of BPR. Love and Gunasekaran in 1997 considered four things as enablers of BPR, namely, IT, organization, human resources, and total quality management.

Did you know? Sarkar and Singh (2006) and Ken, Faizul, and Ziaul (2006) think that the enterprise resource planning and electronic commerce technologies may alter business practices to re-optimize the business processes that lead to improved performance and increased efficiency.

Bucky, Steward, and Best (2008) argue that the strategic alignment of IT and business is essential to use the IT assets and assist business practices and management to alter organization's processes and structure to integrate functionally with external and internal variables.

Example: Nah, Lau, and Zuckweiler (2003), the survey information officers from the Fortune 1000 organizations identified 11 key factors that are essential for the success of Enterprise Resource Planning (ERP). Amongst the factors, change management program, project management, ERP composition and teamwork, project champion, and top management support are the critical ones. They found that centralized and standard integration is determined by clarity of ER coordination, objectives, and control of activities of various business units, for the successful ERP implementation.

In most of the cases, organizations alter their organizational structure to align themselves with the implemented technologies to attain better operational efficiency and business performance. (Park, Kang and Yang 2008).

The three dimensions in BPR that resulted from technology adoption were:

1. ***Organizational Structure Changes:*** With the help of IT, the centralization of decision making changed. Also, by sharing and exchanging information through IT, the business units reduced the mediation process and increased cross-unit collaboration. Therefore, employees had to report directly to their managers and thus, the organizational hierarchies became flatter (Orman 1998).
2. ***Changes of Workplace:*** IT enables staff to communicate from home or various other locations, receive and send multimedia data, accomplish task using electronic mail, exchange information, Internet-based tools, and teleconference. Hence, transportation charges get reduced.
3. ***Workforce Changes:*** IT activates many kinds of automation in various business practices like customer service management, order management, and supply chain management. This leads to manpower reduction and cost drops.

7.1.3 Examples of BPR

The benefits of BPR are:

1. ***Increases Effectiveness:*** Proper control and management of all the business processes reduces the time lag between various processes. This results in increased effectiveness within business processes.
2. ***Reduces Cost:*** Proper management of business processes enhance efficiency and help deliver products to buyers quickly. Thereby, the overall product charges are reduced and this saves cost for the organization in the long run.
3. ***Growth of Business:*** Implementation of BPR results in growth of present business which enables the emergence of new businesses within the same organization.

The benefits offered by BPR have caused many companies to implement BPR in their organizations. Let us discuss a few companies that have benefitted by implementing BPR.

Case Study

IBM Credit

The IBM Credit Corporation is in the trade of financing computers, services, and software that IBM Corporation sells. When a field sales representative in IBM invoked a request for financing, the process of dealing with the request involved five steps namely:

1. One of the central office's operators wrote down the appeal on a sheet of paper.
2. Then, the appeal was dispatched to the credit department where one of the specialists checked the creditworthiness of the potential borrower, then wrote the outcome on a sheet of paper and finally, dispatched it to the Business Practice department.
3. Then, the Business Practice department was responsible for modifying the loan covenant with respect to the customer request. Special terms would be attached to the request form as per the request.
4. Next, the appeal was sent to the Price department to determine the suitable interest rate to charge the customer.
5. Lastly, the administration department converted all the details into a quote letter to be delivered to the sales representative field.

This overall process consumed six days on an average. From the point of view of a sales representative, the turnaround was too high and could make a customer approach another computer vendor.

IBM Credit tried to enhance this process in many ways. For instance, they decided to install a control desk to answer queries of sales representative about the request status. Instead of forwarding the appeal to the Business Process department, each department could return the appeal to the control desk. At the control desk, the administrator could log the completion of every step prior to sending out the appeal again. This solution only increased the turnaround time.

Further, two senior managers at the IBM Credit considered a request and went through all of the five steps. They discovered that a total of just 90 minutes was required to perform the actual work. So, it became clear that the issue did not lie in the tasks and performance of people, but in the structure of the process as a whole.

Finally, IBM Credit replaced their specialists like credit checkers, and so on with the generalists.

The old-process design assumed that each of the requests was unique and hard to process and therefore, the intervention of four highly trained specialists was required. But this assumption was incorrect as most of the requests were straightforward and simple. The tasks to be performed were, find a credit rating in the database, plug numbers into the standard model, and pull clauses from the file. These tasks could be done by any individual who is supported by an easy to use computer system. Therefore, IBM Credit developed a sophisticated and new computer to assist the generalists. In almost all situations, the system offers data and guidance to generalists.

The latest turnaround became four hours instead of six days. Thus, the organization achieved a performance breakthrough by reengineering its processes.

Questions:

1. Discuss the five steps which were involved initially for processing a request from a field sales representative in IBM Credit.
2. Explain the various ways that were used by IBM Credit to enhance their process.

Source: http://www.doc.ic.ac.uk/~nd/surprise_95/journal/vol2/tmkl/article2.html

Case Study

Ford Motor Corporation

The Ford Motor Corporations' Accounts Payable department employed more than five hundred people. Computerization of few of the existing tasks in the division was estimated to result in twenty percent of manpower reduction.

During an effort to reengineer for dramatic enhancements, it was realized that BPR was related to reengineering a process and not a division. The process recognized for reengineering was procurement which involved the following stages:

1. ***Generation of a Purchase Order:*** The internal unit of the organization generates a purchase order which is sent to the supplier externally and a copy is sent to the Accounts Payable.
2. ***Receiving Items Against the Purchase Order:*** The receiving division receives items against the purchase order from supplier along with the delivery notice. Then the Accounts Payable receives the receiving document from the receiving clerk.
3. ***Sending an Invoice to the Accounts Payable:*** The supplier sends an invoice to the Accounts Payable.

Thus, the Accounts Payable division received three documents namely - a purchase order, a receiving document, and an invoice. In case all of them matched as was the case of 80% of transactions, payment was made. Otherwise, enormous amount of manpower and time was used in tracing inconsistencies and making payment to supplier.

The reengineering process is radically varied and is enabled by Information Technology (IT). A company wide database with terminals linked to all divisions permits a purchasing unit to enter details of order into the computer as it is released to the vendor. The receiving division clerk has accessibility to the same database, who on receiving goods from supplier, logs into their system to ensure that the received goods is in accordance with the purchase order. If the received goods match the purchase order list, the clerk admits the delivery and authorizes the payment through system directly. Otherwise, the clerk does not accept the consignment and returns it to the supplier. Here, the requirement for an invoice is eliminated.

The reengineering process eliminates the Accounts Payable division. Thus, the number of people involved was reduced to 125.

Questions:

1. Discuss the process recognized for reengineering in Ford Motor Corporation.
2. Does the reengineering process eliminate the Accounts Payable Division in Ford Motor Corporation?

Source: http://ezinearticles.com/?Ford-Motor-Company---Case-Study&id=1420478

7.1.4 Issues in BPR

Carr and Johnson, in 1995, identified that there exists two kinds of risk while implementing BPR. They are technical risk and organizational risk. Technical risk is the fear that the changes in process will not work and organizational risk is the possibility of reaction of corporate culture against the changes.

The other methodology suggested by Carr and Johnson in reduction of risk is to establish successful reengineering by implementing precisely targeted pilot programs. These programs assist in communication strategy and reinforce the management commitment to create user buy-in.

The challenges faced by BPR are to:

1. Identify the customer requirements and performance problems in the prevailing processes.
2. Reassess the strategic objectives of the organization.
3. Define the opportunities for reengineering.
4. Manage the BPR initiative.
5. Control risks.
6. Maximize benefits.
7. Manage organizational changes.
8. Implement the reengineering processes.

The critical failure factors in BPR are:

1. Trying to fix the process instead of altering it.
2. Absence of focus on the business critical processes.
3. Absence of holistic approach.
4. Readiness to settle for insignificant results.
5. Early quitting.
6. Limiting scope of BPR with the help of prevailing constraints.
7. Poor leadership.
8. Dragging the BPR exercise very long.

Unfortunately, BPR has been linked to "rightsizing" or "downsizing" which means cutting down on manpower. This is used as an excuse for managers to defend the downsizing actions. The downsizing actions must not stray from the need to restructure processes and induce velocity in information and product flow in an organization. BPR seeks to redesign radically the business processes and to alter the organizational structures in accordance with the new processes. It empowers and leverages technology. Even though the top management commitment is enlisted for BPR, there is always a scope for change at all levels. Even people who are well-trenched in their current practices notice a threat to their power, position, and even their jobs. Therefore, BPR projects are difficult to implement.

Few of the issues that are considered to be the biggest hurdles in the success of reengineering projects are:

1. Lack of leadership and management commitment.
2. Unrealistic expectations and scope.
3. Resistance to changes.
4. Not encouraging people to think about the business processes.
5. Negligence to align measures and payments with the latest business process thinking.

These issues point a need for a BPR methodology to build the chances of success of a reengineering project.

Task

The accounts department of an organization is going through serious issues in locating documents due to improper filing system. When a specific document is needed for preparing a financial statement, no one knows where it is filed. Thus, lot of productive time is wasted in finding where the paper is kept. After lot of heated arguments among people, the management decided to solve the problem using BPR. Discuss the BPR procedure that should be adopted by the managerial team.

7.2 BPR Approach

The analysis of business processes of the organization, its trading partners, its interfaces, and boundaries assist in reengineering them from the viewpoint of attaining a high level of efficiency, reduced turnaround time, and low inventory level, so that all agencies including customer attain benefits from the reengineered process. Many people consider BPR as a different type of management thinking.

The business process reengineering approach involves the following phases:

1. ***Project Plan and Launch***: This involves team selection, objective set up, scope definition, method selection, program development, consultant selection, change management planning, sponsor negotiations, and team preparation.
2. ***Current State Valuation and Learning from Others***: This involves high-level process description, benchmarking, customer and employee focus teams, and job evaluation.
3. ***Solution Design:*** This involves process design, technological architecture set up, organizational, and job design.
4. ***Case Development for Business:*** This involves benefit and cost analysis, business case preparation, and presentation to the main business leaders.
5. ***Solution Development:*** This involves detailed definition of process, written system requirements and development, training development, planning of implementation, transition plan, pilot projects, and trials.
6. ***Implementation:*** This involves larger scale projects and phased implementation, full implementation, and measurement systems.
7. ***Continuous Enhancement:*** This involves ongoing enhancement and measurement of latest systems and processes.

7.3 Summary

- BPR helps understand the processes involved in an organization.
- Business Process Reengineering (BPR) is a management approach that aims at enhancements to increase effectiveness and efficiency of various processes.
- Reengineering is the radical design and fundamental rethinking of business processes that help attain dramatic enhancements in critical measures of performance like cost, service, quality, and speed.
- The analysis of business processes of the organization, its trading partners, its interfaces, and boundaries assist in reengineering them for attaining a high level of efficiency, reduced turnaround time, low inventory level so that all agencies including the customer attain benefits from the reengineered process.

7.4 Keywords

Cross-functional Team: It is a group of people with different functional proficiency working toward a common objective.

Generalist: A person skilled in several different fields or activities.

Mass Customization: It is the use of flexible computer-aided manufacturing systems to fabricate custom output.

Telecommuting: It is a work arrangement in which employees enjoy flexibility in working location and hours by working from home or from places flexible to them.

7.5 Self Assessment

1. State whether the following statements are true or false:

   (a) Business Process Reengineering (BPR) is a management approach that aims at enhancements to increase effectiveness and efficiency of processes.

   (b) Hammer considered the lack of leadership and sustained management commitment, unrealistic expectations, scope and resistance to alter the prompted management as the main causes for the growth of BPR.

   (c) BPR is used when major IT projects like ERP is undertaken.

   (d) BPR believes in small enhancements instead of an overall reinvention.

2. Fill in the blanks:

   (a) _____ in any organization plays a vital role in BPR.

   (b) _____ is done to attain cost reduction, enhance quality, service, and speed.

   (c) _____ is the redesign and analysis of workflow done within and among enterprises.

   (d) _____ holds the accountability to drive the analysis of reengineering processes.

3. Select a suitable choice for every question:

   (a) Business process reengineering has no start or end, it is an evolutionary process.

      (i) True

      (ii) False

   (b) Which among the following is a challenge faced by BPR?

      (i) Readiness to settle for insignificant results

      (ii) Absence of holistic approach

      (iii) Absence of focus on the business critical processes

      (iv) Define the opportunities for reengineering

   (c) Business process reengineering is:

      (i) Adding new processes to an organization

      (ii) Radical redesign of existing processes

      (iii) The gradual change of processes within the organization

      (iv) Using engineering systems within an organization

   (d) Who defined Business Process Reengineering as "the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical contemporary measures of performance, such as cost, quality, service and speed."?

      (i) Davenport

      (ii) Bucky, Steward, and Best

      (iii) Hammer and Champy

      (iv) Jeston and Neils

7.6 Review Questions

1. Analyze various business processes and determine where business process reengineering can be implemented.
2. "Today organizations must seek not fractional but multiplicative levels of improvement – 10x rather than 10%." Justify.
3. "Reengineering involves changes in organizational structure, processes, and culture." Elaborate.
4. "Do strategic planning processes influence alignment directly?" Discuss in brief.
5. Is it necessary to match the core benefits of service or product with the core needs of client in order to survive in a highly competitive market? Discuss in brief.
6. "A reengineering expert is accountable for BPR tools and techniques within the organization, for synergizing the impact of various reengineering processes or teams." Elaborate.
7. "BPR seeks to redesign radically the business processes and to alter the organizational structures in accordance with the new processes." Discuss.

Answers: Self Assessment

1. (a) T

   (b) F

   (c) T

   (d) F
2. (a) Support system

   (b) Reengineering

   (c) Business Process Reengineering (BPR)

   (d) BPR project manager
3. (a) True

   (b) Define the opportunities for reengineering

   (c) Radical redesign of existing processes

   (d) Hammer and Champy

7.7 Further Readings

Books

Bajaj. K., and Nag. D. (1999). E-Commerce: The Cutting Edge of Business. New Delhi: Tata McGraw-Hill Publishing Company Limited.

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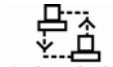
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Unit 8: Business Process Reengineering – Model and Methodology

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Objectives

After studying this unit, you will be able to:

- Explain the strategic alignment model
- Discuss the different BPR methodologies

Introduction

BPR is a management approach that aims to improve a business by increasing the effectiveness and efficiency of the processes that are present within and across organizations. BPR helps organizations to analyze their business processes and determine how best they can be built to enhance the way the business is conducted.

BPR is essential in businesses for several reasons as the organizational processes need to align people, technology, and processes with strategies to attain business integration. BPR evaluates the current state of a business and forms an operational and organizational blueprint to redirect policies, skills, data, organizational skills, and process incentives to make targeted enhancements in business.

8.1 Strategic Alignment Model

The Strategic Alignment Model for Information System (IS) or Information Technology (IT) (Henderson and Venkatraman, 1993) suggests that strategy and IT developments should be coherent. Precisely, the Strategic Alignment model takes into consideration the coherence between four elements, namely, Business Strategy (explanation and application processes of business strategy), the organization's structures and processes, IT Strategy (explanation and application processes of IT strategy), and IT organization (technological processes and infrastructure associated to IT).

The alignment model was adopted by many researchers to study the performance of IT or IS. Strategic alignment model for IT or IS is applicable to the Internet strategy. The strategic alignment model deals with the consistency of Internet strategy with the rest of the organization.

Strategic Alignment

Strategic alignment of Internet activity occurs when Internet strategy and business strategy are aligned.

The involvement of managers and directors from various departments of the company in Internet activity and the involvement of Internet managers in management of organization are the critical factors required to attain strategic alignment. Most of the research conducted on alignment has proved that strategic planning processes are the key elements that influence alignment directly (Broadbent and Weill of 1993).

Even the evaluation of Internet activity by various members of managing staff (service managers, general managers) also needs to be considered to attain strategic alignment. The alignment concept cannot be approached without taking into account technological influences as both cognitive and institutional. A better alignment can be established within an organization by accepting new IT products.

Organizational Alignment

Organizational alignment of Internet activity occurs when it is aligned with Internet strategy.

The organizational evolution holds organizational alignment of Internet activity. It necessitates an adaptation of organizational structure within the organization to match Internet activity and vice-versa. Most of the studies on IS related to alignment underlines the need for such a change to enhance coherence of IT within the organization. Such a change helps to create new processes (Venkatraman, 1995) for Internet activity in the company.

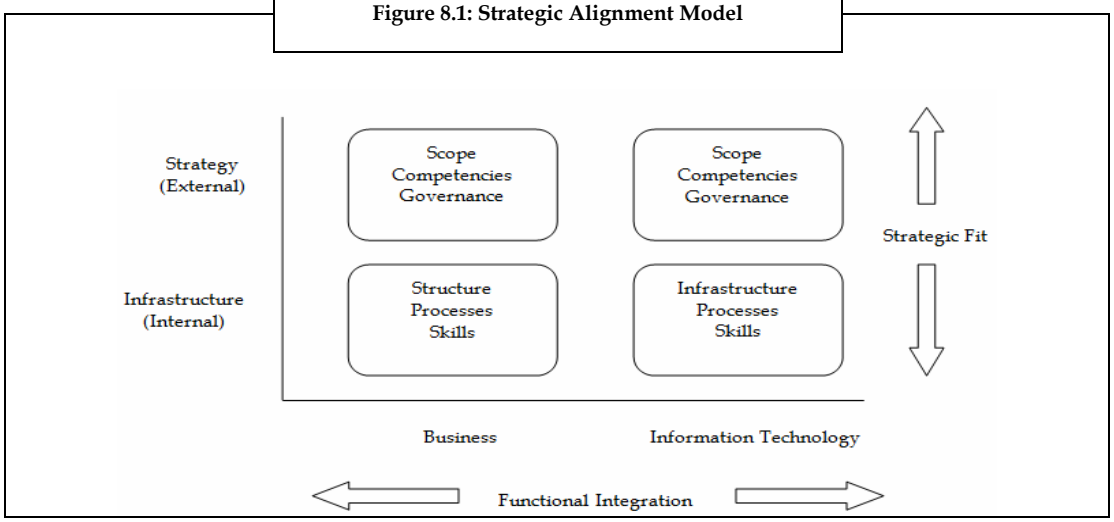
Technological alignment of Internet activity occurs when Internet Strategy and Internet structure (technological processes and infrastructure associated to Internet) are aligned.

Technological evolutions are essential to bring about technological alignment and assist Internet activity. Most of the existing studies have demonstrated the need of technological advancement within the organization to assist the alignment of IT activity.

The strategic alignment model comprises four domains (two internal and two external domains). The external domains are also known as 'Strategy Domains' (both IT and Business Strategy Domain). The internal domains are also known as 'Infrastructure Domains' (both IT and Business Infrastructure Domains).

Figure 8.1 shows a strategic alignment model that illustrates how the decisions made in one domain affect the other domains.

Figure 8.1: Strategic Alignment Model



Source: Henderson and Venkatraman. Strategic Alignment Model. Oregon State University.

The Strategy Domains include both Business and IT Strategy Domain.

The three factors considered in the business strategy domain are:

1. ***Scope:*** Scope refers to organization's involvement in the types of businesses.
2. ***Competencies:*** Competencies refers to the factors that distinguish an organization from its competitors.
3. ***Governance:*** Governance refers to the external business relationships that an organization relies on.

The three factors considered in IT strategy domain are:

1. ***Scope:*** Refers to the information technologies that support or create strategic business opportunities.
2. ***Competencies:*** Refers to the characteristics of IT that helps to create a business advantage.
3. ***Governance:*** Refers to the external relationships that IT depends on such as, vendors, outsourcing, and so on.

Example: Consider the IT strategy of Primis (McGraw-Hill Inc.) which performs custom edition of textbooks. The IT scope, IT competence, and IT governance are as given:

1. ***IT scope:*** The electronic imaging technology is used to get customized edition of textbooks.
2. ***IT competence:*** This provides superior clarity of imaging (a feature of IT strategy) to secure high-quality of printing (a feature of business strategy). Thus, businesses provide customized textbook to interested customers.
3. ***IT governance:*** The long-term agreements and joint ventures with Eastman Kodak and R.R. Donnelley & Sons Co. help attain the competencies needed.

The Infrastructure Domains include both Business and IT Infrastructure Domains. The three factors considered in business infrastructure domains are:

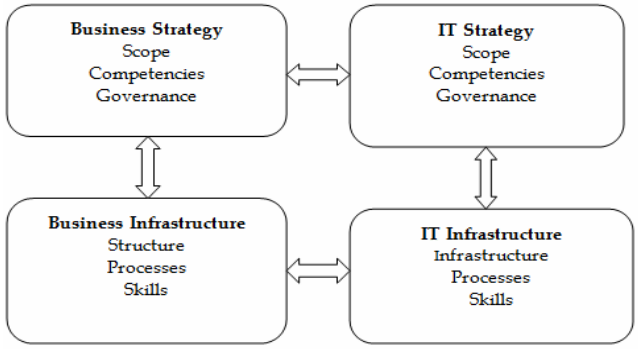
1. ***Structure:*** This refers to the organizational structure.
2. ***Processes:*** This refers to the key business processes in the organization.
3. ***Skills:*** This refers to the skills HR seeks, to accomplish specific competencies.

The three factors considered in IT infrastructure domains are:

1. ***Infrastructure:*** This refers to the networks, database, software, and hardware.
2. ***Processes:*** This refers to operations, maintenance, and development.
3. ***Skills:*** This refers to the skills needed to uphold the architecture and execute processes.

The strategic alignment model devised by Henderson and Venkatraman is pictorially depicted in Figure 8.2.

Figure 8.2: Strategic Alignment Model by Henderson and Venkatraman



Source: Henderson and Venkatraman. Strategic Alignment Model. Oregon State University.

The strategic alignment model comprises three building blocks namely:

1. ***Strategic Fit:*** This refers to the fitness between internal and external business domain. It is the same for IT domains too.
2. ***Functional Integration:*** This refers to the need to incorporate IT and business domains. Few of the functions that need to be considered while aligning strategies are, shared domain knowledge among e-commerce, IT and business executives, e-commerce and IT planning process, communication between business, and IT and e-commerce implementation.
3. ***Cross-domain Relationship:*** Strategic alignment model calls for cross-domain relationships. Effective management of IT necessitates balancing the choices made across all the four domains.

