

## Determinants of the Locus of Global E-commerce

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### **Abstract:**

Internet and e-commerce are experiencing hyperbolic growth rates and highly asymmetric global distribution. There is also a significant variation worldwide in the means used to access the Internet and the e-commerce models adopted. This paper attempts to identify and synthesize the available evidence on predictors of magnitude, global distribution and forms of e-commerce. The analysis indicates that the twin forces of globalization and major revolutions in ICT are fuelling the rapid growth of global e-commerce. On the other hand, economic and infrastructure-related factors, cultural factors, political and legal factors and the activities of supranational institutions determine the proportion of the global e-commerce a country is likely to receive and the forms in which it is implemented. The success of a company is a function of its ability to understand how various environmental factors influence the optimum combination of fixed and mobile telecommunications networks in a country; appropriateness of a product to be sold online; website design; payment mechanism; delivery means; etc.

**Keywords:** e-commerce, globalization, sociocultural factors, political factors, economic factors, supranational institutions

### **Article:**

#### **INTRODUCTION**

The twin forces of globalization and the Internet have the potential to offer several benefits to individuals and organizations in developing as well as developed countries. Apart from economic benefits such as more choices and the convenience of shopping at home, the twin forces can make progress on educational and scientific development, mutual aid, and world peace; foster democracy; and offer exposure to other cultures (Fink 1997; Mansell and When 1998). Likewise, they allow even small and medium sized enterprises (SMEs) and firms from developing countries to reach customers and suppliers worldwide in a timely and cost-effective manner. A larger numbers of firms from developing countries such as South Korea, Taiwan, Israel, Brazil and India have already become global players in many industries (Aggarwal 1999). To fully exploit the potential of the Internet and e-commerce, policy makers in developing as well as industrialized countries are taking initiatives to develop the global information infrastructure (GII) and connect their national information infrastructures to the GII (Gore 1996).

The Internet and e-commerce are experiencing hyperbolic growth rates and highly asymmetric global distribution. Starting from virtually zero in 1995, global e-commerce amounted to US\$ 26 billion in 1997 (OECD 2001) and is estimated to exceed US\$ 5 trillion in 2001 (Computer Economics 2000). Although survey evidence indicates that the Web is widening its reach gradually to developing countries (eg, Funk 1999; ITU 2001; Rosen and Howard 2000; UNCTAD 2000a), so far, Internet and e-commerce are heavily skewed towards developed countries. An estimate suggests that 99.9% of business-to-consumer e-commerce in 2003 will take place in North America, Europe and Asia Pacific (Computer Economics 2000).

There is also a significant variation worldwide in the means used to access the Internet and the e-commerce models adopted. Whereas a large majority of global e-commerce takes place via personal computers connected

to fixed telecommunications networks, use of mobile technology for this purpose is growing more rapidly. By 2005, more than 25% of e-commerce is estimated to take place over handheld sets (Shaffer 2000). While, in the US, a large proportion of online purchases are conducted via credit cards, credit card systems are not well developed in other countries. Europeans mainly rely on debit cards. Payments for online purchases in Asian countries such as India and China are normally made by a mail check, cash on delivery or a wire transfer (Burns and Taylor 2000).

A better understanding of the forces influencing the locus of e-commerce development would help managers choose an appropriate business model. Likewise a clearer understanding of the global forces that affect Internet diffusion helps policy makers formulate appropriate policies to accelerate Internet diffusion and bridge the existing digital divide. Much of the e-commerce literature, however, takes a fragmented perspective of the nature of the various forces influencing Internet and e-commerce diffusion, examining cultural factors (eg, Shabazz 1999), political factors (eg, Hogan 1999), etc. in isolation. This paper attempts to identify and synthesize the available evidence on predictors of magnitude, global distribution and forms of e-commerce. The approach of this study is guided by the following three research questions: a) What factors influence Internet adoption in general?; b) What factors influence the adoption of the Internet for shopping purposes; and c) What roles do the various environmental factors play in different phases of an online transaction?

The remainder of the paper is organized as follows. In the following section, we discuss the forces impacting on the diffusion of the Internet and e-commerce. Next, we analyse the factors influencing the distribution of global e-commerce and its forms. Finally, some conclusions are provided.

