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# ELECTRONIC COMMERCE

## Framework, Opportunities and Risks

Dr. Bharat Bhasker\*

### Abstract

*E-commerce will grow as a major force transforming the way business is conducted. In the process, it promises a growth opportunity for businesses involved in information infrastructure development. The electronic markets offer a convenient, efficient, and cheaper mechanism to consumers. E-commerce will continue to grow as the number of people with access to information service grow worldwide. The economies, businesses, people and nations that adopt and integrate the implications of e-commerce in their strategy are poised to rise to newer heights.*

Tremendous growth in managing a large volume of data storage and retrieval techniques in eighties followed by development of transparent mechanism to inter-connect, data transfer rates and the emergence of global connectivity based on TCP/IP standards, have provided opportunity to manipulate and disseminate information spread across a geographic area. The development of communication infrastructure in late eighties and early nineties in the form of Internet and related developments in information publishing and distribution technologies (generically referred to as Web Technologies), have propelled us towards a new economic era. This new economy driven by the Internet, web technology, also called digital economy, promises to be the engine of growth for at least next quarter of century. The corporations, as well as, the nations that are going to adjust to this reality or adapt to the new scenario are poised to be winners. The appearance of the founders of Information Technology and enabling companies in the recent lists of top 20 richest persons of various developed and developing countries; is just one indicator of the things to come.

The costs, availability of product, price information and delivery are the important factors that influence the economic behavior. In the digital economy, the product & price information can be readily accessed from the providers across the globe, offering an additional service of cross comparison of various product attributes. In a fully developed

digital economy, people will be able to transact business across geographical borders; various needs of consumers will be fulfilled and payments made on-line. Also, the on-line needs of consumers are going to rise. Thus, creating many new products, new businesses and services accompanied by growing employment in this area.

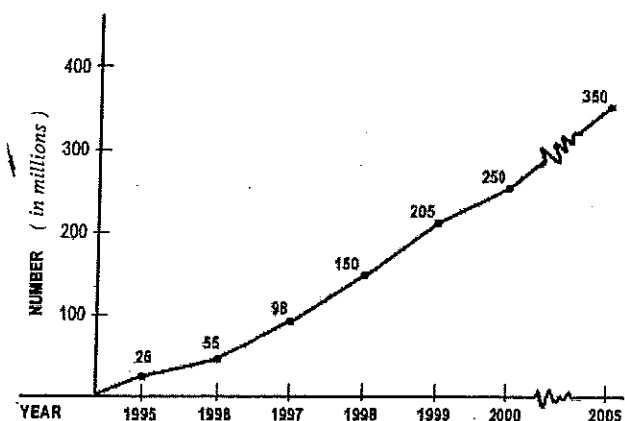
Innovative companies like Dell Computers, Amazon.com, Intel, Cisco, Yahoo!, recognized the potential and pioneered the use of internet/Web as information management tool to their advantage. By integrating various on-line information management tools through the internet, these companies have set up systems for taking customer orders, payments, customer service, collect marketing data, and feedback online. These activities have collectively come to be known as e-commerce or Internet commerce. By adopting e-commerce practices, these companies have boosted their profits, net worth and have permanently altered the competitive dynamics.

E-commerce and its growth have already established themselves as a technological turning point, whose speed of impact is going to be unprecedented. Andy Grove, CEO of Intel Corp. describes them as the strategic points of inflection. These points, generally caused by technology, are full-scale changes in the way business is conducted. A strategic inflection point can be deadly when to unattended, businesses that start declining due to it, rarely recover their previous heights. On the other hand, it creates opportunities for business competitors that adapt to operating in the new order. These inflection points provide opportunity for new businesses and entrepreneurs to reap in the rewards of a new era of growth.

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The identification of these strategic inflection points may not be obvious, as was the case when Studbaker at the turn of century decided to switch from making horse-drawn carriages to making cars. The step was not obvious, as in the preceding five years, New Yorkers had bought only 125 cars as against 350,000 carriages. If we look at the technological changes in the information and communication sectors, a laptop computer, weighing about one kg., contains more power than a million dollar computer in 1980; a fiber-optic cable can carry out 1.5 million conversations simultaneously. Compared to 50,000 computers worldwide in 1980, today numbers are estimated to be in the range of 300 millions. The growth of people with access to Internet has surpassed all past precedence and it is estimated to be in the ranges of 200 million.

How Many Online Worldwide



The emergence of hypertext transfer protocol, hypertext markup language, and further developments related to these distribution and publishing technologies, commonly referred to as the Web in the last decade of this century, have paved a new way of doing business. The explosive growth in the Internet, Intranets, Extranets and other developments in technology have lowered barriers to commerce and have thus, empowered providers (small and large businesses) as well as consumers to benefit from them. This commerce on the net (e-commerce) is already generating transactions well over US\$100 billion. Amazon.com, the online bookseller, offering up to 40% discount, has forced bookstore chains like Borders, Barnes & Nobles to go online. Dell computer, a mail order based computer seller transacts above US\$5 billions, Cisco over US\$6 billions and Intel has reached the levels of US\$10 billion in online sales. General Electric buys over a US\$ 1 billion from suppliers online today and the list keeps on growing. The e-commerce transactions are expected to reach a trillion-dollar mark by the year 2002.