8.1.1 Strategic Alignment Process

The strategic alignment process has the following three elements:

1. ***Alignment Process:*** The process of arranging the key business systems in accordance with a mission statement or common purpose is termed as strategic alignment.
2. ***Strategic Choices:*** The alignment process is co-ordinated and measured against all the strategic choices made by the organization.
3. ***Documentation Process:*** The strategic choices must be documented along with the consequences for their alignment. The organizational activities are checked continually against the strategic choices to ensure that they are coherent.

The strategic alignment process involves the following steps:

1. ***Create an Integrated Sense of Direction:*** The participatory formulation of a mission and vision statement is an instance of how an integrated sense of direction is created.
2. ***Evaluate the Competitive Landscape:*** The present and future competitive needs should be evaluated to ensure the success of all strategic decisions
3. ***Formulate Strategy:*** Strategies can be formulated by taking into account both the internal and environmental strengths.
4. ***Identify Stakeholders:*** Stakeholders comprise employees, customers, shareholders, and the society around.
5. ***Define Outputs:*** Define the outputs that the organization will need to achieve to accomplish its strategic goals and meet the stakeholder expectations.

6. ***Develop Performance Measures:*** Develop performance measures for desired outputs.
7. ***Establish Targets:*** Establish targets for outputs the organization needs to deliver.
8. ***Determine Resource Requirements:*** Determine the resource needed to meet the targets.
9. ***Construct a Balanced Scorecard:*** Balance scorecard is a performance management tool which measures various performance indicators with various aspects of enterprise like learning, growth, internal process, customer satisfaction, and financial health.

Task

Describe the basic steps involved in e-Business blueprint planning and strategies.

The strategic alignment model of e-commerce offers a step by step process to align an e-commerce project with business strategy of business organization or unit. The process is described in a stepwise manner that will refer constantly to the e-commerce strategic alignment model as shown in Figure 8.3.

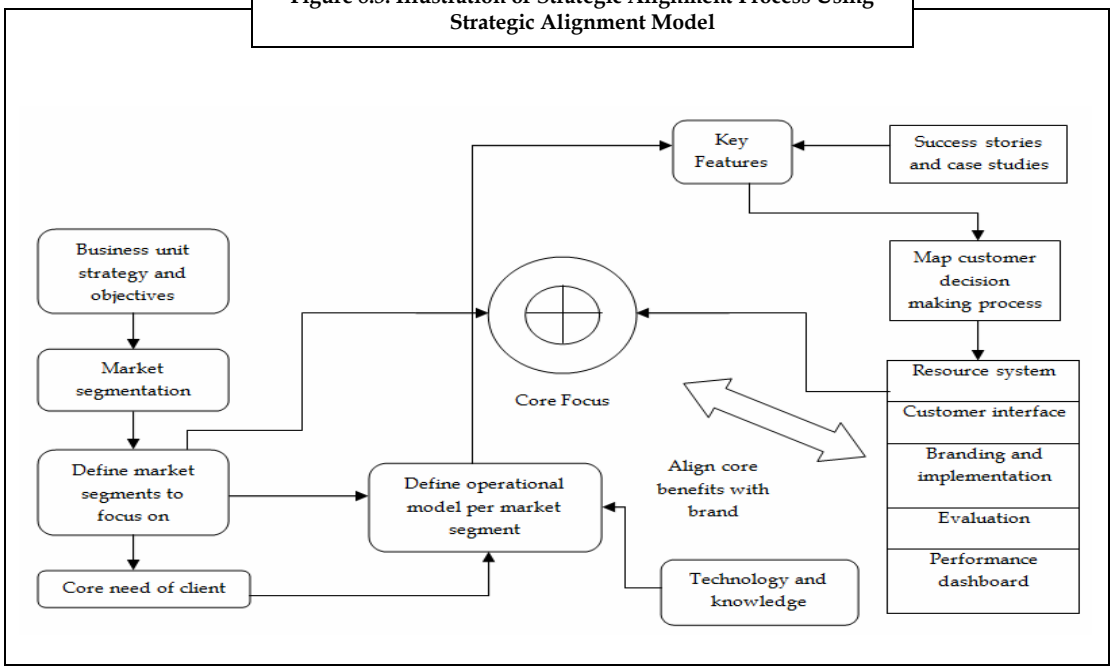
Figure 8.3 provides a graphical overview of the need to match the core benefits with the users' core needs.

The preconditions for the strategic alignment process to start are:

1. The participants need to know the success stories and case studies of other organizations and their e-commerce projects.
2. The participants need to be rooted in strategic conversion that results in the finalization of strategy and objectives of the organization or business unit.

These preconditions allow participants in strategic alignment process to begin with one of the most time consuming and difficult parts of e-commerce alignment model named market segmentation.

Figure 8.3: Illustration of Strategic Alignment Process Using Strategic Alignment Model



Source: Henderson and Venkatraman. Strategic Alignment Model. Oregon State University.

Market Segmentation

Segmenting is not an easy task. One single market can be segmented in several ways. Most segmentation techniques prove to be helpful in defining the e-Business project strategy. In other cases, segmentation does not provide any new insight into the marketplace and will not allow any benefits to strategic planning team.

Core Need of Client

It is important for an organization to consider the core need of market segments that it plans to target. Researching further into each of the segments will disclose the core need of the client. To survive in a highly competitive market, it is essential to match the core benefits of service or product with the core need of the client. As the environment alters, the user's core needs in most of the market segments will alter as well.

Example: Individuals searching for inexpensive airline tickets or holidays obtain their details via the travel agents. As environment changes, several Web sites offer core benefits that match the client's core needs better than travel agents. Thereby, the core needs of the clients are served via other channels.

Define Operational Model per Market Segment

Each of the market segments defined will have an operational model which would fulfill the core needs of user segment effectively compared to other operational models. Three inputs that are needed to determine the operational model are:

1. The market segments.
2. The core needs of every market segment.
3. The knowledge about technology and the acceptance of the same in the marketplace.

An operational model helps associate with the back-office infrastructure required to satisfy the recognized core needs in every market segments.

Example: Let us consider that a Web site concentrates on offering the online booking facilities for the guest houses worldwide. Herein, the market segmentation does not include the business travelers, as they prefer upper class hotels that indulge in luxury rather than the basic, economical and functional guest houses. The Web site will thereby target its clientele amongst people who prefer to stay in guest houses. An issue might arise during the booking of accommodation request. Even though many guests are linked to Internet, they do not have constant online connectivity nor do they use a central booking register. During these cases, double bookings will pose a problem, if the central booking register is not functional. But the quick online booking and confirmation needs of the market segments can be satisfied using the SMS-based messages on GSM networks. As the online client makes booking on the Web site, a text message including the booking details is generated and sent to the owner of the guest house. Then, the guest house owner accepts or denies the request based on its own booking register. Thereby, the client requesting for an accommodation is notified immediately or via an SMS whether the booking was successful or not.

Thereby, the core needs of the selected market segments focused on the organization to satisfy the main needs of client base.

Caution Reengineering is often irreversible. So, the reengineering processes should be rechecked before implementing them.

8.1.2 Types of Alignment

The strategic alignment model intends to align IT with business by involving four components. Hence, there are four possible alignment perspectives. They are:

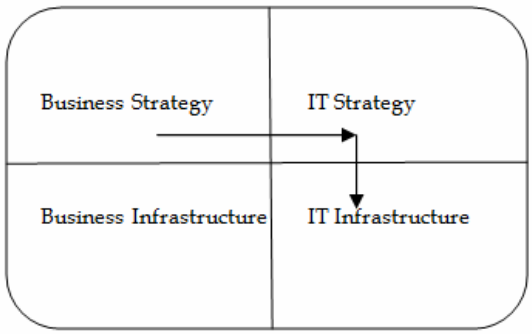
1. Business Strategy as the Driver: Technology Transformation
2. Business Strategy as the Driver: Strategy Execution
3. IT strategy as the Enabler or Driver: Competitive Potential
4. IT Strategy as the Enabler or Driver: Service Level

8.1.3 Business Strategy as the Driver

Business Strategy – IT Strategy – IT Infrastructure

As per the perspective shown in Figure 8.4, the business strategy drives the IT strategy that dictates the IT infrastructure and processes required. The present organizational scenario does not stand as a barrier to this outlook. Here, the emphasis lies in recognizing the best possible IT in market and its equivalent internal IT architecture.

Figure 8.4: Business Strategy as the Driver: Technology Transformation



Source: Bajaj. K., and Nag. D. (1999). E-Commerce: The Cutting Edge of Business. New Delhi: Tata McGraw-Hill Publishing Company Limited. Page 236.

The executive managements' role is to offer the technological vision that matches the selected business strategy. Here, the performance criteria are based on the organization's technological leadership in the IT marketplace.

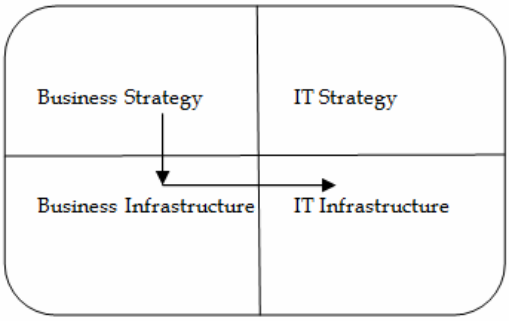
Business Strategy as the Driver: Strategy Execution

Business Strategy – Business Infrastructure – IT Infrastructure

As per the perspective shown in figure 8.5, the business strategy drives the business infrastructure that in turn drives the IT infrastructure. This is the most commonly seen hierarchical strategic management view. The role of management becomes crucial in making this perspective succeed, as the top management and IT manager act as the strategy formulator and strategy implementers. This is referred to as the traditional BPR model. The performance criteria to assess IT or IS function are based on the financial parameters.

Figure 8.5 depicts the way business strategy drivers the IT infrastructure.

Figure 8.5: Business Strategy as the Driver: Strategy Execution



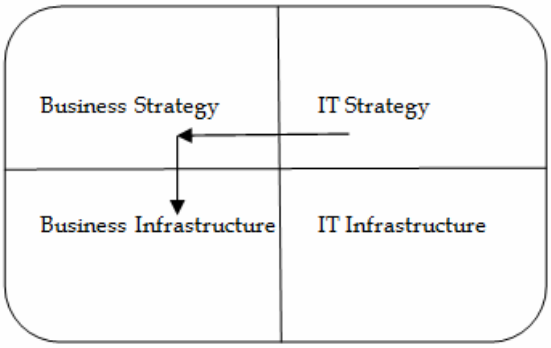
Source: Bajaj. K., and Nag. D. (1999). E-Commerce: The Cutting Edge of Business. New Delhi: Tata McGraw-Hill Publishing Company Limited. Page 237.

IT strategy as the Enabler or Driver: Competitive Potential

IT Strategy – Business Strategy – Business Infrastructure

As per the perspective shown in figure 8.6, the IT strategy drives the business strategy, and this in turn drives the business infrastructure. The organization tries to unveil the emerging IT competencies to impact new services and products and/or enter the new businesses. As per this viewpoint, the business strategy can be adapted with the help of emerging IT capabilities.

Figure 8.6: IT Strategy as the Driver or Enabler: Competitive Potential



Source: Bajaj. K., and Nag. D. (1999). E-Commerce: The Cutting Edge of Business. New Delhi: Tata McGraw-Hill Publishing Company Limited. Page 237.

The top management plays the role of business visionary. It has to articulate and understand the effect of emerging IT competencies on business strategy. The performance criteria in this alignment perspective are based on quantitative and qualitative measurements like market growth, share or a new product introduction.

IT Strategy as the Enabler or Driver: Service Level

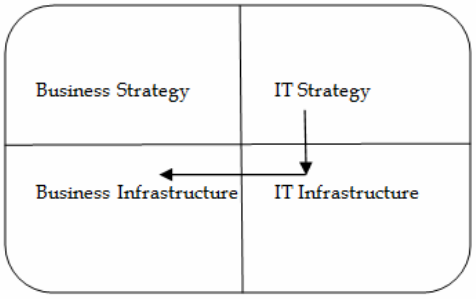
IT Strategy – IT Infrastructure – Business Infrastructure

As per the perspective shown in figure 8.7, the IT strategy drives the IT infrastructure, and this in turn drives the business infrastructure. Here, the business strategy plays an indirect role as this approach

provides direction to stimulate the customer demand. This perspective is essential to ensure the effective usage of IT.

Figure 8.7 depicts IT strategy as the driver/enabler.

Figure 8.7: IT Strategy as the Driver/Enabler: Service Level



Source: Bajaj. K., and Nag. D. (1999). E-Commerce: The Cutting Edge of Business. New Delhi: Tata McGraw-Hill Publishing Company Limited. Page 238.

In this model, the top management plays the role of a mentor to allocate the scarce resources. Here, the performance criteria lie in achieving the customer satisfaction appropriately.

Notes

The four criteria listed by Henderson and Venkatraman that differentiates strategic alignment model from the other models are:

1. The IS function's focus shifts from the internal orientation towards a strategic fit in the IT domain, i.e., to the emerging or existing technologies in marketplace.
2. The challenge lies in selecting one among the four alignment perspectives that suit the organizational objectives and business conditions.
3. The management roles vary in various perspectives.
4. The performance assessment criteria in different perspectives are analyzed. They expand from service and cost considerations to a larger set that involve operational and strategic goals.

Thereby, each organization should select a perspective that is appropriate for it. The appropriate strategic alignment model should be made as per the government rules, IT deployment within the organization, customer profile, IT marketplace, and so on.

8.2 BPR Methodology

This section discusses the methodologies for reengineering the business processes after identifying a project area. Most of the reengineering methodologies share a few common elements. However, a simple difference can have a significant effect on the success or failure of the project.

Two of the BPR methodologies that have been developed and used in the last few years are:

1. Gateway's Rapid Re Methodology for BPR devised by Klein.
2. Process Reengineering Life Cycle (PRLC) devised by Teng, Kettinger, and Guha.

BPR project involves the following phases:

1. ***Analysis Phase:*** In the analysis phase, the customer requirements, current process flow in the organization, benchmark of the best industry practices, and the target performance objectives must be understood. It also helps define the core business processes that are the immediate principles for BPR. At this stage, the mandate of the management must be reconfirmed according to the expectations to ensure the progress of the reengineering project.
2. ***Design Phase:*** The BPR's design phase has to deal with the design principles in categories like:
   (a) *Service Quality:* To design processes that relates to customer contact.
   (b) *Workflow:* To manage workflow through various steps.
   (c) *Workspace*: To deal with layout operations and economic issues.
   (d) *Workforce:* To focus at the workflow's design stage as they are the ones that make the reengineering project work.
   (e) *Information Technology:* To maintain state-of-art IT as an enabler of reengineered processes.
3. ***Implementation Phase:*** The implementation phase of BPR helps to plan logistics, training, facilities modifications, and manage transition.

Modeling and simulation tools help model a complicated process and predict their performance. A model consists of objects and their relationships and tries to replicate a real life system. Such tools assist in analysis stage. A BPR model can be developed by combining a set of local workflow models. The local workflow model combines the flow of work for one or many business processes.

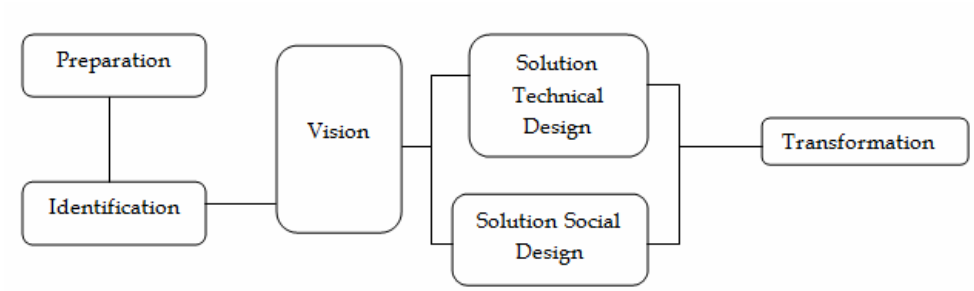
8.2.1 Rapid Re Methodology

This methodology is advocated in American Management Association seminars. This methodology covers five stages, they are:

1. ***Preparation:*** The people in BPR team must be mobilized, organized and energized. The BPR project team must also have insiders who have complete knowledge of procedures, and outsiders who are experienced and creative.
2. ***Identification:*** A customer-oriented process model must be developed for a business. The developed model should include divisions or sections that are customers of other divisions.
3. ***Vision:*** Select the processes that need to be reengineered. Also, formulate the redesign options that are capable of achieving the breakthrough performance.
4. ***Solution:*** Define the social and technical requirements for new processes and develop the detailed implementation plans.
5. ***Transformation:*** Implement the reengineering plans.

The Rapid Re methodology with these 5 stages are shown in Figure 8.8.

Figure 8.8: Rapid Re Methodology



Source: Bajaj. K., and Nag. D. (1999). E-Commerce: The Cutting Edge of Business. New Delhi: Tata McGraw-Hill Publishing Company Limited. Page 243.

Each project needs to customize their tasks according to their needs. Sometimes, most of the tasks might not be required or they need to be grouped together. Similarly, stages 1 (preparation) and 2 (identification) identifies all the key processes. However, BPR may confine to just a few, as the organization might not be willing to start company-wide reengineering. Therefore, the methodology must tailor to the problem environment.

8.2.2 Project Reengineering Life Cycle (PRLC)

The PRLC approach is a BPR methodology that identifies the 6 stages in a reengineering project. They are:

1. ***Envision***

   Envision stage involves the following steps:

   (a) Securing of management commitment.

   (b) Identifying the reengineering opportunities.

   (c) Determining the enabling technologies like EDI, EC, IT, and so on.

   (d) Aligning with the corporate strategy by developing the strategic alignment model.

2. ***Initiate***

   Initiate stage involves the following steps:

   (a) Organizing the reengineering team.

   (b) Building the performance goals based on quality, cost, time, and so on.

3. ***Diagnose***

   Diagnose stage involves the following steps:

   (a) Documenting prevailing processes.

   (b) Discovering pathologies.

4. ***Redesign***

   Redesign stage involves the following steps:

   (a) Designing of new process.

   (b) Designing of human resource architecture.

   (c) Developing prototype.

   (d) Selecting the IT platform.

   (e) Exploring another design.

5. ***Reconstruct***

   Reconstruct stage involves the following steps:

   (a) Installation of IT.

   (b) Reorganization.

6. ***Monitor***

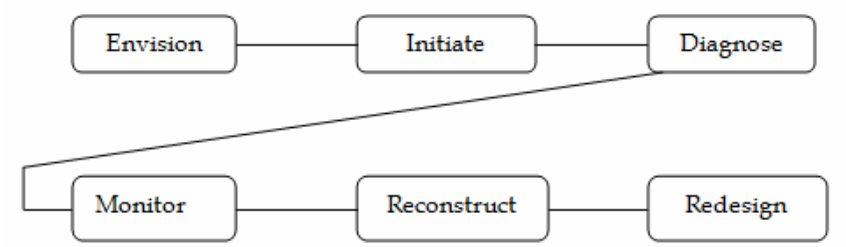
   The monitor stage involves the following steps:

   (a) Measurement of performance.

   (b) Basis to improve quality.

The PRLC is depicted in Figure 8.9.

Figure 8.9: Six Stage Process Reengineering Life Cycle



Source: Bajaj. K., and Nag. D. (1999). E-Commerce: The Cutting Edge of Business. New Delhi: Tata McGraw-Hill Publishing Company Limited. Page 247.

8.3 Summary

- The Strategic Alignment Model for Information System (IS) or Information Technology (IT) (Henderson and Venkatraman, 1993) suggests that the strategy and IT developments should be coherent.
- The strategic alignment model of e-commerce offers a step by step process to align an e-commerce project with business strategy of business organization or unit.
- The strategic alignment model intends to align IT with business by involving four components - business strategy, IT strategy, business infrastructure, and IT infrastructure.
- Two of the BPR methodologies developed in the last few years are: Gateway's Rapid Re Methodology for BPR devised by Klein and Process Reengineering Life Cycle (PRLC) devised by Teng, Kettinger and Guha.
- The Rapid Re Methodology covers five stages namely, preparation, identification, vision, solution, and transformation.
- The Process Reengineering Life Cycle covers six stages namely, envision, initiate, diagnose, redesign, reconstruct, and monitor.

8.4 Keywords

Business Process: It is several tasks that make up a business activity.

Cognitive: It is a process involving conscious intellectual activity.

Electronic Imaging Technology: It is a technology used to capture, store, process, manipulate, and distribute flat information such as documents, photographs, paintings, drawings, and plans, through digitization using computers or specialized hardware/software.

Outsourcing: It is contracting with a different company or person to do a particular function.

8.5 Self Assessment

1. State whether the following statements are true or false:
   (a) The alignment model was adopted by many researchers to study the performance of IT or IS.
   (b) Technological alignment of Internet activity occurs when Internet Strategy and Business Strategy are aligned.
2. Fill in the blanks:
   (a) _____ occurs when Internet Strategy (explanation and application processes of Internet strategy) and Business Strategy (explanation and application processes of business strategy) are aligned.
3. Select a suitable choice for every question:
   (a) Which among the following is not an example of a business process?
      (i) Testing software
      (ii) Purchasing services
      (iii) Hiring an employee
      (iv) Designing a new product

8.6 Review Questions

1. "Do strategic planning processes influence alignment directly". Discuss in brief.
2. "Alignment underlines the need for a change to enhance coherence of IT within the organization." Discuss.
3. "Effective management of IT necessitates balancing the choices made across the four domains like business strategy, business infrastructure, IT strategy, and IT infrastructure." Elaborate.
4. "Segmentation does not provide any new insight into the marketplace and will not allow any benefits to strategic planning team." Discuss.
5. "The performance criteria in this alignment perspective are based on quantitative and qualitative measurements like market growth, share or a new product introduction." Elaborate.
6. "Business strategy as the driver emphasis on the best possible IT in market and its equivalent internal IT architecture." Elaborate in brief.