## **FACTORS FUELLING THE RAPID DIFFUSION OF THE INTERNET AND E-COMMERCE**

### ***Technological Development***

Diffusion researchers have found several characteristics of a new technology that influence its diffusion: relative advantage, compatibility, complexity, observability and trialability (Rogers 1983). Rapid decline in computing, storage and transmission costs has increased the relative advantage and observability and decreased the complexity of using computers and the Internet. The well-known Moore's Law states that the number of transistors on a chip doubles every 18 to 24 months, driving exponential growth rate of computing power. Over the past 30 years, Moore's Law has been found to be remarkably accurate. For instance, the number of transistors on a single chip increased from 2,300 on the 4004 chip developed in 1971 to 42 million on the Pentium IV processor developed in 2000 (Hamilton 2001). Moore (2001) is confident that his law 'will be true for another 20 years'. A corollary of Moore's Law is that the cost of computing declines by about 35% every year (Palem 2001). Likewise, Gilder's law predicts that communications power doubles every six-months due to advances in fibre optic network technologies (Gilder 2000). From the late 1970s to the late 1990s, computing power per dollar invested increased by a factor of 10,000 and the cost of voice transmission fell by a factor of 10,000 (World Bank 1999). The amount of data that can be sent over a single cable in 2001 is more than that sent over the entire Internet in 1997 (Gilder 2000). Faster computing and transmission at lower cost have increased the relative advantage of Internet use accelerating its diffusion.

In addition, the developments of user-friendly software and interfaces have reduced the complexity of computer and Internet use. Such developments have reduced consumer learning requirements (Gatignon and Robertson 1985) for Internet adoption and made the Internet more compatible with people lacking language and computer skills. For instance, Encore Software, a company based in India, has designed a handheld Internet appliance, Simputer, based on the Linux open source operating system (UNDP 2001b). The first version of the Simputer, which costs less than US\$ 200, will provide Internet and email access in local languages and microbanking applications. Speech recognition and text-to-speech software for illiterate users are also being developed. Likewise, Internet users now can choose domain names and email addresses with special letters, accents, and marks in several language (Nua Internet Surveys 2001). As of April 2001, websites could be registered in 350 different languages.

Technological development has also reduced the perceived risk and increased trust in online transaction. For

instance, digital computing makes it possible to use mathematical algorithms for data encryption. Similarly, a number of electronic payment systems that use cryptography to create a unique electronic representation redeemable for payment are in various stages of development. In addition, new technologies such as biometrics for identification are bringing radical changes.

### ***Competition and Globalization***

The rate of diffusion of a new technology is positively related to the level of competitive activity (Hirschman 1980; Gatignon and Robertson 1985; Olshavsky 1980). Porter (1996) identifies four types of forces that influence competition: new entrants, substitute products or services, suppliers, and customers. Ghosh (1998) provides several examples of US companies that adopted e-commerce because of competitive pressures.

With the failure of the Marxist dependency model of the 1960s and subsequent collapse of the command economy and the emergence of a truly global free market economy (Malik 1997), a company is likely to experience competitive pressure from every corner of the globe. To fully exploit the benefits of free trade, developing as well as developed countries are significantly cutting tariff and non-tariff barriers to imports and exports. For instance, tariffs on industrial products in developed countries fell steeply from about 50% in 1948 to close to 4% in 1999 (WTO 1999). As a result world trade is growing much faster than world GDP and multiple revolutions in information and communications technologies (ICT) are fuelling the rapid growth creating a virtuous circle.

One implication of rapid globalization is that Porter's forces need to be examined at the global level, not merely at the national level. Anecdotal evidence also suggests this. For instance, more than five years ago a study found that some organizations from developed countries accepted new suppliers only if they can demonstrate an electronic data interchange (EDI) capability (Schware and Kimberley 1995). The study points out cases of companies 'who have gone out of business because of inability, or unwillingness to comply or disbelief in the need to comply' (p 19). Similarly, American multinationals such as Wal-Mart and JC Penney require their foreign suppliers to transact on the Internet. The suppliers, mainly from developing Asian countries, are adopting the Internet sooner rather than later because of such pressure (Woodall 2000).