As we usher in a new century, e-commerce is a force affecting almost every industry and consequently the competitiveness of nations at large. The transformed way of conducting business in the inter-connected world is opening up new opportunities for existing businesses as well as new entrants. In order to understand the emerging market structure, a framework of e-commerce is presented in figure 1.

The framework describes various building blocks (enabled by technology) that create new markets, and market opportunities. The business opportunities created by each block are described here.

The Network Infrastructure, known as Internet, superhighway etc., consists of heterogeneous transport systems. These different transport networks interconnect using common network protocol standards such as TCP/IP. In the last five years, this has been the biggest growth area of the US economy. The routers, switches, hubs and bridges are the bricks used in constructing networks. The router industry, dominated by Cisco, 3COM, Bay Networks, is already a multibillion dollar industry. Cisco, a company specializing in router business, has grown from a market capitalization of about US\$30 billion in 1996 to over US \$200 billions today. The other players that will continue to grow include: telecom companies providing telephone lines, cable TV systems with coaxial cables, direct broadcast systems (dbs), wireless networks, and computer networking providers. The hardware companies, manufacturing the Data Terminal Equipment (DTE) such as PCs, set-top boxes and software tools companies providing interfacing software for various networking options and interconnectivity, have been growing and will continue to see the exponential growth with the onset of e-commerce era.

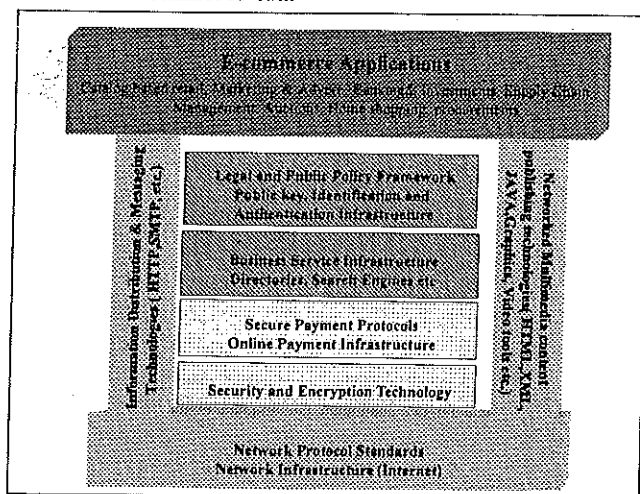


Figure 1. Framework for Electronic Commerce

Information Distribution and Messaging technologies provide transparent mechanism for transferring the information content over a network. It is accomplished through software systems that implement HyperText Transfer Protocol (HTTP), Simple Message Transfer Protocol (SMTP) for exchanging multimedia contents consisting of text, graphics, video and audio data. For e-commerce, challenges exist in providing secure, reliable and non-repudiable mechanism that can operate over variety of devices such as PCs, Workstations, Palmtops, Set-top boxes and wireless communicators. The Netscape, Microsoft and Apache are the major corporations that have filled and ruled the market space for various HTTP servers. All these products provide a generic, as well as, proprietary way of interfacing the HTTP server with corporate databases, and information repositories. The corporate information lies in heterogeneous systems, ranging from file systems to Object DBMSs. As more and more corporations adopt e-commerce, the interface development and tools market is poised to see a substantial growth.

Networked Multimedia Content development, integration and publishing tools, such as HTML editors, Graphics editors, video and audio content managers, Virtual Reality Manipulation Language (VRML) toolkits, will witness a growing demand. The Web provides means to create, integrate and publish contents. The companies that can find better and simpler ways to accomplish the task are likely to flourish.

Security and Encryption techniques are essential for carrying out e-commerce transaction. The parties involved in transactions have to be sure that messages exchanged have not been tampered with. The participating businesses in e-commerce have to publish the information and make it widely available in the network connected world, thus, opening up their site to unwanted intruders. In order to protect the internal data, security firewalls will form essential part of the infrastructure. Thus, the speciality companies capable of providing the site security through various toolkits and firewalls and the encryption technique integrators will see a rise in market demand.

The online payment is fundamental to the acceptance of e-commerce as a viable alternative. It is a mechanism that facilitates an online financial exchange between concerned parties. The estimated e-commerce transactions are stated to be in the region of US\$100 billions and poised to cross a trillion dollar mark in the next three years. The institutions that will become facilitators of electronic payment are likely to garner a share of trillions dollars worth of transactions.