Answers: Self Assessment

1. (a) T
   (b) F
2. (a) Strategic alignment of Internet activity
3. (a) Testing software

8.7 Further Readings

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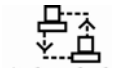
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Unit 9: Legal Issues - I

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Objectives

After studying this unit, you will be able to:

- Discuss legal issues
- Compare paper document with electronic document
- Recall the legal issues for Internet commerce

Introduction

E-Commerce is done on the data and information available on the Internet. Here, parties involved in e-commerce send and receive data. The data shared can be damaged due to many reasons like power failure, viruses, and physical damage. There is also the danger of hackers who can illegally access computer systems, violate privacy and tamper or damage records.

Example: In February 2000, when eBay was attacked, its Web server was bombarded with false requests for Web pages. This overloaded the site and caused it to crash.

In order to secure e-commerce, it has become necessary to give legal rights and obligations in the interest of the companies involved in e-commerce.

9.1 Legal Issues

The world is comfortable using signed paper documents for conducting business and commerce. From past two millennia, commerce has been done based on the written document with the value 'authorized' by the signature of an authorized officer. Present legal practice has paper documents and signatures affixed as a foundation. Electronic documents and messages have changed the scene without the familiar signatures and marks, and the trading world wants to be sure about safety in the electronic world. Therefore, e-commerce system should offer at least the same level of reliability as that of paper world, notwithstanding the important differences between the concepts embodied in electronic messages and paper documents. In the traditional paper-based commercial transactions, fraudsters can forge the signatures, numbers, and impressions. Emblems and seals too are unsafe as they can be tampered too. The trade and legal community knows how to deal with such kind of problems. Companies keep aside funds to take care of the losses due to such frauds.

On the other hand, the electronic world gives exposure to issues that were unknown earlier. These issues are directly the outcome of creating documents electronically, transferring them over worldwide computer communication networks. Trading partners who exchange the documents electronically will have to convince themselves that such kind of documents are authentic when it is received over networks and that their authentication can be recognized in case of dispute.

Transactions can be electronic but the main concepts of admissibility of evidence and evidential value of electronic documents will remain the same. The authenticity of the message needs to be intact while exchanging it with another user. Also, it needs to be secure so that it will not be intercepted by any third party. The electronic message is independent of the actual medium used for storage of transmission. The message can be stored in a floppy disk or an optical disk. It may be transmitted over a local area network, a Virtual Private Network (VPN) or the Internet. The physical medium can be a coaxial cable, an optical fiber, a radio link, or a satellite communication channel.

The security of an electronic message, which is a legal need, will be directly linked to the technical methods for the security of computers and networks.

Legal issues of e-commerce have generated tremendous interest among technologists, legal experts, and traders. Many of the early e-commerce experiments and production systems have gone into operation without any legal interchange agreement between the trading partners or between the network and their customers.

9.2 Paper Document vs. Electronic Document

In the 21st century, many businesses and individuals have switched to electronic documents as computer technology continues to advance. Electronic document helps in reducing paper and saving time, so the risks are worth considering.

Electronic document refers to files, which are stored on a digital device like computer as opposed to papers that might be stored in file cabinets or folders. Electronic storage is usually less costly than paper storage. This can provide security like password protection, which allows easy sharing and accessing of the files. This also saves time and space.

Example: A company can restrict access to the contents displayed on its Web site using a password or login code.

Apart from the benefits of electronic document, there are two major risks:

1. Loss of files
2. Security breaches

Example: Files such as financial data can be lost due to virus attack.

Files can be lost or corrupted due to system crash or any other problem. The risk of losing files can be eliminated or greatly minimized by saving multiple digital copies of files on several computers in

several locations. Breach in the computer security is also a risk, which can be minimized by using antivirus and password protection in the electronic storage system.

Electronic documents over paper have the advantage of being environment friendly. Electronic document helps to minimize or eliminate paper from the daily life, thereby helping to save millions of trees and water costs related to the production of paper.

9.2.1 Risks of Paper Documents

Paper documents pose many risks in business. Some of the risks involved in paper documents are as follows:

1. ***Loss of Data in Case of Disaster:*** Data can be lost due to natural or man-made disasters such as earthquakes, cyclones, or acts of terrorism. The documents may undergo wear and tear caused by physical handling and undesirable weather conditions. The loss is minimal by maintaining multiple copies of the document. This adds to the number of already existing documents.

Example: A company may lose its confidential data stored due to fire.

2. ***Time and Cost Overruns:*** It is time consuming to have paper archives for source of information and reference. The delay in archive process holds up an entire business that could be related to the researched or referenced document.

Example: A company SamServices has done a paper work agreement with its client JosNetworks for a project. Now the client wants to make some changes in their project. In order to incorporate the changes, the company will have to include some additional expenses clause in the agreement as it will cost the company more money. This will make the company to rewrite the document, which is time consuming.

3. ***Communication Gaps:*** Most of the business processes involve stages of conception, iteration, decision, execution, and follow up review. Many departments are involved in the whole exercise and if the source documents are not at the fingertips of every stakeholder in the business, then it can hamper smooth communication of ideas and relevant data.

Example: A company should keep all the departments involved in a project about the updates they get from the client regarding the project. If they miss out any of the department, communication gaps will lead to inconsistency in work. This could lead to a dissatisfied client.

4. ***Lost Opportunity to Delight Customers:*** While handling paper-based documents in front of a client, it is important to keep all the relevant documents available and handy. In case, they get misplaced or lost, the staff may have an agonizingly unprofessional situation. Such kind of encounters or experiences will fail to satisfy the client.

Example: A company, due to data theft, loses some data pertaining to the customer's confidential data. The theft would damage the customer's reputation. The customer would lose the trust in the company and henceforth, would not share any details with the company that would lead to complications.

9.2.2 Risks of Electronic Documents

Electronic documents are common these days because of the ease with which the documents can be located and retrieved on a database. Electronic documents help in reducing storing space, as it is not required to store countless number of paper hard copies. Nowadays, hard copies are less common in use. However, when compared to paper documents, electronic documents have more risks. They are:

1. ***Data Corruption:*** A file can be corrupted due to a number of different reasons. Documents are damaged due to viruses or technological malfunction, which are not accurately retrievable or readable by any computer program. Sometimes, the damaged files can be repaired but the process can be time consuming. It is always suggested to keep backups of all the electronic documents on a different storage device so that it can safely and quickly recover any data which gets corrupted.
2. ***Data Theft:*** It takes some time to take a hard copy document and photocopy it, but an electronic document can be duplicated instantly and e-mailed to any destination in the world. This makes data security an important priority for any business or government agency. Although there are safeguards and programs, when implemented these avoid industrial data theft. However measures to get around safeguards get more advanced at the same rate. In this age of the Internet, it is often difficult to guarantee security of a computer file.

Example: If a company's confidential site is hacked, all the vital information can leak out and this will lead to various kinds of loss for the company.

3. ***Editing:*** The electronic documents can be easily edited and saved, which can be a security nightmare for the businesses and agencies with sensitive records that get changed without the agency's knowledge or consent. There are ways to avoid document editing electronically including file locks and 'read-only' classifications, but the hackers are also adept at circumventing the safeguards. In case of paper documents, authenticity of the original documents is done by getting a signature and stamp of the notary which is very difficult to forge especially in a short period. A document stored electronically has the potential to be edited and saved in seconds in case someone gets the security protocols.

9.3 Legal Issues for Internet Commerce

Internet commerce has raised legal issues through the provision of the following services:

1. Online retailing - ordering of products and services
2. Online marketing
3. Online publishing
4. Exchange of electronic messages and documents
5. Financial services such as banking and trading in securities
6. EDI, electronic filing, electronic transactions, and remote employee access

Trade and commerce over the Internet gives rise to many legal issues like trademarks and domain names, copyright and trademark, jurisdiction issues, service provider liability, and formation of enforceable online contract.

9.3.1 Trademarks and Domain Names

The dot-com domain is used by commercial entities to identify them in cyberspace. The latter is worldwide, since the Internet is not confined to any geographical boundaries. The advantages pose a problem too. A company uses its name to take a domain name from the registry. Unlike the traditional commercial world where different companies may have the same trademark in different products or services, in cyberspace only one name can be given as Name.com. Therefore, the company, which registers its name first as the domain name removes all the others from the cyberspace. As one would expect, this leads to legal battles. It has been argued in the court of law that a domain name functions as a trademark, but using it as a domain name is guilty of the trademark infringement.

The infringement of trademarks using domain names is on two grounds:

1. Confusion
2. Dilution

In U.S., the Lanhan Act, 1984 defines trademark as "any word, name, symbol, device, or combination used or intended to be used to indicate the source of the goods." Liability for infringement, when the infringer uses a mark, which might be confused with the trademark of another, whether deliberately or through negligence, when used in the context of same goods and services, is strictly on the infringer.

9.3.2 Copyright and the Internet

In the printed world, copyright was developed to protect the economic interests of the creative writers. The copyright law protects expression of an idea and not the idea itself. It also protects the originality of artists and innovators. In recent times, the subject matter of copyright has been expanded further to protect the writers.

Example: In U.K., Copyright, Designs and Patent Act, 1988, allows the protection of the following subject matter:

1. Original literary, musical, dramatic, and artistic works
2. Typographical arrangement of published editions of literary, musical, or dramatic works
3. Sound recordings
4. Broadcast
5. Cable programs

They have been classified into two groups as 'media works' and 'author works'. The multidimensional capabilities of Web sites allow all types of words to be published on the Internet which means that copies can be distributed to users or customers. The problem is that, unlike a paper copy, this copy can be further duplicated and distributed by the recipients. If the material is in the public domain, then there is no difficulty. However, the copyright law applies to the downloaded matter, which is very different to the problem in the context of the bulletin boards. Someone might post many works onto them by giving the impression that they can be freely downloaded, but in the first instance they were illegally pasted on the bulletin boards. The service provider who runs the bulletin board will be drawn into the dispute, though the provider may or may not have been aware of this. The Web site creator or the Internet service provider might be liable for the secondary infringement due to its role in infringing copies.

It has been recognized in a number of disputes that a Web site is likely to enjoy copyright protection. However, a Web site operator will have to make sure that he does not violate someone else's copyright while creating the site. Web sites and distribution of material over the Internet attracts copyright provisions which are related to copying and issuing copies to the public.

9.3.3 Jurisdiction Issues

The Internet allows anyone to set up a Web site anywhere in the world. Its location can be used to decide the jurisdiction of disputes. The Web site might accept orders from visitors to the site as part of a shopping mall or the Internet store.

Example: Consider an online retailing bookstore site, which sells books. A court of law may consider the location of the Web site to determine which law would be applicable. E-Commerce on the Internet will grow if the parties doing business know what rules will govern their activities.

Under different jurisdictions, different laws will be applicable. Many questions that are important to the legality of commerce in cyberspace have arisen which are as follows:

1. Who has the right to prescribe the law in a given area?
2. Where can the action commence and should the entity be subjected to legal proceedings?
3. How and when will the arbitral award or court judgment in one jurisdiction be enforced in another?

The personal jurisdiction will exist when a company conducts business over the Internet, with persons in foreign jurisdiction. Thus, the use of the Internet in transmitting computer files, making contracts, or accepting purchase orders from a distant venue might subject the defendant to jurisdiction in foreign states. Some companies include the terms and conditions to be followed in their Web sites. While the enforceability of the provisions changes based on the facts and jurisdiction, many companies have successfully invoked such clauses when the defending cases were brought in foreign jurisdictions.

9.3.4 Service Provider Liability

Internet Service Provider (ISP) provides access to the shared Web sites, e-mail distribution lists, Usenet news, and much more for their users. These facilities may be used by their users to upload defamatory, unlawful, copyright, or trademark infringement material. Unlawful material will include banned publications, pornography and abusive material without giving the ISP a chance to review it. Liability for materials distributed over the Internet might be different for Web site operators and ISPs. The ISP can be held liable for bulletin boards. It is also responsible for aiding and abetting the commission for an offense like distribution of pornography. Similarly, the third party liability for defamation is also a cause for the serious concerns of ISPs, Web sites, and online service providers. Therefore, the concerns include libel and defamation of third party liability and rights for hosting unlawful materials.

Under the Information Technology Act, 2000, Section 79, network service providers are not liable for any third party data or information made available by them, if they can confirm that the offense or contravention was committed without their knowledge or that they had exercised all due diligence to avoid the commission of such offense or contravention.

9.3.5 Formation of an Enforceable Online Contract

The growth of e-commerce depends on the confidence of traders in forming legally enforceable contracts online. The main activities related to the formation of an enforceable contract, take place in the Internet i.e., the offer is communicated in the e-commerce environment through the Internet orally or in writing.

Electronic acceptance of the contract through e-mail and e-form is valid in the same way as a fax message is valid. The offer can present the terms and conditions as a legal notice on the Web site. Visitors to the site, who choose to proceed further, even after reading the notice, can be construed as accepting the conditions enforced. The timing of the acceptance offer decides the laws which would be applicable in case of dispute. Then, there are issues pertaining to identity of parties and the role of digital signatures on the Internet. Writing and signing in print might be the need for some sort of permanent or tangible form. Yet another issue pertaining to electronic contracts is to set up the competency or authority of a party to enter into a transaction.

All these issues are crucial to the creation of an enforceable electronic contract. In case of postal mail, it has been held that when the acceptor mails the contract it becomes valid irrespective of whether it reaches the receiver or not. However, some of the proposals under construction in some countries will reject this rule for electronic communications.

9.4 Summary

- E-Commerce is based on the data available on the Internet where the involved parties can send or receive data.
- Electronic documents have many advantages over paper documents like reducing paper storage space, and saving of time.
- Electronic documents have many disadvantages like data theft, data corruption, and editing.
- Companies doing e-commerce will have to take steps to secure the data from computer hackers who might sabotage the confidential data of the company.
- Copyright law in e-commerce helps to protect the economic interests of the writers.
- Enforceable Online Contracts help to build confidence in the traders.

9.5 Keywords

Breach: It is the act of breaking laws, rules, contracts, or promises.

Emblem: An emblem is a pictorial image, abstract or representational, that gives a typical example of a concept or represents a person.

Hackers: A hacker is someone who tries to break into computer systems.

Lanhan Act: It defines the statutory and common law boundaries for trademarks and services.

9.6 Self Assessment

1. State whether the following statements are true or false:
   (a) E-Commerce does not depend on the data and information on computer and the Internet.
   (b) VPN stands for Virtual Private Network.
   (c) Lost opportunity to delight customers is one of the risks of electronic documents.
   (d) There are three grounds for the infringement of trademarks using domain names.
2. Fill in the blanks:
   (a) _____ domain is used by commercial entities to identify them in the cyberspace.
   (b) _____ storage is usually less costly than paper storage.
3. Select a suitable choice for every question:
   (a) What is the risk of paper documents?
      (i) Data theft
      (ii) Communication gaps
      (iii) Data corruption
      (iv) Editing

9.7 Review Questions

1. "E-Commerce system offers the same level of reliability as that of the paper world." Discuss.
2. "Electronic storage is usually less costly than paper storage." Justify.
3. "Paper documents pose a lot of problems in business." Explain.
4. "E-Commerce system should offer at least the same level of reliability as that of paper world." Justify.
5. "When compared to paper documents, electronic documents have more disadvantages." Explain.

6. "Electronic documents refer to files which are stored on a digital device." Explain.

Answers: Self Assessment

1. (a) F (b) T (c) F (d) F
2. (a) dot-com (b) Electronic
3. (a) Communication gaps

9.8 Further Readings

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Unit 10: Legal Issues - II

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Objectives

After studying this unit, you will be able to:

- Explain the technology for authenticating electronic document
- Discuss the laws for e-commerce in India
- Interpret EDI interchange agreement

Introduction

The Indian parliament came up with the Information Technology Act, 2002, that gives identification for its legal enactment. Now, if anyone knowingly or unknowingly conceals, destroys, tampers, or alters any computer source code, it would be considered an offense. However, electronic records can be authenticated and safeguarded using digital signatures. There are many laws which govern advertising, children, copyright, trademarks, and zoning.

10.1 Technology for Authenticating Electronic Document

Communication systems and digital technology have made changes in the way businesses are done. Use of computer to create, transfer, and store the information or data is increasing. The Information Technology Act, 2000, was passed to promote efficient delivery of government services by means of reliable electronic records. Electronic documents can be authenticated using digital signatures, which in turn are validated by a subscriber using an electronic method or procedure. Any subscriber can authenticate the electronic record by affixing his digital signature.

Digital signatures can be affixed with the grammatical variations and similar expression using any methodology or procedure by a person with the intention of authenticating electronic record. Digital signatures should follow the Public Key Infrastructure (PKI). PKI allows access to users to basically unsecure public network like the Internet to securely and privately exchange data with the use of public and a private cryptographic key pair, which is obtained and shared through a trusted authority. A digital signature scheme consists of three algorithms. They are

1. ***Key Generation Algorithm:*** This allows a user to choose a private key randomly from a set of possible private keys. The algorithm generates a private key and public key.
2. ***Signing Algorithm:*** This generates a signature using the message and private key.

3. ***Signature Verifying Algorithm:*** This either accepts or rejects the message's claim to authenticate using a message, public key, and signature.

Electronic records authentication can be effected by using asymmetric crypto system and hash function, which envelops and transforms the first electronic record into another electronic record. Any person using the public key of the subscriber can verify the electronic record. The private and public keys are unique to the subscriber and constitute a functioning key pair. The concept is similar to the locker key. You have the 'private key' while the bank manager will have the 'public key'. The locker cannot be opened unless both the keys are used together.

If the concerned parties agree to the application of the security procedure, then the digital signature affixed can be verified to be:

1. Unique to the subscriber affixing it
2. Capable of recognizing such subscriber
3. Created in a manner that is under the exclusive control of the subscriber. It is linked to the electronic record to which it relates in such a manner that if the electronic record is changed then the digital signature will become invalid.

Such digital signature will be deemed to be a secure digital signature. The digital signature will be certified by the Certifying Authority. The Certified Authority is licensed, supervised, and controlled by the Controller of Certifying Authorities.

Laws of different countries give different authentication standards, sometimes indicating a clear technology bias, which should be inter-operable to facilitate cross-border transactions.

Did you know? In 1984, Silvio Micali, Shafi Goldwasser, and Ronald Rivest were the first to define the security needs of digital signature schemes.

Example: An e-commerce company, which uses PKI authentication technology for its online contracts with Indian consumers, can use different forms of technology while getting into online contracts with the consumers in other countries.

10.2 Laws for E-Commerce in India

A number of e-commerce laws and guidelines will have to be followed while operating in the e-commerce world. E-Commerce laws give you a chance to succeed with the online selling and make you aware of the fraudsters on the Internet to ensure more security for the operating companies. These laws are relevant and will go a long way towards helping shopping cart companies to survive and be profitable.

10.2.1 Cyber Laws in India

When the Internet was developed, no one would have realized that the Internet could change itself into an all-pervading revolution, which could be misused for criminal activities and which would require regulation. The anonymous nature of the Internet is responsible for the variety of criminal activities, because of which, people with intelligence have been trying to perpetuate criminal activities in cyberspace. Hence, cyber laws were introduced in India. Cyber law is vital because it touches all the aspects of transactions and activities pertaining to the Internet, World Wide Web (WWW), and Cyberspace.

Every action and reaction in cyberspace will have some legal and cyber legal perspectives. Cyber law issues are involved everywhere, from the time you register the domain name, the setup of the Web site, and to the point when you conduct electronic commerce transactions on the site.

In India, Information Technology Act, 2000 deals with the issues pertaining to the Internet. This act attempts to change the outdated laws and give ways to deal with cybercrimes. Such laws will help people to perform purchase transactions through credit cards over the Internet without the fear of misuse. This Act offers the legal framework so that the information is not deprived of legal effect, enforceability or validity solely on the ground that it is in the form of electronic records.

Notes

Information Technology Act is based on the United Nations Commission on International Trade Law (UNCITRAL) Model Law on Electronic Commerce, 1996.

This Act empowers government departments to accept creating, filing, and retention of official documents in digital format. The Act also proposes a legal framework for authentication and origin of electronic records or communications done through digital signature.

Information Technology Act, 2000 from the perspective of e-commerce in India has the following provisions:

1. E-mail will be a valid and legal form of communication in India, which can be produced and approved in the court of law.
2. Companies will be able to carry out electronic commerce by using the legal infrastructure given by the Act.
3. Digital signatures have legal validity and sanction in the Act.
4. Government can issue notification on the Web, which heralds e-governance.
5. Corporate companies have permission to be in the business of Certifying Authorities for issuing Digital Signatures Certificates.
6. Companies can file any form, document or apply with any authority, office, body or agency owned or controlled by the appropriate government in electronic form by means of electronic form as prescribed by the appropriate government.
7. Companies have statutory remedy in case anyone breaks into computer systems or networks and causes damages or copies data.

Did you know? Information Technology Act, 2000 came into force on 17th October, 2000.

Notes

According to Information Technology Act, "computer" means any magnetic, electronic, optical or any high-speed data processing system or device that does logical, memory and arithmetic functions by manipulating magnetic, electronic or optical impulses. It includes all the input, output, storage, processing, computer software, or communication facilities, and this is connected or related to the computer in a computer system or network.

Task

Browse for the latest company case on the Information Technology Act. List out the various rules that have been used to safeguard a company's interest at a time of conflict with another entity.

10.2.2 Commonly Used Laws

E-Commerce companies will have to meet the terms with a wide range of laws. E-Commerce owners and workers should be aware of some of the commonly used laws for advertising, children, copyright, trademarks and zoning.

Advertising

Web sites advertise their goods or services to their customers. The traditional laws of advertising that apply to ordinary sales are enacted in the interest of the consumers to avoid deceptive and unfair acts or practices. The laws are also applicable to the advertising or marketing on the Internet. The Web site will be liable if it creates confusion or misrepresents the features, quality, or geographic origin of the goods or services which are offered for sale in the advertisement. In addition to the advertising laws, depending on the kind of business, the Web sites will have to comply with the laws applicable to business. Some countries have introduced legislations that will place limitations on the Internet advertising. In such cases, Web site owners will be subjected to liability for violation of the laws of a country even though they were unaware of such limitations or restrictions on advertisements. Further, advertisement or banners may be exposed to liabilities under the consumer protection laws since the consumer in different jurisdictions might subject it to different interpretations.