### **FACTORS INFLUENCING THE DISTRIBUTION AND FORMS OF GLOBAL E-COMMERCE**

All countries are not likely to benefit equally from the virtuous circle of Internet diffusion created by globalization and multiple revolutions in ICTs. Forces influencing the distribution of global e-commerce and its forms include economic factors, political factors, cultural factors and supranational institutions. Economic factors mainly influence perceived relative advantage of Internet use whereas political and cultural factors influence the compatibility of the Internet with a society. Supranational institutions' initiatives are influencing the price, quality and availability of ICT products and services, mainly in developing countries, thereby increasing relative advantage of Internet use. Moreover international institutions are influencing laws, regulations and policies in developing countries making them more compatible with Internet use. The influences of these factors on Internet adoption in general and the three phases of online transaction – advertising and searching phase, payment phase and delivery phase – are presented in Table 1.

### ***Economic and Infrastructure Related Factors***

Economic factors such as income; availability and price structures of ICT products; bandwidth and supporting infrastructures; and availability of credit influence relative advantages of Internet and e-commerce. Whereas the cost of a PC is 5% of per capita GDP in high-income countries, it is as high as 289% in low-income countries (ITU 2001). For example, in January 2001, the cheapest Pentium III computer cost US\$ 700 (UNDP 2001b), which is much higher than the average per capita GDP of most developing countries. Likewise monthly Internet access charge as a proportion of per capita GDP in the world varies from 1.2% in the US to 118% in Sierra Leone (ITU 2001). Even if consumers are willing to pay, existing telecommunications networks in many developing countries are insufficient to meet the demand. For example, 43 million people were on registered waiting lists for telephone connection in developing countries in 1996 (ITU 1997) with average waiting periods longer than 10 years in Russia and Moldavia (The Economist 1999).

Credit cards systems and other infrastructures needed for handling online transactions are not well developed outside the US. A merchant cannot verify the address of a credit card holder in Europe. Other supporting infrastructures required for the proper functioning of e-commerce are found to be insufficient even in the US (Kasarda and Rondinelli 1998) in spite of the huge infrastructures created by direct sales and catalogue businesses. Infrastructures taken for granted in the US are unavailable in other countries. For instance, there is no central package tracking system in Europe. Similarly, in Sweden and in the rural areas of Australia, home delivery may not be available.

Available bandwidths are also very low in developing countries. For instance, 50% of the worldwide bandwidth capacity is in the US and Canada whereas the Middle East and Africa account for only 3% of the total worldwide bandwidth ([Frontline.net](http://Frontline.net) 2001). Lower bandwidth means longer time for data transfer and hence low relative advantage of Internet use. Due to the lack of intraregional infrastructures in developing nations of Asia, Africa and Latin America, even Internet communications with neighbouring countries have to be routed through the US or other industrialized countries in Europe. Moreover, ISPs in these countries have to pay for the full cost of leased lines to Internet backbones in the US, which increases the costs of providing Internet services (Petrazzini and Kibati 1999).

Table 1. Factors Influencing the Distribution and Forms of Global E-commerce

Stage	Economic and Infra-structure-related Factors	Sociocultural Factors	Political and Legal Factors	Supranational Institutions
Internet adoption	Per capita GDP	Literacy rate and computer skill	The Internet 's democratic nature incompatible with authoritarian political structures	UNDP – introduction of the Internet in many countries.
	Availability of telephone and computer	English language skill		GATS – competition in telecom sectors
	Pricing structure	Viewed as a tool of cultural imperialism in some societies.	Tariff and non-tariff barriers to ICT products	ITA – reducing the price of ICT products
	Contribution of ICT to total GDP		Monopoly in telecom sector in some countries	ITU – global standard, EC-DC programme
	Total bandwidth available	Preference for face to face communications	Ban on culturally objectionable materials	World Bank – InfoDev
		UNCTAD – GTPN		
Buying/ selling online (general)	Availability of credit	Intellectual property protection		Redress mechanisms in case of problems in online transaction
	Financial infrastructure	Preference for touch and feel	Existence of DES laws	WIPO treaty
	Means used to access the Internet			ICC's self-regulatory products
Advertising and searching phase	Operating speed of computer and modem size	Influence of language and symbols used on site visited and purchase decision	Ban on some websites in authoritarian regimes	OECD action plans Products can be advertised and searched globally on GTPN of UNCTAD.
Payment phase	Penetration rate of credit cards	Forms of payment: check, wire transfer, cash on delivery, etc.	Governments' concern on the outflow of foreign currency	UNCTAD smart card
Delivery phase	Delivery means and infrastructure	Products stolen in some countries	Tariff/non-tariff barriers	Electronic delivery free of customs duties in WTO members
			Regulation in delivery	