There have been various online payment mechanisms, such as Ecash, Digicash, Netchecks, Smart cards and traditional credit cards. Although, credit card majors have come up with Secure Electronic Transaction (SET) protocol, for reasons of anonymity, privacy and small purchases the electronic cash payment mechanism will remain essential.

Business service infrastructure, directories and catalogues, to assist buyers in identifying and locating the businesses that can meet the demand, are basic requirements for e-commerce to take off. The Altavista, Yahoo, Lycos, Infoseek etc. identified and capitalized on the need by providing not only a directory service; but a full service search capability. Many other specialized directory services will be required to locate and index the businesses in the global mass and mini market space. The need for infrastructure directory services that can interact and work with software agents, working on behalf of the buyers, has begun to manifest itself.

The e-commerce transaction, in the digital economy, actually takes place between processes operated by various transacting parties. Although, the security and encryption technology can help in ensuring the secrecy and originality of data, but to ensure the transaction is conducted on behalf of two acclaimed parties, the authentication infrastructure has to be put in place. In order to authenticate people, a massive public key infrastructure, operated by legal establishment, approved certification authorities will be required. With estimated 200 million people online today, which is expected to cross a billion mark in few years, servicing the online authentication, ensuring non-repudiation of contracts, purchase orders, agreements repositories will open up a substantial business opportunity. The certification authority based on public key infrastructure, for this purpose has already been adopted under e-commerce laws of many countries. The proposed draft of Indian e-commerce act also relies on the same concept.

Finally, the e-commerce applications for conducting business to consumer (B2C) and business to business (B2B) transactions will continue to provide opportunity to information technology companies involved in setting them up. The biggest impact, especially once the various elements of the e-commerce framework are in place, will be the shift from traditional market to an efficient, low transaction cost based, and convenient electronic market paradigm that reduces the transaction friction substantially.

Electronic commerce is already forcing the shift in the way business is conducted, by opening up and throwing all

those involved in extreme competition. This will lead to bypassing the wholesaler, or the middlemen in a direct transaction, and thus reducing friction between the manufacturer and the consumers. These savings will markedly reduce the cost of transaction. Access to marketplace reduces barriers to entry, and continues to result in creation of new businesses such as priceline.com - a bargain airlines ticket agent, chipshot.com- a customized golf equipment seller. As the consumers are able to express their needs, products unique to electronic market will continue to appear. Examples of some of these products include, online entertainment industry, software-on-rent businesses. Ultimately, each business will become highly specialized and will leverage upon strengths of others, leading to the growth of international virtual corporations. From the consumer's perspective, electronic commerce offers a greater variety. One can purchase the finest product from any part of the world, thus saving time, energy and resources, manage finances and even hunt for a new job from the comforts of home.

However, the existing social and economic structure is designed and optimized for the current monetary systems and trade practices. The setup now requires a suitable modification for smooth conduct of the electronic markets. Any tampering with the structure is fraught with risks. The first risk emanates from the way electronic markets operate. Although, efficient and convenient, these markets depend upon the information network infrastructure. Any disruption in the infrastructure, due to natural disasters, accidents or sabotage can have far-reaching disastrous consequences. A single failure of settlement in major financial markets could, in principle, influence the entire economic system; in the least, paralyzing the system. In the software agent based economy, actions of a few software agents can cause unprecedented price wars, or the stock market swings: The 1987 crash of US stock market was accentuated due to program trading with lack of effective circuit breakers. The economic

fraud and online crimes such as stealing of trade secrets, commercial espionage, invasion of privacy and infringement of intellectual property rights may see a rise. As the economies get inter-twined closely, the efficiency of electronic markets will make the money movement more fluid. As a consequence, the fluctuations in the global economy and market will be wider and quicker than ever before. The traditional set of economic rules and regulations devised for national economies will become obsolete and will have to adapt to the new economic reality. On the social front, the benefits of the market efficiency will accrue to the information rich nations and societies. Sets of people, without access to information infrastructure, are likely to miss out on the benefits of electronic markets, resulting in greater divide between rich and poor people, companies, and nations.

In the interest of healthy economic growth, certain countermeasures are required. These include, universal access, information literacy and re-establishment of economic rules and transaction policies. Today, most of the people in our country don't even have access to a telephone. It is time to think of ingenious ways to leapfrog and build an information infrastructure that guarantees universal access to the service through interfaces in their native languages. It also offers great opportunity for growth of businesses in the niche area of public interface to electronic markets. In this regard, the governments and countries with advanced e-commerce infrastructure must offer financial and technical support. As the actual infrastructure is being implemented, people must be educated about the usage, benefits, ethics and dangers of the networks. Finally, the information security needs to be strengthened to resolve the fragility and vulnerability of e-commerce. This would require technological improvements in network management, encryption and public key infrastructure, also, a legal framework related to information protection and crime prevention in the information network.