Children

Children's Online Privacy Protection Act applies to any operator of commercial Web site, which directs services to children under the age of 13 and collects personal information from them. Such sites will have to post a privacy policy on their homepage and links to other pages where the information will be collected. Such sites should allow parents the choice to give consent or refuse the use of the child's personal information.

Task

Browse for some of the Web sites, which ask for parent's consent before taking up any child's information.

Copyrights

E-Commerce involves selling goods or services through the Web sites. Since, these Web sites have written words and materials, they can be subject to copyright laws. Copyright protection is given immediately to any original work of authorship. Anyone using the creation contrary to the writer's wish will face legal consequences.

Example: An online company cannot use the name or logo of another company to do their business.

Trademarks

Similar to copyright protections, trademark rights give the owner an exclusive use of any distinctive name, sign, logo, or any similar combination, which recognizes the company or product. Using the trademarked name or property on a Web site, without getting the consent of the owner will result in serious legal actions.

Zoning

Every state and local municipal organization will set its laws and regulations pertaining to zoning. Zoning laws generally restrict or govern how the land can be used. The laws can change widely from state to state and from city to city, but generally restricts or categorizes land use in one of the five categories like residential, commercial, industrial, agricultural, or rural. E-Commerce may be subject to zoning laws depending on the size and extent of the business.

Example: A single person operating an e-commerce site out of the residence would have to comply with residential zoning restrictions. Neither can the owner have a commercial signboard nor do anything else in violation of residential zoning regulation.

10.3 EDI Interchange Agreement

It is a well-known fact that some order is necessary in the conduct of commerce in the paper world. Simple activities like preparing an invoice, preparing a commercial contract, signing, and dispatching will have to follow some protocols agreed by the trading partners. These might be formal or informal. Apart from this, acceptable rules of conduct are necessary to achieve the kind of discipline needed for conducting smooth and effective trade and commerce.

In the Electronic Data Interchange (EDI) world of electronic documents, such a discipline has to be created through a set of rules, that have been developed in the form of interchange agreements within the number of user groups, regions, and nation organizations. At the international level, UN has adopted 'The Model Interchange Agreement' for the International Commercial Use of Electronic Data Interchange (ICUEDI), which indicates the interchange of data and not the underlying commercial contracts between the parties. It addresses the requirement for uniformity of agreements to eliminate barriers in international trade, since different solutions for problems are being adopted by countries. UN has recommended that the member countries have to take into account the terms and provisions of the Model Interchange Agreement while framing their own laws on e-commerce.

An interchange agreement can be made between the trading partners. It sets up the rules to be taken for using EDI or e-commerce transactions. It lists the individual roles and legal responsibilities of the trading partners for transmitting, receiving, and storing electronic messages. The signing of the interchange agreement indicates that the parties want to be bound by it and that they wish to operate within the legal framework. This can help to minimize legal uncertainty in the electronic environment.

Many conventions and agreements pertaining to international trade do not anticipate the use of EDI or e-commerce. Many national laws also create uncertainty pertaining to the legal validity of electronic documents. There are very few national and international judgments which are ruling the validity of electronic documents, signatures, or messages. It is in this kind of scenario where clear legal rules and principles are missing that an interchange agreement gives trading partners readily available solutions for formalizing the EDI or e-commerce relationship between them. It gives a strong legal framework for making sure that the electronic documents will have a legally binding effect, subject to the national laws and regulations.

The issues that were addressed by the working party, which set the Model Interchange Agreement are as follows:

1. Selection of EDI standards, messages, and methods of communication.
2. Responsibilities to make sure that the equipment, software and services are operated and maintained effectively.
3. Procedures for making any system change which might impair the ability of the trading partners to communicate.
4. Security procedures and services.
5. Points at which EDI messages have legal effect.
6. Roles and contracts of any third party service providers.
7. Procedures for dealing with technical errors.
8. Need for confidentiality.
9. Liabilities in the event of any delay or failure to meet all EDI communication needs.
10. Laws governing the interchange of EDI messages and arrangements of the parties.
11. Methods for resolving any possible disputes.

The interchange agreement is flexible enough to meet the needs of all business sectors involved in international trade. Trading partners might feel confident that it is addressing the known legal issues arising from the commercial use of EDI in the international trade. It will give a strong legal and practical framework for considering and recording the required business decisions.

Example: Some of the interchange agreements are UK EDI Association Model Interchange Agreement and European Model EDI Agreement (International).

10.4 Summary

- The Information Technology Act in India was introduced to protect e-commerce from cybercrimes. This takes care of the security of data.
- Electronic documents can be authenticated using digital signatures, which is based on the Public Key Infrastructure.
- E-Commerce laws give you a chance to succeed with the online selling and make you aware of the fraudsters on the Internet.
- Electronic Data Interchange refers to data exchange, which is created with a set of rules that can be used as Interchange Agreement.

10.5 Keywords

Crypto System: It is a method for encoding and decoding messages.

Digital Signature: It is a mathematical design for demonstrating the authenticity of a digital message or document.

Hash Function: It is a mathematical function that converts a large, variable-sized amount of data into a small datum, typically a single integer that may serve as an index to an array.

Zoning: It is dividing an area into zones or sections reserved for different purposes such as residence, business and manufacturing, etc.

10.6 Self Assessment

1. State whether the following statements are true or false:
   (a) A digital signature scheme consists of three algorithms.
   (b) Any person using the public key of the subscriber can verify the electronic record.
2. Fill in the blanks:
   (a) The electronic documents can be authenticated using _____ signatures.
   (b) The digital signatures should follow _____.
   (c) The _____ will be licensed, supervised, and controlled by the 'Controller of Certifying Authorities.'
3. Select a suitable choice for every question:
   (a) Which Model Law is used to create the Information Technological Act?
      (i) UNCITRAL
      (ii) ICNITRAL
      (iii) INICTRAL
      (iv) ITINTRAL

(b) Which algorithm is used for digital signature scheme?

(i) Signing

(ii) Key verifying

(iii) Hash algorithm

(iv) Key degeneration

(c) What is the full form of ISP?

(i) Internet Set Provider

(ii) Intranet Service Provider

(iii) Internet Service Provider

(iv) Internet Service Programmer

(d) What kind of protection can be given immediately to any original work of authorship?

(i) Digital

(ii) Editing

(iii) Copyright

(iv) Zoning

10.7 Review Questions

1. "Electronic documents are authenticated using digital signatures." Describe.
2. "Information Technology Act, 2000, deals with the issues pertaining to the Internet." Explain.
3. "An interchange agreement is made between the trading partners." Justify.
4. "Growth of e-commerce depends on the confidence of the traders in forming legally enforceable contracts online." Describe.

Answers: Self Assessment

1. (a) T (b) T
2. (a) Digital (b) PKI (c) Certified Authority
3. (a) UNCITRAL (b) Signing (c) Internet Service Provider (d) Copyright

10.8 Further Readings

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Unit 11: Cyber Security and Crime

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Objectives

After studying this unit, you will be able to:

- Explain cyber security
- Describe cyber crimes
- Understand Computer Emergency Response Team (CERT)

Introduction

The Internet has grown rapidly with advancements in computer and telecommunication technologies. Internet commerce tools are used in the fields of education, communication, work, trade, health, interaction, and commerce. The growth of Internet has provided an opportunity for people to improve the quality of their lives which has led to the betterment of society.

However, Internet commerce tools are also used for fraudulent activities. This is because Internet systems are vulnerable targets for attack. Systems that are not configured securely or not protected from known vulnerabilities are easy victims to cyber attacks. Cyber criminals attack computer networks, advocate violence, promote hatred, and vandalism using the Internet. Internet based applications such as electronic banking and e-commerce are potential targets for computer criminals. Criminals can conduct their operations from any corner of the world and can access any computer network. Hence, cyber security is essential to protect us from cybercrimes.

11.1 Cyber Security

Individuals and groups engage in crime by utilizing the tools provided by Internet for the benefit of people. It is extremely difficult to trace the criminals, and even when they are traced it is difficult to prosecute the culprits due to lack of laws. The governments are gradually trying to regulate the Internet through cyber laws. Law enforcement agencies are given the power to intercept online communications to curb cybercrime.

Example: The Regulation of Investigatory Powers Act in Britain gives law enforcement agencies the power to intercept online communications. South Korea has blocked access to gambling sites and Singapore has blocked access to pornography sites.

11.1.1 Cyber Attacks

A cyber threat is an intended or unintended illegal activity that could lead to unpredictable, unintended, and adverse consequences on a cyberspace resource. Cyber attacks are classified as network based and executable based attacks. Executable based attack happens when a program is executed on a target computer system through either of the following ways:

1. ***Trojan:*** Trojan is a computer program with hidden and potentially malicious functions that evade security mechanisms. They exploit authorizations of a system entity that invokes the program. Trojans pretend to do one thing while actually they do something different. Modifying a normal program to perform fraudulent activities in addition to its usual function is known as a Trojan horse attack. An attacker accesses the source code of an editor program, modifies it to steal someone's files, compiles it and saves it in the victim's computer. The next time the victim executes the editor program, the intruder's version gets executed. The editor apart from performing its normal functions transmits the victim's files to the attacker.

Example: Dmsetup.exe and LOVE-LETTER-FOR-YOU.TXT.vbs are examples of Trojan programs.

2. ***Virus:*** Virus attaches itself to a legitimate program with the intention of infecting other files. A virus cannot run by itself. It requires a host program to get executed and to make it active. It is hidden by nature and propagates by infecting a copy of itself into another program. A virus writer first produces a new useful program, often a game, which contains the virus code hidden in it. The game is then distributed to unsuspecting victims through the available networks. When the victim starts the game program, it examines all the binary programs on the hard disk to see if they are already infected. When an un-infected program is found, the virus program infects it by attaching the virus code to the end of the file and makes the first instruction jump to the virus code. In addition to infecting other programs a virus can also erase and modify files.

Example: Polyboot.Band AntiEXE are boot viruses.

Caselet

Virus Creates Cyber Threat

A programmer was accused of unleashing a computer virus named Melissa from a stolen AOL account. The programmer constructed the virus to evade anti-virus software and to infect computers using Microsoft Windows and Word programs. The virus appeared on thousands of e-mail systems on March 26, 1999 disguised as an important message from a colleague or friend. The virus was designed to send an infected e-mail to the first 50 e-mail addresses on the address book of the users' Microsoft Outlook. Each infected computer would send out e-mails to 50 additional computers which in turn would infect

Contd…

another 50 computers. The virus spread rapidly and exponentially resulting in substantial interruption and impairment of public communications and services. Many system administrators had to disconnect their computer system from the Internet. Many companies were forced to shut down their e-mail gateways due to the vast amount of infected e-mail the virus was generating.

An investigation was conducted and the programmer was prosecuted for writing the virus. He was sentenced to 20 months in federal prison and a fine of $5,000 was imposed.

Source: http://articles.cnn.com/1999-04-02/tech/9904_02_melissa.arrest.03_1_computer-virus-attorney-general-peter-verniero-monmouth-county-jail?_s=PM:TECH

3. ***Worm:*** Worm is a computer program that runs independently and can propagate a complete working version of itself onto other hosts on a network. Virus is part of a program. Whereas, a worm is a complete program in itself. Both viruses and worms try to spread themselves and can cause enormous damage. An attacker uses bugs in the operating system or in an application to gain unauthorized access to machines on the Internet. Then a self-replicating program is written which exploits the errors and replicates itself within seconds on every machine it could gain access to.

Example: ExploreZip worm deletes files on a host system.

4. ***Spam***: Spam is a major source of cyber attack. It is used to propagate viruses and worms. It appears to be promotional material and is similar to advertisements and catalogs. Unsuspecting users become victims when they click on attachments the spyware and Trojans get installed on their systems. Information and data on all activities of interest thus gets reported from users' computers to sites whose forwarding addresses have been installed as part of spyware. This information may be used by competitors.

In order to protect the information present on computers and servers a proper antivirus must be installed and updated regularly.

11.1.2 Cyber Security Threats in India

Terror attacks in major cities and towns across the world show the inadequacy of the mechanisms to address the challenge of cyber threat. Many nations have designed counter-terrorism strategies and anti-terror mechanisms to address this challenge. Most of these mechanisms are designed in a conventional pattern and might be effective in a conventional terror attack. However, these mechanisms have limitations for terror attacks that are unconventional in nature.

The growth in the Information Technology (IT) sector has exposed the user to a huge bank of information. However, it has also added a new dimension to terrorism. Recent reports suggest that the terrorists are also getting equipped to utilize cyber space to carry out terrorist attacks.

In the last couple of decades, India has grown enormously in the IT sector. Most of the Indian banking industry and financial institutions have embraced IT to its full optimization. Cyber attacks are commonly directed towards economic and financial institutions. Due to the increased dependency of the Indian economic and financial institutions on IT, a cyber attack might cause irreparable damage to the economic structure of the country.

Cyber terrorism is basically the union of terrorism and cyber space. It generally means unlawful attacks and threats of attacks against computers, networks, and information stored in them. Terrorists use cyber space to disrupt key services and create panic by attacking critical systems or infrastructure which can be very dangerous to the country.

Terrorists use tools like e-mails, cell phones, and satellite phones to stay connected and have mastered the use of laptops and PCs. As terrorist organizations realize the capability and potential of these tools to cause disruption at lower costs, they use technology to implement their strategies and tactics.

Methods of Attacks

The most popular weapon in cyber terrorism is the use of computer viruses and worms. The attacks on the computer infrastructure can be classified into three different categories:

1. ***Physical Attack***: In this type, the computer infrastructure is damaged by using conventional methods like bombs, fire, and so on.
2. ***Syntactic Attack***: In this type of attack, computer viruses and Trojans are used to modify the logic of the system in order to introduce delay or make the system unpredictable.
3. ***Semantic Attack***: In this type of attack, the information keyed in the system during entering and exiting the system is modified without the user's knowledge in order to induce errors.

Notes

The use of computers, Internet, and information gateways to support the traditional forms of terrorism like suicide bombings is also a form of cyber terrorism. Most common usage of the Internet is designing and uploading Web sites through which false information is propagated. This can be considered as using technology for psychological warfare.

Did you know?

Attackers use JavaScript, Perl, PHP, and many other scripts to redirect the user to a site that is similar in appearance to the original Web site. The script requests the user to enter authentication information, credit card number or social security number and from the entered information the attacker can steal the user's money.

Cyber Security Initiatives in India

National Informatics Centre (NIC): NIC is a premier organization which provides network backbone and e-governance support to the Central Government, State Governments, Union Territories, Districts, and other Governments bodies. NIC helps in the improvement of government services, provides wider transparency in government functions and facilitates improvements in decentralized planning and management. The cyber security group in NIC is responsible for providing cyber security to Information and Communications Technology (ICT) infrastructure created for e-governance.

Indian Computer Emergency Response Team (CERT-In): CERT-In is the most important constituent of India's cyber community. It aims to ensure the security of cyber space in the country by enhancing the security communications and the information infrastructure through proactive actions and effective collaboration. They aim at providing security incident prevention and response, and security assurance.

National Information Security Assurance Program (NISAP): This program is for the Government and critical infrastructures. The highlights of this program are:

1. Government and critical infrastructures should have a security policy and create a point of contact.
2. It is mandatory for organizations to implement security control and report any security incident to CERT-In.
3. CERT-In will create a panel of auditors for IT security. All organizations need to have a third party audit from this panel once a year.
4. All organizations have to report about the security compliance on a periodic basis to CERT-In.

Indo-US Cyber Security Forum (IUSCSF): This forum was set up in 2001 by high power delegations from both US and India. Several initiatives were announced. Some of them are:

1. Setting up an India Information Sharing and Analysis Centre (ISAC) for better cooperation in anti-hacking measures.
2. Setting up India Anti Bot Alliance to raise awareness about the emerging threats in cyberspace by the Confederation of Indian Industry (CII).
3. Expanding the ongoing cooperation between India's Standardization Testing and Quality Certification (STQC) and the US National Institute of Standards and Technology (NIST) to new areas.
4. Determining the methods for intensifying bilateral cooperation to control cybercrime between two countries.

Challenges and Concerns

India's reliance on technology is evident from the fact that India is entering into various facets of e-governance. India has already brought areas like income tax, passports, and visa under e-governance. The travel sector is also heavily reliant on the Internet. Most of the Indian financial institutions have undertaken full-scale computerization and have brought in concepts of e-commerce and e-banking. These financial institutions are lucrative targets to the cyber terrorists who want to paralyze the economic and financial institutions and create panic in the country. The damage done can be catastrophic and irreversible.

Some of the major challenges and concerns are:

1. Lack of awareness and the culture of cyber security at individual as well as institutional level.
2. Too many information security organizations which have become weak due to financial concerns.
3. Old cyber laws and weak IT Acts which have become redundant due to non-exploitation.
4. Lack of trained and qualified workforce to implement the counter measures.

11.2 Cybercrime

Cybercrime is the latest and perhaps the most complicated threat in the cyber world. Any criminal activity that uses a computer either as an instrument or target is classified as cybercrime. The computer may be used as a tool in the following activities - pornography, sale of illegal articles, online gambling, property crime, financial crimes, e-mail spoofing, and cyber stalking. The computer can however be the target in the following activities - salami attacks, data diddling, logic bomb, physically damaging the computer system, theft of computer system, and so on.

11.2.1 History of Cybercrime

Cybercrime has been in existence since the invention of computers. The first recorded cybercrime took place in the year 1820 which is not surprising considering the fact that the abacus which is the earliest form of computer has been around since 3500 B.C. in India, Japan, and China.

In 1820, Joseph-Marie Jacquard, a textile manufacturer in France produced the loom. This device allowed the repetition of a series of steps in the weaving of special fabrics. This resulted in a fear amongst Jacquard's employees that their traditional employment and livelihood were being threatened. They committed acts of sabotage to discourage Jacquard from further use of the new technology. This is the first recorded cybercrime.

In the 1960s, large mainframe computers were used. Cybercrimes during this period included computer sabotage, computer manipulation, and use of computers for illegal purposes. Access to mainframe systems was limited and the systems were not networked with other systems due to which, the crimes were usually committed by insiders.

The term hacker emerged during the late 1950s when Massachusetts Institute of Technology (MIT) students used the term hack to refer to creative college pranks. The term was used as a positive connotation as it denoted someone who was an expert in computer programming.

In 1969, the world's first packet switching network Advanced Research Projects Agency Network (ARPANET) emerged. It was used to connect computers in universities, defense contracting companies, and research laboratories. This linked hackers all over the world and led to the development of a distinct hacker culture. The emergence of personal networked computer in the 1980s led to the further development of the hacker culture over the next decade. The movie War Games, which was released during 1983, popularized the image of the hackers.

In 1978, a couple of computer enthusiasts in Chicago put the first civilian bulletin board system online. These systems allowed users to interact online with other users and share information. Some of these bulletin boards were used to trade pirated software and stolen credit card data. In 1981, Ian Murphy was the first person to be prosecuted in the US for hacking. Murphy hacked into AT & T's system and changed the clocks that metered billing because of which the subscribers were charged night rates for calls made during the day.

In 1988, Robert Tappan Morris, a graduate student of Cornell University released the first worm over the Internet. The worm was released with the intention of showing the inadequacy in Internet security. However, the worm spread around the country causing a lot of damage. Morris was prosecuted federally under the federal Computer Fraud and Abuse Act. This incident led to the formation of CERT at Carnegie Mellon University.

In 1994, a 16-year-old student, nicknamed "Data Stream" was arrested by the UK police for hacking into computers at the Korean Atomic Research Institute, NASA, and several US govt. agencies. In 1997, the freeware tool AOHell made it easy for unskilled hackers to penetrate America Online and cause extensive damage. In 1999, David Smith created and released the deadly Melissa virus.

In 2000, Microsoft was subjected to a Denial of Service (DoS) attack. This attack targeted domain name servers and corrupted the DNS paths, permitting users to access the Microsoft's Web sites. This attack prevented millions of users from accessing Microsoft Web pages for two days.

In the recent years with the growth and advancement in technology there has been an increase in the usage of personal computers and Internet. All these advancements resulted in increase of cybercrimes. Hacking has become more popular along with online extortion and cyber terrorism. Due to rise in cybercrimes there is a need to bring in certain preventive measures to control them. Several mechanisms and policies were adopted to control these crimes some of them include strict user authentication, data integrity and secure communication.

11.2.2 Types of Cybercrimes

Cybercrime may be broadly classified under the following three groups:

1. Against individuals
2. Against organization
3. Against society at large

1. ***Against Individuals:*** The following crimes can be committed against individuals:
   (a) E-mail spoofing
   (b) Harassment via e-mails
   (c) Cyber-stalking
   (d) Dissemination of obscene material
   (e) Indecent exposure
   (f) Cheating and fraud
   (g) Defamation

The following crimes can be committed against the property of individuals:

(a) Transmitting virus

(b) Computer vandalism

(c) Unauthorized access over computer system

(d) Internet time thefts

(e) Intellectual property crimes

Caselet

Fraud by Employees of a Call Center

Some employees of a call center gained the confidence of the customer and obtained their PIN numbers to commit fraud. The employees transferred US $ 3,50,000 from accounts of four US customers to bogus accounts. They got these under the pretext of helping the customers out of difficult situations. Even though the call center had the highest security they could not prevent the fraud from happening.

The call center employees are checked when they enter and exit the premises, to ensure that they cannot copy down the numbers. But the employees memorized these numbers, went to a cyber cafe and accessed the accounts of the customers.

All accounts were opened in the city where the call center was located and the customers complained that the money from their accounts was transferred to the accounts present in that city. Thus, the criminals were traced and the police was able to prove the honesty of the call center and have frozen the accounts to which the money was transferred.

2. ***Against Organization:*** The following crimes can be committed against organizations:

   (a) Possession of unauthorized information

   (b) Cyber terrorism against government organizations

   (c) Distribution of pirated software

   (d) Unauthorized access over computer system

3. ***Against Society:*** The following crimes can be committed against society at large:

   (a) Financial crimes

   (b) Pornography

   (c) Trafficking

   (d) Online gambling

   (e) Forgery

Here some of the crimes are discussed briefly:

1. ***Denial of Service:*** These attacks are aimed at denying access to authorized persons to a computer or a computer network. These attacks can be launched with the use of a single computer or multiple computers across the world. The victim's computer is flooded with more requests than it can handle which causes it to crash. Distributed Denial of Service (DDoS) attack is also a type of denial of service attack in which the offenders are wide in number and widespread.

2. ***IP Spoofing:*** IP spoofing is used by intruders to gain unauthorized access to computers. Messages are sent to the computer with the sender's IP address of a trusted system by modifying the packet headers.

3. ***Hacking:*** Externally accessible systems are hacking targets. Hackers can spoil Web sites and steal valuable data from systems resulting in a significant loss of revenue. Hackers often hide the identity of computers that are used to carry out an attack by falsifying the source address of the network communication. This makes it more difficult to identify the sources of attack and sometimes shifts attention to innocent third parties.

Case Study

Hi-Tech Cybercrimes

This case study is about potential threats of using net banking. A person's bank account was hacked. The amount that was lost was Rs. 3,00,000.

Fact in Net Banking

Individuals, who want to transfer money from their account to another account, will have to add the recipient in their net banking profile as a third party beneficiary. During this transaction, the bank sends a Unique Reference Number (URN) to their registered mobile number. Sachin who had registered personally and had access to net banking did not update the registered mobile number with his bank when he was transferred to another state. He had assumed that his bank account could not be hacked and that he would receive the URN for all transactions.

But Sachin's account was hacked from Nigeria on three different dates. The hackers were successful as they adopted the following methods:

1. The hackers collected Sachin's user name and password by using a phishing page or a remote key logger.
2. They learnt Sachin's details including his mobile number.
3. They learnt from their Indian agent the details of the mobile subscriber. The hackers then registered a case of mobile theft and deactivated the number which was in the other state. The mobile service provider re-issued the same number with a different Electronic Serial Number (ESN).
4. Then they added five accounts as third party beneficiary accounts. The culprits got the URN in their mobile and transferred the amount to those five accounts.

Question:

1. What were the methods adopted by the hackers to transfer money from Sachin's account?

Source: http://urproblemmysolution.blogspot.com

Task

Find out the different mechanisms used by attackers to hack Web sites.

Notes

We can prevent information hacking by adopting the following measures to set difficult passwords:

1. Using alternate capital and lower-case letters in random order.
2. Using figures instead of letters for instance, 5 can be written as S
3. Typing few words with the keyboard layout of other language.

A complex password is a random combination of figures and letters, for example, 8EHnL4K8

4. ***Cyber Stalking***: It involves the following:

   (a) Following a person's movements over the Internet by posting threatening messages on the bulletin boards frequently visited by the victim.

   (b) Entering the chat-rooms frequently visited by the victim.

   (c) Bombarding the victim with e-mails constantly.

Example: A Glendale based businessman spied on his ex-girlfriend with the help of a GPS tracking device (Nextel phone device) on a cell phone. The device was embedded with a motion switch that turned itself on when it moved. The businessman installed the phone under his girlfriend's car. When the device was in on mode, it transmitted a signal to the GPS satellite which traced the location information and forwarded it to the computer. The victim realized about the monitoring just after the phone was found underneath her car.

5. ***Data Diddling***: Data diddling involves modifying raw data just prior to the computer processing. The data is then changed to its original form after the processing is completed.

Example: Indian Electricity Boards were victims of data diddling. They were targeted when the private parties were installing their systems.

6. ***E-mail Bombing***: E-mail bombing involves sending a large number of e-mails to the victim which crashes the e-mail account or mail servers.

Example: A foreigner who had been residing in India for almost thirty years wanted to avail a scheme introduced by the Shimla Housing Board to buy land at lower rates. The person's application was rejected on the grounds that the scheme was available only for citizens of India. The person decided to take revenge and consequently sent thousands of e-mails to the Shimla Housing Board till their servers crashed.

7. ***Salami Attack***: These attacks are used for the commission of financial crimes. An important feature of this type of attack is that the alteration is so small that it normally is not noticed.

Example: A bank employee inserted a program into the bank's servers. This deducted a small amount of money from the account of every customer. No account holder noticed this unauthorized debit, but the bank employee was able to accumulate a sizable amount of money every month.

8. ***Internet Time Theft***: In these kinds of thefts the Internet browsing hours of the victim are used up by another person.

Example: Mr. Ram asked a nearby Internet browsing center owner to set up his Internet connection. While doing this, the owner got to know Mr. Ram's username and password. The owner then sold this information to another Internet browsing center. A week later, Mr. Ram discovered that his allotted Internet hours were almost over. From the total of 100 hours bought by Mr. Ram, 94 hours were already used by the third party within the week.

9. ***Logic Bomb***: These programs are created to do something only when a certain event occurs.

Example: Some viruses may be termed logic bombs because they are inactive all through the year and become active only on a particular date.

10. ***Intellectual Property Crime:*** Intellectual property crime is generally known as piracy or counterfeiting. Piracy involves willful copyright infringement. Whereas, counterfeiting is willful trade mark infringement.

Example: Sachin, a software professional from Bangalore was booked for stealing the source code of a product being developed by his employers. He started his own firm and allegedly used the stolen source code to launch a new software product.

Example: In Australia's largest copyright infringement case, three university students received criminal sentences for running a Web site which offered more than 1,800 pirated songs for download. The court warranted 18-month suspended sentences for two of the students and an additional fine of US$5,000 for one of them.

11.2.3 Reporting a Cybercrime

Crime in a society will remain at a tolerable level if it is detected early and the criminals are identified and awarded appropriate punishment. This will dissuade other individuals from indulging in such acts in the future. An unreported crime encourages the criminal to commit further such acts, apart from taking away the deterrence for others. Proper reporting helps the policy makers to know about the trends and allocate the resources to adequately tackle newer crimes.

Individuals do not report crime as they are concerned about the loss of reputation or negative publicity. However, most law enforcement agencies are aware of this and take steps to keep crime details confidential.

The following details must be provided by the complainant while addressing a complaint to the head of cybercrime investigation cell:

1. Name of the complainant.
2. Mailing address and telephone number of the complainant.
3. Details on how the offence was committed, along with names and addresses of suspects, and any other relevant information.

The content of the application varies with the type of fraud faced by the victim. The following details must be provided by the complainant for the respective fraud faced:

Cyber Stalking

Cyber stalking is the most common type of crime and the victim's report should contain the following:

1. E-mails or messages received.
2. Phone numbers of any obscene callers.
3. Web site address which contains the victim's profile.

4. Screen shot of the Web page has to be saved and a hard copy must be submitted.
5. Any other relevant information could be provided after consulting law enforcement agency.

Password Hacking

The following details must be provided in case of password hacking:

1. Details of last access of the e-mail account.
2. Details of the computer used for browsing.
3. Any information related to e-mail account such as date of birth entered, pin code entered, security question, and last password.

11.2.4 Preventing a Cybercrime

Governments should engage academic institutions to educate the common man about the dangers of cyber terrorism. There has to be a joint effort by all Government agencies including defense forces to attract qualified skilled personnel to implement counter measures. There is a growing connection between the hacker and the terrorist. Very soon terrorists themselves will become excellent hackers. A common vision is required to ensure cyber security and prevent cybercrimes.

The following measures must be taken to prevent cybercrime:

1. Avoid disclosing any personal information
2. Avoid sending any photograph online to strangers
3. Use latest and updated antivirus software
4. Never send credit card number to any site that is not secure
5. Use a firewall

Task Find out various techniques employed by software firms to overcome cybercrime.

11.3 Computer Emergency Response Team (CERT)

Computer Emergency Response Team (CERT) is an organization that provides incident response services to victims of cyber attack. It analyzes computer and network securities and publishes alerts concerning threats and vulnerabilities to improve network and computer security. CERTs play a vital role in dealing with the Internet incidents as they have the expertise and experience to handle any problem. CERT organizations throughout the world are independent entities, although there may be coordinated activities among groups.

Did you know? The first CERT group was formed in the United States at Carnegie Mellon University.

Indian Computer Emergency Response Team (CERT-In) is a government mandated Information Technology (IT) security organization. CERT-In responds to computer security incidents, reports on vulnerabilities, and promotes effective IT security practices throughout the country. CERT-In was started by the Indian Department of Information Technology in 2004 and operated under that department. According to the provisions of the Information Technology Amendment Act, 2008, CERT-In is responsible for overseeing administration of the Act.

11.3.1 Objectives of CERT-In

The primary objective of CERT-In is to raise awareness among Indian cyber community and to provide technical assistance and advice to help recover from computer security incidents. It provides technical assistance to system administrators and assists them in recovering from any computer security incident.

It identifies patterns in intruder activity and works with other security organizations to resolve major security issues. It also publishes many advisories, guidelines, and best practices to promote awareness about security among the cyber community.

11.3.2 Functions of CERT-In

Under Section 70-B (4), as inserted by the recent Information Technology (Amendment) Act, 2008, CERT-In has been designated to serve as the national agency to perform the following functions in the area of cyber security:

1. Collection, analysis, and dissemination of information on cyber incidents.
2. Forecast and alerts of cyber security incidents.
3. Emergency measures for handling cyber security incidents.
4. Coordination of cyber incidents response activities.
5. Issue guidelines, advisories, vulnerability notes, and whitepapers relating to information security practices, procedures, prevention, response, and reporting of cyber incidents.

For carrying out the activities, the CERT-In has been vested with authority to give directions to the service providers, intermediaries, data centers, and any other person.

11.4 Summary

- A cyber threat is an intended or unintended illegal activity that could lead to unpredictable, unintended, and adverse consequences on a cyberspace resource.
- Cyber attacks can be categorized as network based and executable based attacks.
- Executable based attack happens when a program is executed on the target computer system through either of the following - virus, Trojan, worm, and spam.
- Cyber attacks are commonly directed towards economic and financial institutions.
- The first recorded cybercrime took place in the year 1820.
- Proper reporting of cybercrimes helps the policy makers to know about the trends and to allocate resources to adequately tackle newer crimes.
- Governments should engage academic institutions to educate the common man about the dangers of cybercrime.
- Indian Computer Emergency Response Team (CERT-In) is a government-mandated information technology (IT) security organization that is responsible for handling computer security incidents, reports on vulnerabilities. It also promotes effective IT security practices throughout the country.

11.5 Keywords

Computer Vandalism: Computer vandalism is a program that performs malicious functions such as extracting a user's password, other data, or erasing the hard disk.

Defamation: It is a false communication that harms the reputation of an individual, business, product, group, government, or nation. The claim may be expressly stated or implied to be factual.

Self-replicating: It is the ability to produce copies of itself.

Spyware: Software installed unintentionally, that intercepts personal data and transmits the information to a third-party for commercial gain.

11.6 Self Assessment

1. State whether the following statements are true or false:

   (a) Virus attacks modify normal program in order to perform fraudulent activities in addition to the usual function of the program.

(b) Virus is hidden and propagates by infecting a copy of itself into another program.

(c) Worm is part of a program whereas a virus is a complete program in itself.

(d) IP Spoofing is used by intruders to gain unauthorized access to computers.

(e) CERT is an organization which provides incident response services to victims of cyber attack.

(f) CERT-In has the power to give directions to the service providers, intermediaries, and data centers.

2. Fill in the blanks:

(a) _____ is a forum that was set up in 2001 by high power delegations from both US and India.

(b) _____ attack is a type of denial of service attack in which the offenders are more in number and widespread.

(c) _____ is a type of attack that involves modifying raw data prior to the computer processing and then changing it back to the original form after the processing is completed.

(d) _____ is a type of program that is created to do something only when a certain event occurs.

(e) CERT-In was started by the _____ in 2004.

3. Select a suitable choice for every question:

(a) Which of the following crime can be committed against an individual's property?

(i) Cyber stalking

(ii) Defamation

(iii) Computer vandalism

(iv) Forgery

(b) Which of the following offence is so small that it would normally go unnoticed?

(i) Salami attack

(ii) Denial of service

(iii) Internet time theft

(iv) Hacking

(c) Software piracy is an example of which of the following crime?

(i) Intellectual property crime

(ii) Logic bomb

(iii) Data diddling

(iv) IP spoofing

(d) Which of the following crime causes the mail servers to crash?

(i) Hacking

(ii) E-mail bombing

(iii) Logic bomb

(iv) Online gambling

(e) Which of the following is responsible for overseeing administration of the Information Technology Amendment Act of 2008?

(i) Indo-US Cyber Security Forum (IUSCSF)

(ii) National Information Security Assurance Program (NISAP)

(iii) National Informatics Centre (NIC)

(iv) CERT-In

11.7 Review Questions

1. "Growth in Information Technology (IT) sector has exposed the user to a huge bank of information." Comment.
2. "Terror attacks in major cities and towns across the world show the inadequacy of the mechanisms to address the challenge of cyber threat." Comment.
3. "Executable based attack happens when a program is executed on the target computer system." Analyze.
4. "Cyber attacks are commonly directed towards economic and financial institutions." Discuss.
5. "Crime in a society will remain at a tolerable level if it is detected early." Discuss.
6. "Governments should engage academic institutions to educate the common man about the dangers of cyber terrorism." Comment.
7. "The day is not far when terrorists themselves will be excellent hackers." Comment.
8. "Cyber terrorism is the convergence of terrorism and cyber space." Analyze.
9. "Cyber criminals attack computer networks and advocate violence, promote hatred and vandalism using the Internet." Discuss.
10. "A common vision is required to ensure cyber security and prevent cyber-crimes." Comment.
11. "The most popular weapon in cyber terrorism is the use of computer viruses and worms." Discuss.
12. "Cybercrime is the latest and perhaps the most complicated problem in the cyber world." Comment.

Answers: Self Assessment

1. (a) F (b) T (c) F (d) T (e) T (f) T
2. (a) Indo-US Cyber Security Forum (IUSCSF) (b) Distributed Denial of Service (DDoS)
   (c) Data diddling (d) Logic bomb (e) Indian Department of Information Technology
3. (a) Computer vandalism (b) Salami attack (c) Intellectual property crime
   (d) E-mail bombing (e) CERT-In

11.8 Further Readings

Books

Bajaj, K. K., and Nag, D. E-Commerce: The Cutting Edge of Business, 2nd ed. New Delhi: Tata McGraw-Hill

Chan, H., Lee, R., Dillon, T., and Chang, E. (2008). E-Commerce: Fundamentals And Applications, Student ed. New Delhi: Willey India (P.) Ltd.

Online link

http://cybercrime.planetindia.net/intro.htm

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Unit 12: Management of Change

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Objectives

After studying this unit, you will be able to:

- Provide an overview of change management
- Discuss about e-commerce in India
- Analyze the usage of Internet in India

Introduction

We live in the age of constant change. We have a tendency to associate the idea of change with that of progress. Today, teams and organizations are facing rapid changes like never before. Globalization has amplified the markets and opportunities for extra growth and revenue. Progressively, diverse markets have a broad variety of needs and expectations that must be understood if they are to become strong customers and collaborators. The capability to manage change while continuing to meet the needs of customers, is a very essential skill required by today's leaders and managers.

According to John Kotter (1996), "Most credible evidence suggests that change will happen at a more rapid pace in the business environment in the future. The rate of environmental movement and the pressure on organizations to transform themselves will increase over the next few decades. If this is the case, then the only rational solution is to learn more about what creates successful change."

As the speed of change is continuing to increase, change management has become a fundamental skill needed by managers, human resources staff, and organization leaders. Change management is a structured approach of shifting individuals, teams and organizations from an existing state to a desired future state. It is an organizational process targeted to empower employees to accept changes and implement the changes in their present business environment.

Notes

1. Change management involves attentive planning and responsive implementation, along with consultation and participation of the people affected by the changes.
2. Change must be realistic, attainable, measurable, and voluntary.

12.1 Overview of Change Management

According to Albert Einstein, "The world we have created is a product of our thinking and it cannot be changed without changing our thinking."

The main target of change management is to assess and plan the change process to make sure that if a change is made, it is completed in the most proficient way. A general definition used for change management is a set of processes that is employed to guarantee that significant changes are implemented in a logical, controlled, and efficient manner to effect organizational change.

Example: The set of processes include recording of changes, evaluating the impact, cost, benefit, and risk of planned changes, developing business validation, and obtaining approval.

Some of the other activities under change management program are managing and coordinating change realization, monitoring and reporting on implementation, reviewing and closing change requests.

Organizational change management takes into account the processes and tools that managers use to formulate changes at an organizational level. Most organizations desire change to be implemented with the slightest resistance possible and for this to happen, change must be applied with a structured approach.

Change management must work to make sure that the changes are:

1. Justified
2. Carried out without risking service quality
3. Appropriately recorded, classified, and documented
4. Diligently tested in a test environment
5. Functioning with backup plans and if the system functions inaccurately after implementation, then the changes can be undone.

Before initializing organizational change, we need to make sure what we want to achieve with the change and how will we know that the change has been achieved. We also need to make sure who is affected by this change, along with their probable reactions to the same. These aspects relate strongly to the management of personal as well as organizational change.

12.1.1 Strategies of Change Management

There is no specific change management strategy model for each and every organization. Each organization develops its own model of change management, often by selecting a model and modifying it as they go along in developing their own planning process. The basic strategies provide a range of alternatives from which organizations select an approach and begin to develop their own change management process.

Notes

An organization may prefer using a scenario to identify strategic issues and goals, and then carefully plan to address the issues and reach the goals.

Types of change management strategies include:

1. ***Directive Strategies:*** This approach emphasizes on the manager's right and authority to manage and enforce change without involving other people. The main advantage of the directive strategy is that change can be brought into effect quickly.

   This approach however does not take into account the views of other people who are involved in, or are affected by the imposed change. Valuable information and ideas may be missed in this approach as the inflow of new ideas or information is restricted due to non-participation of other people. There is generally a strong aversion from the staff of an organization, when changes are forced on them rather than discussed and agreed.

   Example: When a manager wants to shuffle the domain of the employees working in a project, he or she takes the decision and conveys the change to the higher authorities.

2. ***Expert Strategies:*** This approach takes into account change management as a problem solving process, which involves an expert. The expert approach is primarily applied to problems that are more technical and are normally led by a specialist project team or senior manager. In this scenario, there is little involvement with those affected by the change.

   Example: When a new learning management system is introduced in an organization, an expert leads the team to build and initiate the system.

   The advantage of using this strategy is that experts play a key role in finding a solution to a problem. The implementation of the solution is quick as a small number of experts are involved. However, those affected by the change may have different views than those of the experts and may not welcome the solution being imposed or the outcomes of the changes made.

3. ***Negotiating Strategies:*** This approach emphasizes on the willingness of the senior managers to negotiate and bargain in order to achieve change. Senior managers must also believe that adjustments and concessions may need to be made in order to realize change.

   This approach recognizes that those affected by change have a right to say about the implemented change. Individuals feel involved in the change and are supportive of the changes made. This approach takes more time to effect change, which is one of the disadvantages of this strategy. The outcomes of this approach cannot be predicted and the changes made may not accomplish the total expectations of the managers.

   Example: Suppose an automobile company decides to upgrade its database to be more competent in the growing market. For this they need to hire an IT company who will provide the required software. The software and its annual maintenance will cost the buyer a lot of money. The senior managers negotiate to reduce the price of the software. If the negotiation is successful, the software will be bought at the price fixed by the senior managers of the automobile company.

4. ***Educative Strategies:*** This approach involves changing people's values and beliefs, which motivates them to support the changes and move toward the development of a shared set of organizational values. Activities like education, training, and selection are used which are led by specialists and in-house experts. Individuals within the organization have optimistic commitment to the changes. The disadvantage of this approach is that it takes a longer time to implement.

5. ***Participative Strategies:*** This approach emphasizes on the full participation of all of those involved and affected by the changes. Though senior managers drive this approach, the process is equally driven by the management, groups or individuals within the organization.

   The views of all the individuals involved are taken into consideration before changes are made. Consultants and experts from outside the organization are used to aid the process but they do not

make any decisions regarding the outcomes. The main disadvantages of this process are that the process is lengthy and the outcomes may be unpredictable.

This approach is also more expensive due to the numerous meetings of consultants and experts who are paid for their services. However, the benefit of this approach is that the changes made are more likely to be supported due to the involvement of all those who are affected.

12.1.2 Challenges of Change Management

Change management faces various challenges. Some challenges are internal whereas some are external. Now, we will discuss the challenges.

Challenges of Initiating

These challenges are often sufficient to thwart any growth almost before it starts. They are encountered at the early stages of major organizational change. The ability to deal with the challenges must be created under high pressure. However, to manage these challenges efficiently, organizations must develop competencies much earlier instead of dealing with them in the future. The following are the challenges of initiating:

1. ***Not Enough Time:*** This is the challenge of control over one's time. It represents an important prospect for restructuring the way that work places are organized and to provide flexibility and time for expression and innovation.
2. ***Lack of Help:*** Some managers consider asking for help, a mark of incompetence, while others are unaware that they need coaching and support. Meeting this challenge means developing the capabilities for identifying the need for help, recognizing the appropriate help, and the desire to guide each other in developing successful innovations.
3. ***Not Relevant:*** The main concern for pilot groups is to get a convincing case for learning and change. If people are not totally committed to an initiative's goals, a commitment gap develops and this hinders them to take part enthusiastically in achieving the goal. Creating relevance depends on open conversations regarding the reasons for change and the expected commitments of the people involved.
4. ***Lack of Leadership Values:*** It effects a change when there is a mismatch between the conveyed message and the actual behavior. If executives and leaders are not able to provide an atmosphere of trust and authenticity, then genuine change cannot occur or move forward. Leaders and managers must be sincere and open.

Challenges of Sustaining Momentum

These challenges occur in the initial years when the group has clear goals and has realized that new methods save enough time to put them into practice. Now the pilot group's real troubles begin. Sustained activity creates boundaries between the work of the pilot group and internal attitudes and beliefs, and between the pilot group's requirements and the values and measures of scaling success in larger companies. Some of the challenges are:

1. ***Fear and Anxiety:*** Everyone expresses their fear and anxiety in different forms of defensiveness. It becomes difficult to deal with the concerns of team members about exposure and inadequacy, triggered by the conflicts between increasing levels of fairness and openness and low levels of trust. This is one of the most commonly faced challenges and the most difficult to overcome.
2. ***Assessment and Measurement:*** It is always a concern to deal with the connection between the achievements of a pilot group and the organization's traditional ways of measuring success.
3. ***Believers and Nonbelievers:*** There is always a dispute between the pilot group members and their colleagues and peers. The pilot group becomes more isolated from the rest of the organization during the project time. The isolation leads to some unfamiliar approaches and behavior which gives rise to misunderstandings between the pilot group and their peers, which in turn may accelerate into unnecessary opposition.

Challenges of System wide Redesign and Rethinking

These challenges come into sight as the pilot group's work gains immense credibility. This authority challenges the established internal infrastructure and practices of the organization. Some of the challenges are:

1. ***Governance:*** With the increase in pilot group's capabilities and activities, it starts running into the priorities and traditional processes of the rest of the organization which leads to conflicts over power and liberty. This can be avoided if the capabilities are in place for organizational redesign.
2. ***Diffusion:*** Organizations must learn to recognize and deal with their odd, almost unnoticed incapability to transfer knowledge across organizational boundaries. Otherwise, people around the system will not build upon each other's successes.
3. ***Strategy and Purpose:*** Planning must be done to revitalize and rethink the organization's intended direction for success, its contribution to its community and its future identity. Steps need to be taken to improve the processes of conversation that guide people to build and refine their aspirations and goals for achieving them.

12.1.3 Guidelines for Change Management

The change management process should include the following elements:

1. ***Change Initiation:*** A Request For Change (RFC) should be filed and recorded. The request includes the proposed change, change category, and any other additional and supporting details. The resources necessary to successfully plan, develop, test, and implement the proposed change allot a standard, minor, significant, or major change category.

Example:

When a need for change has been recognized and the initiator has raised a Request For Change (RFC), the change is categorized and prioritized based on the initial information available.

2. ***Change Review:*** The change manager reviews the RFC to conclude the impact of the requested change and accredit priority to the RFC as urgent, high, medium, or low priority. The change manager makes sure that the RFC is complete and practical. During the course of change review, existing information on identified risks and their potential impacts from risk management is used to process the RFC. When there is inadequate information to conclude the potential impact of the RFC on the exchange service, the risk management process takes place. Findings are documented as part of the risk list and risk statement.

Example:

After the RFC is ready, the authorization process takes place. If the change is authorized, it continues into the approval process. If authorization is denied, it is returned to the change initiator for additional information and rework before it is resubmitted.

3. ***Change Approval and Scheduling:*** An acceptably completed RFC with an appropriately identified category and priority requires approval from the decision maker or the Change Advisory Board (CAB). The CAB is a group of stakeholders representing different business entities and interests. If the change is accepted and approved, the CAB sets a first round schedule for implementing the requested change. All relevant approval or reject discussions and scheduling decisions are entered into the change management log.

Example:

The CAB appoints a team to validate the test plan as part of the change management process. The team tests all items in a test lab, analyzes, verifies the results, and prepares a report for the CAB.

4. ***Planning, Developing, Testing, and Implementing:*** Once the change is approved, scheduled, and documented, the RFC goes to the change owner, who is accountable for implementing the requested change. As a part of configuration management, all data regarding planning, developing, testing, and implementing the change is entered into the log.

Example: The change owner is the person who plans and implements the change. The change owner tests whether the implemented change actually works and satisfies the change request.

5. ***Change Verification and Process Review:*** The change requester and change manager authenticate whether the change owner has effectively implemented the changes. The success or failure and the efficiency of the change process are documented, so that counteractive actions can be taken to pick up future changes.

12.1.4 Change Management in Public Administration

Governments always face a growing complexity and need more specialized staff to manage and solve new problems. Traditional administration, governed by a set of specific legislation is not sufficient for this purpose. Each organization has a specific culture depending on which, certain changes are made. Restructuring and reengineering of the government has become a necessity to alter its image and make it friendlier to the people. Its performance and presentation has to be enhanced through innovative and cost effective processes based on IT, EDI or e-commerce in particular.

Example: Changes in legislation, social or political climate change, competition, economy, and so on.

Change management refers to the adoption and implementation of change in a planned, structured, and organized way. The government is responsible for the change management in public administration. They follow a structured and organized process that helps in the transition from one stage to another. The aim is to implement more effective methods and systems in an organization that can function efficiently. However, few changes are found to be managed within the organization and are controlled by it.

In many cases, the process of change is treated independently from the characteristics of a situation. It is extensively recognized that these processes of change management must be performed by agents of change.

12.2 E-Commerce in India

E-Commerce covers all business conducted with the help of computer networks. Developments in telecommunications and computer technologies in recent years have made computer networks a vital part of the economic infrastructure. More and more companies are promoting transactions over the Web. There has been an incredible competition to target each and every computer owner who is connected to the Web.

Even though B2B transactions play a significant part in e-commerce market, a share of e-commerce revenues in developed countries is generated from B2C transactions. E-Commerce provides numerous benefits to the consumers starting from availability of goods at lower cost to a wider choice of goods and this saves time. Customers can buy goods with a click of mouse button sitting in their house or office.

Example: Online services such as banking, buying tickets of airlines, bus and railways, bill payments, hotel bookings, and so on.

The majority of experts believe that overall e-commerce will enhance exponentially in the coming years. Statisticians say that India will have more than 14 crore Internet users by 2013.

According to eBay (2010), "There are around 2,471 e-commerce hubs in India and states like Andhra Pradesh, Tamil Nadu, Maharashtra, and Gujarat are the most active areas in terms of online trading."

B2B transactions will symbolize the largest revenue but online retailing will also see drastic growth. Online businesses like, travel, entertainment, financial services, and groceries are all expected to grow.

For developing countries like India, e-commerce offers significant opportunity. E-Commerce in India is still in a blossoming stage, but even the most-pessimistic projections indicate a boom. It is foreseen that the low cost of personal computers, a growing use of the Internet and an increasingly competitive Internet Service Provider (ISP) market will facilitate e-commerce growth in India.

Did you know? Among the Asian nations, the growth of e-commerce between 1997 and 2003 was highest in India.

A successful e-commerce transaction needs both the payment and delivery services to be competent. There has been a steep rise in the number of companies implementing e-commerce in the recent past. Most of the Indian portals have also shifted towards e-commerce instead of depending on advertising revenue.

Various sites are now selling a diverse range of products and services.

Example: Electronic gadgets, greeting cards, flowers, computers, movie tickets to groceries, and so on.

The time for true e-commerce in India has finally arrived with the stock exchanges coming online. There are several challenges faced by e-commerce sites in India. This is mostly because of the relatively small credit card population and lack of standardized credit agencies. Delivery of goods to consumer by couriers and postal services is not very consistent in smaller cities, towns, and rural areas.

Many Indian banks have set up the Internet banking facilities in place for the advancing e-commerce market. There has been a tremendous improvement in the speed post and courier system in recent years. Modern computer technology like Secured Socket Layer (SSL) helps to guard against payment fraud and to share information with suppliers and business partners. It is expected that India will soon become a major player in the e-commerce market with additional improvement in the payment and delivery system.

In this age, many companies and organizations in India have started to take advantage of the prospects of e-commerce. However, critical challenges are still there which we need to overcome before e-commerce can become an asset for common people.

Notes The Indian middle class population is equal to the entire U.S. consumer base. This makes India a genuinely attractive market for e-commerce.

12..2.1 EDI in India

Electronic Data Interchange (EDI) has changed the way enterprises conduct business across the globe. It has facilitated easy access of documents, thereby reducing paperwork. EDI reduces errors in transcription, reduces inventory requirements, and facilitates faster response time for procurement and customer needs.

Today's businesses depend on efficient information exchange in the form of paper documents such as purchase orders, spreadsheets, and so on. The process of exchanging these documents can be quite inconvenient if they are on paper. This is where EDI technology facilitates the electronic exchange of business documents. EDI based solutions require minimal human intervention as most processes are automated.

EDI is used for following applications:

1. Inventory and logistics management
2. Transport and distribution
3. Administration and cash management

EDI specifies a standard format for each type of business document. The EDI standards are developed under the guidance of United Nations/Electronic Data Interchange For Administration, Commerce and Transport (UN/EDIFACT)). Maintenance and further development of this standard is done through the United Nations Center for Trade Facilitation and Electronic Business (UN/CEFACT) under the UN Economic Commission.

There is a rapid growth of EDI in India. India is currently in the middle of an e-commerce revolution. The influx of the Internet, followed by the promising growth of Web-based businesses is leading to more e-commerce, both on the B2B and the B2C models.

Example: The extension of the telecom network, the usage of broadband, adoption of digital technology for the telecom highways, and the increase in the sales of PCs imply that EDI in India is blooming.

Videsh Sanchar Nigam Limited (VSNL) is India's global telecom carrier. In 1995, it commissioned the Gateway Electronic Data Interchange System (GEDIS). Similarly, National Informatics Center (NIC) has also fitted its Very Small Aperture Terminal (VSAT) based satellite communication system with EDI capability. India, like its trading partners worldwide, is building up EDI facility for Indian enterprises over its telecom networks. The implementation of EDI in different sectors and institutions in India are as follows:

Customs

Indian Customs EDI System (ICES) has enabled the Indian trading community to exchange documents electronically with Customs and other Government agencies. The main objective of ICES is to improve the way the business is conducted. ICES comprises two main sub systems. The sub systems are India Customs EDI system/Imports (ICES/I) and Indian Customs EDI System/Export (ICES/E).

The main features of ICES are:

1. ***Security*:** ICES provides security at all levels of access to the system. At the service center, security features are implemented at module level. System keeps track of any transaction carried by a user.
2. ***Help:*** ICES includes powerful help features, which can be invoked by the assessing officers from their respective screens to help their assessment work.
3. ***Management and Control:*** ICES allows the collector to find out the status of any document in the system. Controlling officers can monitor the progress of the Customs officers in processing the documents and provide help to them.

Railways

Indian Railways is one of the most advanced ministries in India. It uses extensive and innovative IT environment and a state of art reservation system. EDI is used extensively by the railways. The railway's most successful e-commerce initiative in India is the IRCTC (Indian Railways Catering and Tourism Corporation). It has contributed Rs 34 crore to the total e-commerce business of Rs 90 crore. In 1986, the Ministry of Railways established the Center for Railway Information Systems (CRIS) as a support system for all computer activities on Indian Railways. CRIS, with its own research and development effort is responsible for designing, developing, and implementing all major computer systems for the railways.

Example: The major achievement of CRIS is a sophisticated reservation and ticketing application called Country-Wide Network for Enhanced Reservation and Ticketing (CONCERT). CONCERT is a total solution to the networking of the Passenger Reservation Systems (PRSs).

The computerized Passenger Reservation System (PRS) at present operates from five regional passenger reservation centers, each of which is an independent site with its own local database. During the late 1990s, CRIS linked the passenger reservation centers so that reservation of tickets could be done from any station of Indian Railways.

Directorate General of Foreign Trade

The Ministry of Commerce implemented EDI in 1995-96 with the help of Directorate General of Foreign Trade (DGFT). Kochi was the first Indian port to implement EDI transactions. The systems in Kochi are based on the EDI for administration, commerce, and transport standard that is accepted worldwide.

The EDI implementation in DGFT facilitates electronic submission, processing of licenses, and other applications in the office of DGFT. The licensing details are shared between DGFT and customs whereas, the shipment details against the licenses is shared between customs and DGFT. The implementation of EDI by DGFT has attracted a number of users towards adapting EDI.

Apparel Export Promotion Council

Apparel Export Promotion Council (AEPC) works closely with the Government of India on policy issues. They provide specialized services and global business opportunities for the industry.

EDI based processing system enables sharing of information between the community partners related to the quota management. They also provide clearances of shipping documents confirming to quota requirements. The quota clearances information is electronically shared between AEPC and the U.S. customs under the Electronics Visa (ELVIS) system whereas, it is under Import Licensing System (SIGL) with the European Union.

Banks

Banks introduced EDI based processing into the following functioning facilities:

1. Inter-bank and intra-bank transactions in electronic media
2. User interface for electronic clearances and payments

Financial EDI (FEDI) is playing a vital role in today's payment and collection cycles. FEDI allows payment exchange related information between businesses in a standard format. Banks with EDI capability can act as outsource processor of accounts for an organization. They can translate the standard electronic payment into the general ledger system of an organization.

Port Authorities

The EDI system facilitates electronic sharing of all types of documents with the community partners. The community partners in this case are Shipping-line, Customs, Agents, Banks, Railways, Container Corporation of India Ltd. (CONCOR), and so on.

The documents related to the goods being transported by ship can be shared with the ports in EDI mode well in advance before the ships arrive at the port. The interface with Indian Railways would facilitate effective movement of goods to and from the ports. The EDI implementation in CONCOR facilitates effective handling of container related documents between CONCOR and its community partners.

Airport Authority of India

The community partners in aviation sector facilitate EDI based processing into the clearance of export and import consignments. The community partners in this case are Airport Authorities of India (AAI), airlines, Customs, banks, agents, and so on. The AAI facilitates EDI based cargo handling system in its functioning. The system also facilitates EDI based linkages with trading partners.

The EDI based interface with Customs, airlines, and agents is implemented by AAI as part of the EDI implementation. An electronic interface between courier operators and customs can enable speedy clearances of express courier consignments in compliance with international standards.

Task

Discuss how the Indian Railways is benefitted by implementing CRIS.

12.3 Internet in India

An important question arises here about the willingness of Indian buyers for e-commerce. The expansion of the Internet and the granting of licenses to private ISPs have put the Indian market on route to a new phase. The small and medium enterprises along with the bigger ones have been realizing the potential of the Internet. The technological advancements occurring in all spheres of life have been the driving factors for the spread of e-commerce in India.

The National Association of Software and Service Companies (NASSCOM) have conducted a survey to evaluate the e-commerce scenario in India. The survey shows that e-commerce is limited in India because of the poor number of the Internet users in the country.

The world has undergone a big transformation in the recent years. The Internet has seen a steady evolution from being a source of instant communication in the early 1990s to a wealthy source of information and education. This evolution has been motivated by the growing customer expectations with the support and use of the Internet. With the growing expectations of the customers, newer segments of the Internet usage have emerged and many potential user segments are still unexplored, which may emerge in the future.

Few years ago, the Internet access was limited and only few major cities were able to access it. VSNL and the Department of Telecommunications (DOT) were the only Internet service providers. They provided an agonizingly inconsistent connectivity with poor bandwidth. There were very few phone lines to sustain a wider network. The number of connections was as low as 5% and users were frequently interrupted from the services. Moreover, the rates for this level of service were among the highest in the world. After many years of government monopoly, by the end of 1998, there were only 150,000 Internet connections in India.

At present, the government monopoly as the only Internet service provider is mostly over. Several small and large ISPs have set up infrastructure, triggering a price war and an impressive improvement of service. Users are now estimated at over Rs 50 lakhs, with a growth predicted to reach more than Rs 5 crore in the next five years.

Did you know? According to the NASSCOM survey for the year 1999-2000, the total volume of e-commerce transactions in India was only 450 crore.

Out of the total volume of Rs 450 crore, about Rs 50 crore was contributed by retail Internet or B2C transactions and about Rs 400 crore by B2B transactions. Rs 450 crore of e-commerce transactions may seem to be insignificant but, taking into consideration the situation in India, this amount seems extraordinary in the background of an almost non-existing regulatory framework to support e-commerce. Thus, if e-commerce based businesses can materialize as viable business propositions, India can emerge as the most potential country in e-commerce business. A legal regulatory structure has come into existence with the passing of the Information Technology (IT) Bill in both the Houses of Parliament.

According to the NASSCOM survey, e-commerce in India will witness a significant jump over the next few years, considering the increasing interest of the government in the growth of e-commerce market. Based on the preliminary findings, experts have concluded that the diffusion of the Internet and e-commerce transactions in India will increase by many folds.

Did you know? According to I-Cube 2009-2010, a survey conducted jointly by IMRB International and Internet and Mobile Association of India (IAMAI), India had Rs 5.2 crore active Internet users and Rs 7.1 crore claimed Internet users in 2009.

Revenue streams will gradually be more aligned with the growing global model, as anticipated.

Example: A major part of the revenues will come from transactions, while a smaller amount would be realized from advertising.

It is expected that by the end of the current fiscal year, the revenues of the Internet B2C businesses would come from online transactions rather than advertisements. The advertisement revenues would amount to about 8% of the total amount spent on advertisements by the companies. Analysts also believe that at present, one out of every four non-resident Indians make some form of purchase from India through the Web sites.

Task Analyze the importance of private ISPs in the economy of India.

12.4 Summary

- Change management is a structured approach of shifting individuals, teams, and organizations from an existing state to a desired future state.
- The main target of change management is to assess and plan the change process to make sure that, if a change is made, it is completed in the most proficient way possible.
- Each organization develops its own nature and model of change management, often by selecting a model and modifying it as they go along in developing their own planning process.
- Change management faces various challenges. Some challenges are internal whereas, some are external.
- Governments face a growing complexity in Public Administration and need more specialized staff to manage and solve new problems. The Government is responsible for the change management in Public Administration.
- Developments in telecommunications and computer technologies in latest years have made computer networks a vital part of the economic infrastructure.
- A successful e-commerce transaction needs both the payment and delivery services to be competent.
- Electronic Data Interchange (EDI) has changed the way enterprises conduct business across the globe.
- The EDI standards are developed under the guidance of United Nations/Electronic Data Interchange For Administration, Commerce and Transport (UN/EDIFACT).
- The expansion of the Internet and the granting of licenses to private ISP have put the Indian market in a new advanced phase.
- The Internet has seen a steady evolution from being a source of instant communication in the early 1990s to a wealthy source of information and education.

12.5 Keywords

Agonizingly: It is doing a task in a very excruciating manner.

In-house Experts: It is the experts within an organization.

NASSCOM: It is the global trade body that facilitates business and trade in software and services and to encourage advancement of research in software technology.

Pilot Group: It is a group associated with an activity planned as a test or trial.

12.6 Self Assessment

1. State whether the following statements are true or false:
   (a) Globalization has amplified the markets and opportunities for extra growth and revenue.
   (b) Managing and coordinating change realization is not a part of change management program.
   (c) Each organization develops its own nature and model of change management.
   (d) Negotiating approach takes into account the change management as a problem solving process.
   (e) Negotiating strategies recognize that those affected by change have the right to say about the implemented change.
   (f) There is always a dispute between the pilot group members and their colleagues and peers.
2. Select a suitable choice for every question:
   (a) Which of the following is a challenge of initiating change management in an organization?
      (i) Lack of help
      (ii) Fear and anxiety
      (iii) Governance
      (iv) Assessment
   (b) Which of the following strategies implement activities like, education, training, and selection?
      (i) Negotiating strategy
      (ii) Directive strategy
      (iii) Educative strategy
      (iv) Participative strategy
   (c) Which element of the change management process is taken care by Change Advisory Board?
      (i) Review
      (ii) Initiation
      (iii) Testing
      (iv) Approval and scheduling
   (d) Which among the following has CONCOR as its community partner?
      (i) Railways
      (ii) Port Authorities
      (iii) Banks
      (iv) DGFT

(e) Which among the following is a challenge of Systemwide Redesign and Rethinking?

(i) Diffusion

(ii) Measurement

(iii) Lack of leadership values

(iv) Lack of time

3. Fill in the blanks:

(a) The _____ appoints a team to validate the test plan as part of the change management process.

(b) Modern computer technology like _____ helps to guard against payment fraud.

(c) The _____ approach does not take into account the views of people who are involved in, or who are affected by, the imposed change.

(d) Once the change is approved, scheduled, and documented, the RFC goes to the _____.

(e) _____ linked the passenger reservation centers so that reservation of tickets could be done from any station of Indian Railways.

12.7 Review Questions

1. "Globalization has amplified the markets and opportunities for extra growth and revenue." Discuss.
2. "Organizational change management takes into account both the processes and tools that managers use, to formulate changes at an organizational level." Comment.
3. "Negotiating approach emphasizes on the willingness of the senior managers to negotiate and bargain in order to achieve change." Analyze.
4. "Everyone expresses their fear and anxiety with different forms of defensiveness." Comment.
5. "An acceptably completed RFC with an appropriately identified category and priority requires approval from the decision-maker or the Change Advisory Board (CAB)." Why? Discuss.
6. "Developments in telecommunications and computer technologies in recent years have made computer networks a vital part of the economic infrastructure." Analyze.
7. "Many Indian banks have set up Internet banking facilities for the advancing e-commerce market." Why?
8. "Indian Customs EDI System (ICES) has enabled the Indian trading community to exchange documents electronically with Customs and other Government agencies." Discuss.
9. "The major achievement of CRIS is a sophisticated reservation and ticketing application called Country-Wide Network for Enhanced Reservation and Ticketing (CONCERT)." Comment.
10. "Financial EDI (FEDI) allows exchange of payments related information between businesses in a standard format." Analyze.
11. "According to the NASSCOM survey, e-commerce in India will witness a significant jump over the next few years." Comment.
12. "Participative strategy emphasizes the full participation of all of those involved and affected by the changes." Discuss.

Answers: Self Assessment

1. (a) T (b) F (c) T (d) F
   (e) T (f) T
2. (a) Lack of help (b) Educative strategy (c) Approval and scheduling
   (d) Port Authorities (e) Diffusion
3. (a) CAB (b) SSL (c) Directive (d) Change owner
   (e) CRIS

12.8 Further Readings

Books

Kalakota, R., and Whinston, A. B. (2000). Frontiers of Electronic Commerce, 4th ed. India: Thomson Press.

Bajaj, K. K., and Nag, D. (1999). E-Commerce: The Cutting Edge of Business, 2nd ed. New Delhi: Tata McGraw-Hill Publishing Company.

Online link

http://itil.osiatis.es/ITIL_course/it_service_management/change_management/overview_change_management/overview_change_management.php

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http://www.change-management.com/tutorial-2007prep-strategy.htm

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http://www.gatewayforindia.com/technology/e-commerce.htm

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Unit 13: Designing and Building E-Commerce Web Site - Basics

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Objectives

After studying this unit, you will be able to:

- Analyze the concept of designing and building e-commerce Web sites
- Explain managing products on an e-commerce Web site
- Explain database management for e-commerce Web sites
- Discuss shopping cart applications

Introduction

E-Commerce Web sites provide an excellent mode of expanding business across the globe. The customers around the world can access the e-commerce Web site for shopping and various other purposes. E-Commerce Web sites provide a virtual mode of shopping that deal with purchase of various products or services. Building e-commerce Web sites require various tools and features for making it user-friendly and attractive to the customers. Every shopping Web site provides a virtual trolley or a shopping cart that stores the products selected by the customers online. The cart with items stays visible until the customer makes the payment online.

13.1 Designing and Building E-Commerce Web site

Web site technologies provide an opportunity to build Human Machine Interfaces (HMIs) using new technologies with high speed communication links to connect business with the global market. Creating a Web site involves many tradeoffs involving the choice of hardware and software while developing and running the Web site, type of audience, visual design of the site, and so on. A team dedicated for Web site development must be skilled to make the organization's tradeoffs effectively. The main goal of building an e-commerce Web site is to present functionality and content through some type of visual interface. An organization must consider the following factors before developing an e-commerce Web site:

1. The organization must make a survey in the market and analyze the types of audience that the Web site will serve.
2. The organization must analyze the competing organization's market standards.
3. The organization must identify necessary requirements to market its products globally over the Internet.

4. The customers must be provided with a secure mode of payment over the Internet.
5. The organization must employ skilled professionals for developing its Web site.

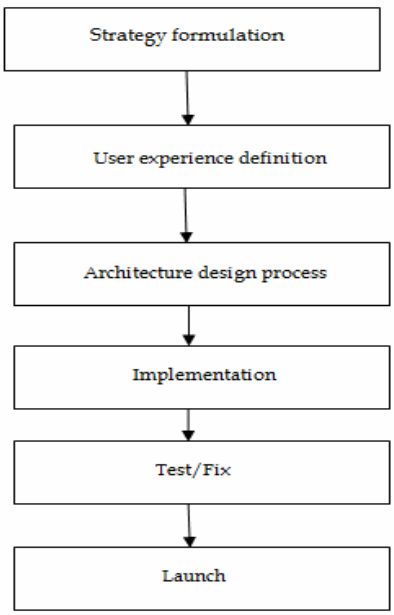
The process of building a Web site must consider certain aspects such as:

1. A finite set of business objectives for developing a site.
2. A clear and well-defined project plan with checkpoints and milestones.
3. Appropriate budget plans.

The process of building Web site consists of a sequence of methods that are deployed in the development process.

Figure 13.1 depicts the process for building a Web site.

Figure 13.1: Process for Building a Web site



Source: Jeffery H. Rayport, Introduction to E-Commerce, Tata McGraw-Hill Publication, 2003

The initial step in the process of building a Web site deals with framing strategies. The strategies are the foundation for building an e-commerce Web site. It binds the team members and process into certain rules through which the organization executes the process effectively. The next step deals with analysis of the user experience. This step is necessary as it enables the development team to understand the requirements of the users. The information gathered in the first two phases is carried into the next step which is called architecture design. This phase mainly deals with designing the blueprint for the Web site. It includes translation of raw data into functionality and screen representations. The next phase is the implementation phase which deals with building the actual Web site. It includes template designing, backend coding, content writing, and integrating security network for the Web site, and so on. The Web site is then tested repeatedly until it is considered acceptable. Once the Web site is in the acceptable form, it is launched.

The site design must combine multimedia features, functions, and content. The team developing the site must be given sufficient time and place for performing the given task. Adequate time and space enhances the output of the Web site development, which in turn will be in a useful format for the end

users. A clear understanding of the business objectives provides an easy flow of developing the Web site.

Example: ESPN (www.espn.com) created its Web site after clearly identifying the type of audience it would cater to. Most of the audience logging into the Web site are sports fans and are primarily interested in reading sports related articles, updates on new sports wear and accessories, game summaries, and so on. Hence, the homepage is designed in such a way that users are provided with options to access the detailed content or navigate to other page which can be of interest to the user.

There are various additional components for the site development process which includes:

1. ***Functional Specification***: It provides a detailed description of necessary information that needs to be included in each page of the Web site. The functional specification document is similar to the blueprint required for developing the Web site. It also provides the rules to be applied for designing the Web page and its functionalities. The functional specification additionally defines every action that is carried out in the Web page, which includes page navigation, selecting an item, providing information about the product, ensuring secured payment, adding to shopping cart, calculating shipping charges of the product, and providing the end user with detailed information about the product and the process of purchase and payment.
2. ***Change Management Process***: It acts as a framework for identifying the problems within the project. It involves identifying software bugs or changing the site according to the new requirements. The problems are identified and prioritized according to their severity and are assigned to a team for resolving and maintaining an error free site. To make any changes or further developments to the Web site after its release in the market, it is important to obtain an approval from the Change Management Board.
3. ***Project Plan***: It deals with designing checkpoints and resources while analyzing the requirements to build a Web site. The project manager proactively uses various planning methods to manage the expectations of stakeholders and the development team, to identify the project bottlenecks, to flag the resource constraints, and to spot project dependencies. Project planning helps to break down the large task into small discrete components such that the progress of the project can be measured easily.

Example: Dell is a pioneer in direct marketing of computers online. It sells products worth $30 million every day. The company gained huge profits due to its ability to customize orders and set standards for online computer retailing. Dell's customer support section known as www.support.dell.com contains a feature called AskDudley. It mainly handles technical queries from customers who have purchased Dell's products.

Example: QVC is a leading e-commerce Web site that provides television based shopping of various products. It markets a wide variety of products in various categories such as electronics, jewelry, cosmetics, home furnishings, and so on. It has an additional feature known as "Watch Live TV" that provides an option to watch TV live while shopping online.

13.2 Managing Products

In an e-commerce Web site, every business transaction is done online which includes marketing, shopping, payments, and shipping. Therefore, it is important for a Web site to contain all these necessary features to deal with these requirements. The outlook of the online store must be professional to encourage customers to shop through the Web site. The graphical user interface of the Web site must be unique in order to ensure that the customers purchase more products. The products must be

displayed in a user-friendly manner for the customers to access the products conveniently. E-Commerce Web sites contain various products that are listed for the customers to view and purchase. Hence, it is necessary to categorize the products into related search groups so that the customers can easily search the product.

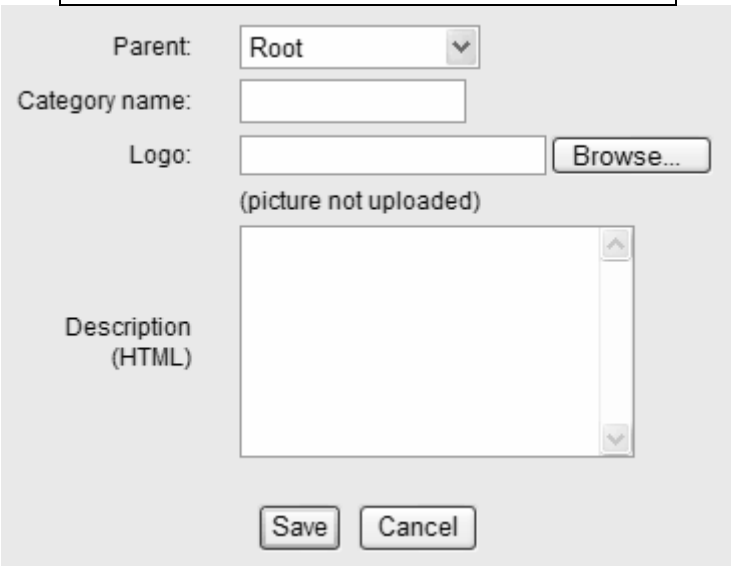
The basic architecture of the Web site application includes designing product catalog that provides details of the products. To create such a catalog, it is important to design architecture that involves the following procedure:

1. Design a database for storing product catalog that are sub-divided into various departments and categories.
2. A Structured Query Language (SQL), Hypertext Preprocessor (PHP), HTML, JavaScript, Ajax, CSS code is written to access the data and make the product catalog functional.
3. Add data to the product catalog that defines product attributes such as color, size, and so on.
4. A product search engine must be provided and the site administrator must be provided with a private section in order to manage the online product catalog.

Once the catalog is built, the next step is to offer products for sale by integrating the products with shopping cart functionality and order-processing system. This will help to handle credit card transactions and e-mails with details of orders.

The products must be categorized to maintain the product information for effective browsing in the Web site. The merchant is provided with a product category form during the process of adding a new product to the Web site. The figure 13.2 depicts the product category form of an e-commerce Web site which helps in categorizing the products according to the listed category in the Web site.

Figure 13.2: Product Category Form



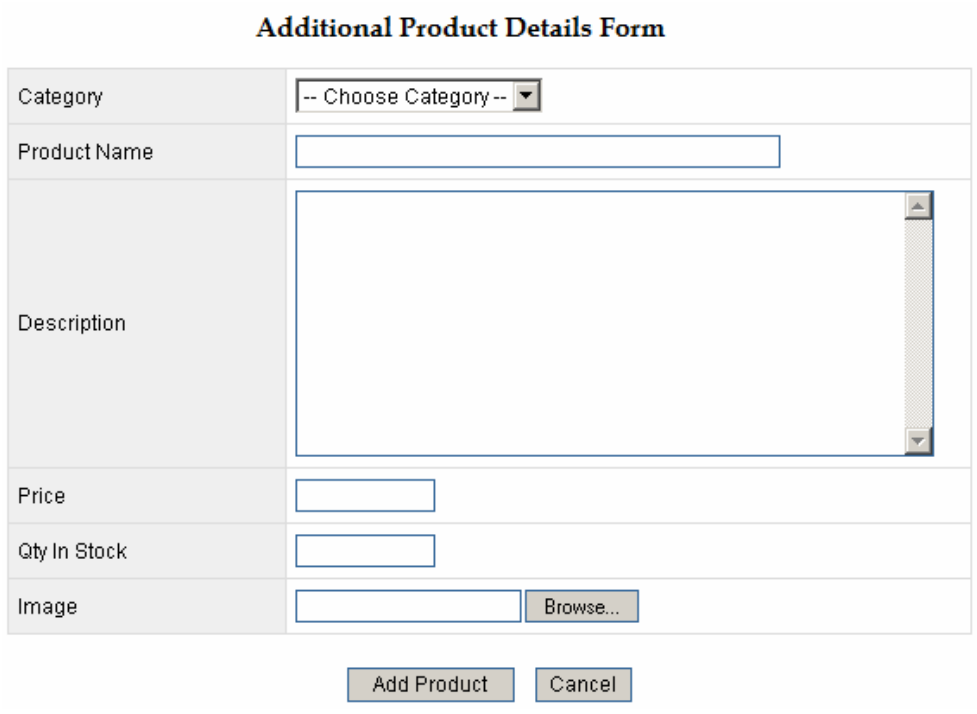
Source: http://www.php-shopping-cart-tutorial.com/managing-categories.htm

In the figure 13.2, the product category form is used by the manufacturers to advertise their respective products on the Web site. It consists of Parent, Category name, Logo, and Description of the category. The Category Name specifies the category in which the product can be advertised. Description refers to the description of the product and the picture URL links the Web page to the specific image of the product.

Example: A car dealer wants to enter the details of Maruti Zen. The dealer must enter Maruti Zen for the Category Name and the car description which describes the type and model of the car. The manufacturer must provide the URL of the image of a Maruti Zen car for the Category thumbnail or image URL to link to the car Web site containing the product.

Once the product category is created, then the products to be advertised must be assigned to the product category while configuring the product details. The figure 13.3 depicts product details form which helps the customers to identify the product in the specific category.

Figure 13.3: Additional Product Details Form



Source: http://www.phpwebcommerce.com/shop-admin-add-product.php

In the figure 13.3, the additional product details are entered for the created product category. It consists of Category, Product Name, Description, Price, Quantity (Qty) in Stock, and Image of the product. The form displays the product description which was entered in the product category form. The manufacturer can select the product category to which the product needs to be assigned from the Category drop down list. The products entered in the Category list are displayed to the customer.

Figure 13.4 Product List Displayed to the Customer

Source: http://www.tipsandtricks-hq.com/ecommerce/wordpress-estore-product-categorization-431

In the figure 13.4, the Web site displays the description of the product, image, price, and license of the product which was entered earlier by the vendor. An option is provided to the customers to add the particular product into the cart.

The product production and services depends on control function management, operations management, and configuration management. Control function management mainly deals with controlling variety of ongoing management activities to co-ordinate operations in the Web site. Operations management in Web site deals with wide variety of operations. Configuration management deals with tracking the new versions of products and services which includes updating, deleting, and configuring the product and its information in the Web site.

The product management in a Web site must contain the details of the products and the manufacturer for the customer's awareness regarding the manufacturers of the product. In order to maintain the details of the manufacturer, a separate category must be created. A panel is developed in the Web site that contains the manufacturer information in a particular category form.

In the figure 13.5, the manufacturer category form contains information which includes category name and category description. The manufacturer must enter the category of the product which is to be advertised on the Web site with description. In this example, 'Publishers' is given as the Category Name. The Category Description contains the description of the publisher which is specified as a Manufacturer of books, CDs, and information products. The information provided to the customers must be stringent and clear so that there is no ambiguity among the customers. Hence, it is very important to add the manufacturer information so that the products being advertised in the Web site seem original. Once the manufacturer category form is filled, the next step is to add the manufacturer information.

Figure 13.5 is a snapshot of manufacturer's information form which is filled by the manufacturer during the process of adding product to the Web site.

Figure 13.5: Manufacturer Category Form of VirtueMart

Source: http://www.packtpub.com/article/managing-manufacturers-vendors-product-categories-joomla-ecommerce-virtuemart

If such a form is expanded, it should contain the manufacturer name, URL of the company, category of the manufacturer, description of the manufacturing company, and customer support e-mail id for the customers to send their queries directly to the manufacturer. Once the manufacturer information is added, it gets updated in the Web site and the customer can choose the products with complete details.

Example: VirtueMart is an e-commerce Web site. It offers various products for sale with advanced features of product management. The VirtueMart Web site contains a manufacturer category form in which the details of the manufacturer advertising the product are entered before publishing the product for sale. The figure 13.5 is a snapshot of the manufacturer category form present in the VirtueMart Web site.

The products are updated in the Web site according to the release of its new versions and variable changes in the prices.

13.3 Database

A database is mainly required to store and update large quantities of data. The online Web sites dealing with buying and selling of products provide great importance to database. The database management system is a systematic approach of storing, accessing, and retrieving data effectively. The database management systems consist of a data warehouse that archives the data provided by the manufacturers regarding the product. The data is classified, summarized, and categorized in the data warehouse so that the end users are provided with information at a faster rate.

The database stores the information of the product, manufacturer, and customers who regularly visit the Web site, and so on. It provides a convenient mode of transaction over the Internet to locate, purchase, make inquiries, and review the products or services. It provides greater access for choosing various products that are stored in the database.

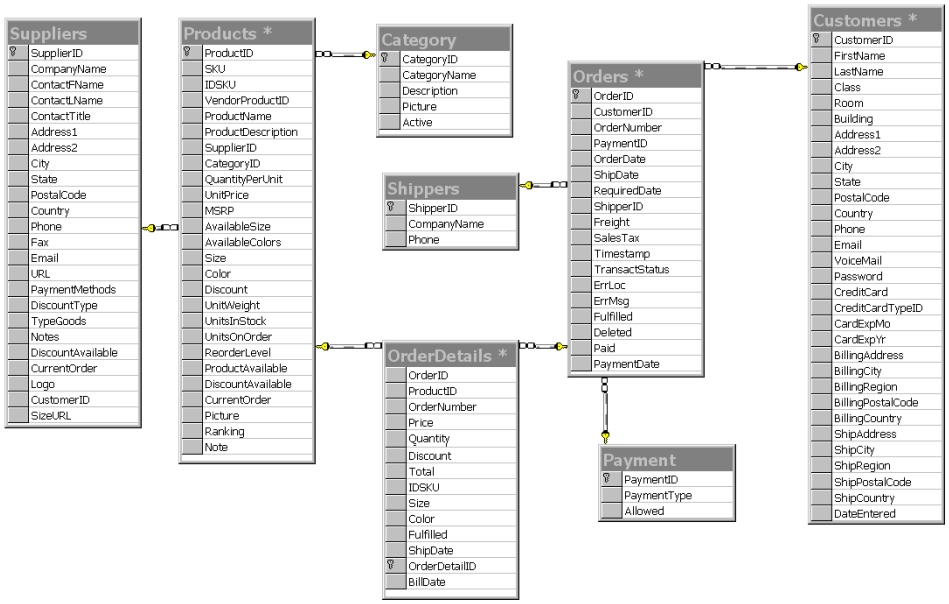
The designing of e-commerce Web site database usually consists of four primary tables. They are:

1. ***Customers Table:*** It stores the information of the customer logging into the Web site like customer's residential address, billing address, shipping address, and so on.
2. ***Products Table:*** It stores the product information such as description, size, color, price, and so on.
3. ***Orders Table:*** It stores the information regarding customer ID, date of order, shipping date, and so on.
4. ***Order Details Table:*** It stores information on each product ordered which includes quantity, price, any discounts on product, and so on.

The attributes of the data must be entered while designing the database so that the searching process of the customers can be done easily.

The figure 13.6 depicts the schematic diagram of the relational database in which the products and its details are stored. Each table is interrelated such that the customer is provided with complete details of the product, payments, and shipping process.

Figure 13.6: Relational Database



Source: http://www.princeton.edu/~rcurtis/ultradev/ecommdatabase.html

In the figure 13.6, the tables created are Suppliers, Products, Category, Shippers, Order details, Orders, Payment, and Customers. The Suppliers table consists of various attributes such as supplier ID, company name, contact address of the manufacturer, type of products, and so on. The Products table consists of product name, supplier ID, picture of the product, price, description of the product, and so on. The Category ID table is linked to the Product table such that the category under which the product is advertised can be retrieved easily. The Order Details table is interrelated with Products table and Orders table. It consists of order ID, product ID and other attributes related to the order of the product. The Payment table describes the type of payment, mode of transaction, and the amount details in the transaction. The Customers table includes the customer's data such as name, address, shipping address, and so on.

There are different database systems that are used for creating e-commerce Web site. Some of databases are:

1. SQL server is the most popular database software systems for storing large quantity of data. SQL is Structured Query Language for accessing the databases. If the business requires Web site to be able to store and retrieve data from a database, it must have access to a database which is coded using SQL.
2. Microsoft Access software is used when Web site requires simple database solution.
3. Oracle is a very popular database software for data driven Web sites with high traffic.

4. MySQL is a database server used for low traffic Web sites and represents an inexpensive database solution for small scale e-commerce Web site.

The back-end coding is used for interconnecting the Web host and the database. Coding languages such as, PHP, XML, JavaScript, Ajax, and CSS are used for data security and accessing database. HTML is used for creating the frontend GUI and designing of the Web site.

Notes

IDG e-commerce database helps the end-users to obtain a list of e-commerce products and services. It is one of the largest sources of qualified e-commerce database. It provides an excellent functionality of describing information regarding the software, hardware, trade shows, seminars, services, and computer catalogs that are related to e-commerce market.

Task

Create a database for a cosmetic product Web site. Include various products belonging to different companies. Develop tables in database such that it contains table attributes that are linked with other tables.

13.4 Shopping Cart Applications

A shopping cart is a piece of software that helps in simplifying the shopping process for an online customer when purchasing multiple products or services from a merchant's Web site. It provides an interface between a company's Web site and its deeper infrastructure. It allows consumers to select merchandise, review the selected merchandise, and purchase the merchandise.

Basically, a shopping cart is a software that allows merchants to list their products on a Web site and then automatically collect fees when a customer buys products from their Web site.

Example: Assume that you have a grocery shop, and now you want to start selling grocery products on a Web site. To do that, first, you must have shopping cart software. You must also have a business bank account, payment gateway, and a service that allows you to automatically process credit cards on the web site.
Once you have the shopping cart software set up on the Web site, you can add grocery products to the Web site using a Web browser. The software allows you to include images, description, prices which are stored in database and recalled on structured queries. Shopping cart is as good as a shopping basket as it holds the products.

Customers log into the Web site and add products to their shopping cart. When they are ready to buy the products, they enter their shipping and credit card information in a form. This enables the merchant to know where to ship the product and whom to charge it to. Once the customer clicks the button to submit the order, the shopping cart uses the payment gateway and credit-card-processing service, to validate the credit card and then transfer the money from the customer's credit card to the merchant's bank account.

Shopping carts are written in different types of programming languages. Some of them give full access to the source code and thus, allow experienced programmers to make modifications to the system features. Some shopping carts run on Windows Web servers, some on UNIX, and others on both. In most cases, the merchant can place the shopping cart on a Web server by transferring the source code files into the server using any File Transfer Protocol (FTP) software.

Example: ProductCart, shopping cart software, is a collection of files written in a programming language called Classic ASP. An e-commerce merchant can host that software on a Windows server. As the source code is included, the experienced programmers can customize the system as per their choice.

Normally all the shopping carts share the same structure. The structure includes:

1. A database that stores information such as product details, customer data, order information, and so on.
2. A storefront that displays the stored information.
3. An administration area that allows the store administrator to manage the store by adding products, setting up shipping and payment options, and processing orders.

As most of the information is stored in a database, the shopping cart creates pages dynamically as per the requirement of the customer. Apart from the HTML pages that make up most of the Web site, the shopping cart pages do not exist until a customer requests one. The Web server dynamically generates the page by retrieving data from the database.

Example: X-cart is shopping cart software that is template based with open source code. It means that the look and feel and functionality of the shopping cart can be changed according to the business requirements.

Shipping Calculation

In the last few years, the shipping calculations have become more sophisticated. All the up-to-date carts include the following two types of shipping calculations:

1. Calculation from the look-up tables which is set up by the merchant.
2. Real-time calculations that take information from the major shippers and couriers.

Generally, shipping calculations from look-up tables which are set up by the merchant, work perfectly well. Shipping costs may differ from those in the look-up tables. However, in the long run, these cost differences even out. Shopping carts often include a wide variety of shipping calculations which can be grouped by:

1. Total sales
2. Number of items in the order
3. Weight and zone
4. A fixed shipping price for all products

The merchant has to select the particular system of grouping shipping calculations that applies to all their products. Some of the carts add a shipping surcharge to selected products that are especially bulky or require special crates or shipping containers.

Many merchants go for the by weight system and find it most flexible especially, when they have a number of products that are dissimilar in size and shape.

The merchants can also use the plug-ins supplied by some of the major shippers. The shipping companies offer a service to online merchants that estimate shipping costs, depending upon the type of service the customer selects, like shipment on the same day or the next day, and so on.

13.5 Summary

- Web site development is a challenging aspect for companies to sell their products online. Design and building of Web site for e-commerce requires analysis of various factors such as business requirements, budget, and so on.
- Developing an e-commerce Web site requires addition of various features that are user friendly to the customers.
- The products must be managed in an effective way such that, it is organized according to the categories.

- Database for an e-commerce Web site helps in storing and retrieving data of products and other features in an effective way.
- A shopping cart is a piece of software that helps in simplifying the shopping process for an online customer, when purchasing multiple products or services from a merchant's Web site.
- Apart from the HTML pages that likely make up most of the Web site, the shopping cart pages do not exist until a customer requests one.

13.6 Keywords

***Human Machine Interface (HMI)*:** It is the interface or space of interaction between the human and an equipment/machine.

***Page Navigation*:** It is the movement from one page to another in an application.

***Shopping Cart*:** It is a cart provided by a shop, for use by customers inside the shop for carrying of commodities to the check-out counter during shopping.

***Web Server*:** It refers to both hardware (computer) and software (computer application) that delivers content that can be accessed through the Internet.

13.7 Self Assessment

1. State whether the following statements are true or false:
   (a) Change management process acts as a framework for identifying the problems within the project.
   (b) Order table holds information on each product ordered which includes quantity, price, any discounts on the product.
   (c) Shopping cart is basically an interface between a company's Web site and its deeper infrastructure.
   (d) All the shopping carts run on Windows Web servers.
2. Fill in the blanks:
   (a) _____ provides a detailed description of necessary information to be included in each page of the Web site.
   (b) _____ deals with tracking the new versions of products and services which includes updating, deleting and configuring the product and its information in the Web site.
   (c) To place the shopping cart on your Web server, you can transfer the files by using any _____software.
3. Select a suitable choice for every question:
   (a) Which among the following is closely related to identifying software bugs or changing the site according to the new requirements?
      (i) Functional specification
      (ii) Project plan
      (iii) Change management process
      (iv) Configuration management

(b) Which among the following defines product attributes?

(i) Product catalog

(ii) Product category catalog

(iii) Order details catalog

(iv) Attribute catalog

(c) Which among the following is a widely used form of shipping calculations?

(i) A fixed shipping price for all products

(ii) Calculation from the look-up tables

(iii) Real-time calculations

(iv) Fixed amount per transaction

13.8 Review Questions

1. Construct a manufacturer information form considering the manufacturer of a car with details of the car to be sold online.
2. "Many factors need to be considered for designing a database for e-commerce Web site." Justify.
3. "A shopping cart is a piece of software that helps in simplifying the shopping process for an online customer." Discuss.
4. "All the up-to-date carts include two types of shipping calculations." Discuss.
5. "Programs are used to keep track of the shopping carts." Discuss.

Answers: Self Assessment

1. (a) T (b) F (c) T (d) F
2. (a) Functional specification (b) Configuration management (c) File Transfer Protocol (FTP)
3. (a) Change management process (b) Product catalog

   (c) A fixed shipping price for all products

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Unit 14: Designing and Building E-Commerce Web Site - Advanced

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Objectives

After studying this unit, you will be able to:

- Explain the process of integrating mobile e-commerce
- Discuss the features of payment gateways
- Explain the process of tracking orders
- Analyze some case studies

Introduction

E-Commerce Web sites are dominating the World Wide Web in recent years. Different users across the globe can access a single e-commerce Web site at the same time. The vendor sets up individual merchant account to advertise the products. This enables the customers to purchase items and make payments online. The Web site provides various models and designs of the products so that the customers can choose the product that meets their requirements. The mode of payment over the Internet provides a secured transaction between the customer and the vendor. Most of the product oriented companies develop e-commerce Web sites for the customers to purchase items online.

Example: Oriflame (www.oriflame.com), a Swedish cosmetics company has developed an online shopping Web site for its customers to order cosmetics across the globe. It provides a monthly cosmetics catalog listing the prices of the various cosmetic products on its Web site, for the customers to choose the items and store it in a shopping cart and make payments accordingly.

14.1 Integrating Mobile E-Commerce

Mobile e-commerce is continuing to grow at a rapid rate. Companies are constantly creating more mobile optimized Web sites that allow the customers to accomplish e-commerce transactions over mobile, instead of browsing the Internet.

Example: Shoppers can purchase any product on Web sites like Amazon.com through the mobile optimized site.

Customers accessing the site through their mobile phone should be automatically redirected to the mobile-optimized version of the site. Designers of the site should ensure that the URL of the mobile site is easy to remember.

Notes

Mobile Web sites are made accessible by:

1. Appending the word 'mobile' to the main domain.
2. Using dot mobi domain with the brand name.

Mobile Internet connections can sometimes be unstable.

Example: Mobile connections get dropped when the mobile phone moves into a low signal area or runs out of battery.

Mobile Internet Connections instability will not pose a problem if someone is just browsing the data.

Example: Reading the news updates will not be affected by instability of mobile Internet connections.

While there is not much one can do to enhance mobile network coverage, the effects of dropped connections can be mitigated by doing the following:

1. Saving all details at every step of the transaction.

Example: Details of items in a shopping basket or shipping data already entered.

2. Making sure that a transaction can be resumed from the point where it was paused, without having to start again.
3. Capturing visitor's e-mail addresses or mobile phone numbers at the start of the transaction and sending them instructions to help continue an uninterrupted transaction.
4. Making sure that all the transactions that are available on the mobile site are completed in a few short steps.

Though high-end smartphones are increasingly incorporating on-screen keyboard, it is not always easy to type data like addresses and credit card numbers on a mobile phone.

To reduce the chances of the customers dropping off at this point, the data entry can be minimized by:

1. Allowing customers to log-in with the same username and password which they use for the main Web site to get shipping and billing information stored in the account.
2. Integrating with the third party billing services.

Most of the online shoppers want their transactions to be secure because of the frequent reports of credit card fraud and identity theft. Most of the shoppers seek reassurance that the online transactions are secure. Most mobile browsers do not offer the security features, while most of the desktop Web browsers highlight the secure Web sites and protect the users from visiting fraudulent sites.

The homepage of a Web site and other pages which do not ask sensitive data can be securely accessed from a mobile phone.

Customers feel comfortable if they do not have to give any sensitive data over the mobile repeatedly.

Online merchants need to practice the following guidelines:

1. When customers buy goods through the mobile site, give a mobile solution for tracking the progress of the order and delivery of the goods.
2. When customers book tickets or other services through the site, give a mobile-friendly booking confirmation e-mail. Consider mobile ticketing solutions where the tickets can be electronically stored in the mobile phone in the form of a special barcode.
3. Make sure that all the e-mails which follow up a transaction are mobile-friendly.

Notes

In mobile commerce, companies can promote and showcase their products to increase customers.

14.2 Payment Gateways

Payment gateway is the service that automates the payment transaction between the buyer and the seller. It is a third-party service, which is a system of computer processes that functions, verifies, accepts, or declines credit card transactions on behalf of the merchant through the secure Internet connections. It is the infrastructure that allows a seller to accept credit card and other forms of electronic payment. The payment gateways used for the Internet transactions are also called as an Internet Protocol (IP) payment gateway.

Electronic payment is an essential part of Mobile Commerce. Electronic payment is a financial exchange which takes place online between the buyers and sellers. The content of this exchange is usually some form of digital financial instrument like encrypted credit card number, digital cash, or electronic cheques given by a bank or an intermediary or by legal tenders. The three factors that stimulate the interest among the financial institutes in electronic payments are decreasing technology cost, reducing operational and processing cost, and increasing online commerce. The desire to minimize cost is one of the major reasons for the rise in electronic payments. Cheques and cash are very expensive to process and banks are looking for inexpensive alternatives.

Electronic currencies are designed as electronic analogs of cash and represent various forms of payment, supported by a bank or financial institutions. Therefore, electronic currencies are similar to cash which is backed by a bank.

There are three types of electronic currencies:

1. ***Cash on Real-time:*** Transactions are completed with the exchange of the electronic currency.

Example: Online currency exchange is electronic cash.

2. ***Debit or Prepaid:*** Users pay in advance to the banks or financial institutions.

Example: Prepaid payment mechanisms are stored smart cards and electronic purses which store electronic money.

3. ***Credit or Postpaid:*** Server authenticates the customers and checks with the bank if the funds are sufficient before purchase.

Example: Postpaid mechanisms are credit or debit cards and electronic cheque.

Most of the e-commerce Web sites accept credit cards. Merchants require two components to accept credit cards online:

1. ***Merchant Account:*** This allows the customers to accept credit cards, online or otherwise. For this purpose, the merchant will have to set up a merchant account with a bank. A merchant account is a term used for a business banking relationship where customer and the bank arrange to accept the credit card payments. Establishing a merchant account usually involves understanding the business and also working with a third-party processor to arrange a mechanism for accepting the payments.
2. ***Payment Gateway:*** This is an online payment service, which connects users of the Web site with the merchant account to process the payment. It is the link between the Web site and the bank. When a merchant submits a payment transaction to the payment gateway, it is sent through a secure connection from the Web site. When the customers submit their order they get some type of notification that the order has been submitted. The transaction data is then routed from the Web site to the merchant's bank processor, which then submits their information to a Credit Card Interchange (CCI). The CCI is an organization responsible for managing, processing, clearing, and settling credit card transactions. The CCI routes the transaction to the customer's credit card issuer, where it is either approved or rejected based on the balance available on the card. The transaction again goes to the payment gateway which is responsible for saving the data and sending the results of the transaction to the customer and merchant. In the last step, the CCI will send the funds to the merchant's bank for deposit. While the payment processing routine might seem long, the whole process normally finishes in a few seconds.

Merchants must have a merchant account with the financial institution and must choose an appropriate shopping cart software as well as payment gateway to handle the transaction.

Integrated merchant accounts have a merchant account and payment gateway integrated into one service. These are more convenient, but often charge high fees.

Merchant accounts mostly charge a percentage of the transaction. They also charge:

1. Setup fee
2. Monthly or annual fee
3. Fixed amount per transaction

The user should know the number of transactions before shopping and the average value of each transaction. Normally, higher volume transactions have lower fees. Some banks may be reluctant to provide merchant account to a business with no trading history.

Most payment gateways have the same fees. Many charge a fixed amount per transaction rather than a percentage. They will sometimes provide extra features like fraud detection.

Did you know? Payment gateways service can be scripted using scripting languages like PHP, Perl, and dot-Net.

Task

Design a payment details form for e-commerce Web site. Consider the order is made for two products of different price.

14.3 Tracking Orders

In an online shopping store, the shopping cart program should be able to differentiate between multiple shoppers so that it can correlate the shoppers with their shopping cart at the check-out time. There are many programs to track the shopping carts:

1. ***Cookie:*** A cookie is a small computer file containing the cart number which is transmitted to the Web browser and remains on the hard disk during the visit to the store. The use of the cookies is quite widespread and will be used by most software since it is probably the most efficient method. A few people view cookies as an invasion of privacy so, an alternate tracking method is sometimes required.
2. ***Temporary IP Number:*** The temporary IP number is automatically assigned by the Internet Service Provider (ISP) to recognize the customers when they log onto the Internet. While the customer cannot see the IP number, it will however be stored in the store software.
3. ***Cart Number:*** Randomly-generated cart number can be appended to the URL which appears in the browser's "Location" or "Address" field. Whenever, the customers navigate to another product page, their cart number will also appear on that page.

There are some programs which maintain the state of the customers shopping throughout the year.

It is vital that the shopping cart software chosen is able to recognize shoppers by methods other than the cookie method since, a small percentage of shoppers can have their cookies turned off. However, the cookie approach is generally preferred since it allows the shoppers to obtain their cart when they login again later.

It is also important that the merchant is able to keep track of the shopper's name and address apart from the cart numbers. The software products will maintain the online database of customers. When shoppers want to place another order, a cookie on the shopper's browser will recognize them as a repeat customer and often identify them by name. Some of the database-energized sites will be able to personalize contact with the customers, like:

1. Giving filled-in billing and shopping address preferences.
2. E-mailing data about sales and special offers.
3. Presenting the shopper with the offers and product recommendations based on the previous purchases or items which are placed in the shopping cart.
4. Allowing the customer login access to past order history, present order status, packaging tracking, and so on.

14.4 Case Study

Case study is a practical study that analyzes the growth and challenges faced by the organizations during the operations process. The following sections discuss the analysis and various issues pertaining to the online shopping giants like Amazon.com and eBay.

14.4.1 Amazon.com

Case Study

Amazon.com

Amazon.com is an e-commerce pioneer that began in the year 1995 as a unique online book store with a plan to revolutionize the market place. It now offers various new, used and refurbished products in different categories like books, DVDs, electronic gadgets, apparels, jewelry, sports, and so on. It now ships millions of products to more than 200 countries.

Through the use of a unique business model when online retailing was a new concept, the organization looked to minimize overheads while capturing a key demographic group on a global scale. The online model gave the opportunity to offer increased customer choice beyond the traditional retailer and mail order companies.

The Web site initially concentrated on selling books online. It provided an option for the customers to view the preview of the books and purchase the books online. The Internet search technology allows customers to access the entire database of books.

Amazon has made strategic acquisitions to gain dominance in research and technology. Being a customer centric organization, Amazon has incorporated many advanced and innovative techniques like one-click technology, reviews, personalization, search options, browsing opportunities, auctions, and merchant partnerships that attracted more customers.

Amazon's success is based on strong core values like customer satisfaction, employee enthusiasm, operational efficiency, and effective Web strategy. Some of the tactics that were used by the organization to enhance its competitive advantage and overall growth are:

1. Offering products at competitive prices.
2. Marketing quality products that attract customers.
3. Providing hassle free services that satisfy the customer needs, fulfill expectations and resolve any problems at a faster rate.
4. Applying technology to make ordering secure, easy, and efficient.
5. Growing through strategic alliances and acquisitions.

Amazon.com offers an online catalog of various products and information. The home page of the site is a hub that links to catalogs of different product or services. The different functionalities of the site make it unique. The configuration e-mail facility keeps the users informed and maximizes their trust in the overall fulfillment process.

The fulfillment process mainly provides customers a confirmation mail which clearly states the product purchased, time, date, price, shipping details, and mode of payment. The login screen of the Web site provides an enhanced feature for the non - members or new customers trying to log into the Web site. Amazon.com presents two questions to the customers logging into the Web site in a linear order.

1. What is your e-mail address?
2. Do you have an Amazon.com password?

The users can respond to any one question. According to the membership status of the customer, the Web site allows complete access or partial access to the Web site.

Amazon.com is the globe's largest customer centric organization that focuses on customer relationships. The advanced functionality of the Web site tracks the browsing and purchase history of its customers and the collaborative filtering systems computes the similarity of preferences among different individuals. This process allows the organization to create a unique experience for every individual by suggesting products likely to interest that person. The suggestions are either made in real time when the users navigate the site or through e-mails.

The option of recommending related books at the end of each book review interests the customers and also creates a tremendous cross-sell and up-sell opportunity for the Web site.

The powerful A9 search engine of Amazon.com allows site visitors to easily search for the desired product or services. The landing page is colorful and contains lot of information that is relevant to the products.

One-Click ordering facility allows the registered users to check shipping and billing information without any hassle every time they make a purchase. The shipping of the products is prompt and confirmed with tracking information through e-mail to the customers.

Any queries, problems, refunds, or complaints are handled quickly and satisfactorily.

Main Reasons for Amazon's Success

Amazon.com has been successful mainly due to the diversity of its business, which applies to both the products offered and the architecture used. Its operational practice also incorporates diversity. Originally known as a book retailer, the organization moved into alternate media to expand the scope of its business. Amazon's acquisition of an Internet movie database company is an instance of this. Amazon found an opportunity to widen its customer database through direct marketing which gave it the opportunity to target the various market demographic categories using a limited marketing expenditure.

In Amazon.com, a review function allows its patrons to rate and discuss books, films or music online in order to share their feedback with others. This function is cited as the primary reason for Amazon.com having more than doubled the number of users when compared to other primary retail sites. However, the system for the user reviews has been criticized due to the opportunity for abuse that the functionality gives. This has been evident in the previous years with authors and musicians inflating reviews for their own products under anonymous names in order to stimulate sales.

The following are some of the patents of Amazon.com:

1. System and method for conducting a discussion relating to an item.
2. Internet based referral system to customers.
3. Method to produce sequenced queries.
4. Method to gather data around forms and search barriers.

Questions:

1. "Marketing tactics enhance the organization's competitive advantage and overall growth." Justify.
2. "Amazon sells used books to its customers alongside the new versions." Is this a sensible business practice, or does it unfairly undermine the market for new books? Analyze.

1.4.4.2 Ebay.com

Case Study

Ebay.com

eBay which has become the leader of the online auction industry was founded in 1995 by Pierre Omidyar. It has created a powerful platform for the sale of goods and services by a passionate community of individuals and businesses.

eBay aims to increase its gross merchandise volume and net revenues. Detailed objectives are defined to achieve these aims, with strategies focusing on:

1. ***Acquisition:*** Increase the number of newly registered users on the eBay Marketplace.
2. ***Activation:*** Increase the number of registered users that become active bidders, buyers or sellers on the eBay Marketplace.
3. ***Activity:*** Increase the volume and value of transactions that are conducted by each active user on the eBay Marketplace.

At the end of 2007, eBay had approximately 83 million active users, compared to approximately 82 million at the end of 2006. An active user is any user who has bid, bought, or listed an item in the current 12-month period.

eBay is famous for its core service which enables sellers to list items for sale on an auction fixed price basis. It gives buyers an opportunity to bid for and purchase items of interest.

Software tools are provided, particularly for frequent traders which include Turbo Lister, Seller's Assistant, Selling Manager and Selling Manager Pro. Tools that are used to help automate the selling process include the Shipping Calculator, Reporting tools, and so on. Today, over sixty percent of listings are done with the help of the software. This proves the value of automated posting for frequent trading.

eBay has developed "Trust and Safety Programs" which are very important to give assurance to the customers since online services are prone to fraud. In case of any fraud, eBay works with law enforcement and government agencies to enforce its policies. eBay has developed many programs and resources to ensure the safety of trade and to help in building trust.

eBay Feedback

Each member of the eBay Web site has a feedback score that is displayed in the seller information box of the item listing page. It helps to build trust among the people involved in trading.

Spoof Web site Protection

The eBay toolbar enables its members to protect their accounts by warning them when they are on a potentially fraudulent or spoof Web site.

eBay Security Center

The eBay security center provides guidance to its members on buying, selling, and paying safely. It is a valuable resource for all the users. To protect the user from threat, Rapport online browsing protection is provided by the security experts at Trusteer. Rapport secures the user communication with eBay. It blocks malicious programs from stealing the financial information.

To take advantage of the protection offered by Rapport, the user needs to download and install the Rapport plug-in for Windows or Mac.

Rapport doesn't alter the user's experience on eBay. Once installed, it operates quietly in the background to protect the user's communication with eBay's site and participating financial sites. Rapport works in conjunction with the user's existing antivirus software and firewall.

Competition

Currently eBay is facing a problem in creating a business plan to maintain their position as the leader in the online auction industry.

There are both direct and indirect competitors of online auction services. As per eBay (2005) competing channels are, online and offline retailers, distributors, liquidators, import and export companies, auctioneers, catalog and mail-order companies, classifieds, directories, search engines, products of search engines, virtually all online and offline commerce participants, online and offline shopping channels, and networks.

Some of the competition that eBay is facing are sites such as Yahoo Auctions, Overstock.com, Craigslist, Google, and Amazon.com.

eBay is not a free site. Sellers have to pay monthly fees, which in turn can increase the cost of the items being sold. On the other hand, sites like Craigslist are completely free which is increasing its popularity.

Questions:

1. How has eBay been able to maintain its dominant position?
2. What method does eBay use to reduce the potential for fraud by traders on its site?

14.5 Summary

- Mobile phones can be used in e-commerce.
- Payments gateway is an online payment service used to connect the buyer and the supplier.
- Orders for online shopping can be done using cookies, temporary IP number, and cart number.

14.6 Keywords

IP: It refers to Internet protocol through which the data packets are transmitted over the network.

Smartphone: A Smartphone is a mobile phone that offers more sophisticated and advanced computing ability and connectivity than a contemporary feature phone.

URL: It stands for Uniform Resource Locator. It specifies the global address of web documents and web resource.

Virtual Shopping: The imitation of a shopping mall environment on the Internet.

14.7 Self Assessment

1. State whether the following statements are True or False:
   (a) Mobile Internet connections can sometimes be unstable.
   (b) High-end smartphones are increasingly incorporating on-screen keyboard.
2. Fill in the blanks:
   (a) _____ is an online payment service.
   (b) Temporary IP number will be automatically assigned by the _____.
3. Select a suitable choice for every question:
   (a) How many types of electronic currencies are there?
      (i) Four
      (ii) Three
      (iii) Two
      (iv) Five

(b) Which account has both merchant account and payment gateway integrated into one service?

(i) Buyer account

(ii) Merchant account

(iii) User account

(iv) Integrated merchant account

14.8 Review Questions

1. "E-Commerce provides excellent mode of business expansion across the world." Justify.
2. Log into Amazon e-commerce Web site and identify the unique feature that differentiates the Web site from other Web sites.
3. "Companies are constantly creating more mobile optimized Web sites." Explain.
4. "Payment gateway is the service which automates the payment transaction between the buyer and the seller." Explain.
5. "Electronic payment is an essential part of Mobile e-commerce." Justify.

Answers: Self Assessment

1.	(a) T	(b) T
2.	(a) Payment gateway	(b) ISP
3.	(a) Three	(b) User account

14.9 Further Readings

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