Finally, economic and infrastructure related factors influence the means used to access the Internet. For instance, a paging network is gaining popularity in China because of the higher costs of computer and Internet access ([Ebusinessforum.com](http://Ebusinessforum.com) 2000). In Japan, the popularity of NTT DoCoMo's I-mode services and government's effort to lower mobile data rates fuelled the growth of mobile Internet (Stout 2001). Likewise, broadband has been the major force driving rapid Internet diffusion in South Korea.

### Cultural Factors

The Internet's degree of compatibility with the values and norms of a social system (Rogers 1983) determines its diffusion in the system, purpose of its use, site visited, purchase decision, and also type of the product likely

to be bought and sold. It is, thus, necessary to examine the 'values' and 'culture' inherent in the Internet to predict the degree of acceptance or rejection of the Internet and e-commerce in a society. One of the components of the value system is related to skills required to use the Internet. Literacy and computer skills are the prerequisites to Internet use. Large proportions of the population in developing countries are illiterate and still higher proportions lack computer skills. Moreover, the Internet and e-commerce favour English-speaking populations as the bulk of the software and interfaces used in the Internet are in the English language. Also, a large proportion of the WWW content is in the English language. For instance, a survey of 2.5 million Web pages in 1998 found that about 85% of the texts on the WWW were in English (Nunberg 2000), which decreased to about 80% in 1999 (Nua Internet Surveys 1999).

The Internet's asynchronous and relatively impersonal nature of communication makes it incompatible with cultures of some societies. For instance, Japan's custom requires personal correspondence to be handwritten to show respect and courtesy (James 1998), which is incompatible with Internet use. Likewise people in some cultures prefer to touch and feel the product before buying it.

Another component of the Internet's value system is related to its origination and origination of the content on the WWW. The Internet originated in the US and most of the content on the WWW originates in western countries. Many people in the east do not trust the integrity of information that originates in the west and tend to view its pervasive use of English as a vehicle for executing an electronic 'Pax Americana' (Shabazz 1999).

Cultural factors also influence the websites visited, purchase decision, payment mechanism and the type of the product likely to be successful on the Internet. A study by Forrester Research found that visitors are twice more likely to stay at a website written in their native languages and business users are three times more likely to buy on the Internet when addressed in their languages (Peek 2000; Silberstein 2000). A survey of Chinese Internet users indicated that about 78% view Chinese language information (CNNIC 2001). Similarly, a large proportion of e-commerce takes place on a cash on delivery basis in Asian countries since 35 to 40% of business transactions are conducted on a cash basis in these countries compared to 3% in the US (Biederman 2000). Moreover, many Asian countries do not believe in the private ownership of ideas and hence lack intellectual property protection laws (Mittelstaedt and Mittelstaedt 1997). The proportions of pirated software in Asian countries are found to be as high as 99% in Vietnam, 96% in China and Indonesia (Marron and Steel 2000) and 97% in Thailand (Thurow 1997). Products like online music and software are not likely to be profitable in these countries since they are available almost free.

### *Political and Legal Factors*

Internet adoption in some countries is hampered by such factors as authoritarian governments' concern about the free flow of information on the Internet; tariff and non-tariff barriers to ICT products; regulation in telecom and courier markets; absence of appropriate e-commerce laws; and concern about the outflow of foreign currency.

The Internet, 'the greatest democratizer the world has ever seen' (Pitroda 1993: 66), is incompatible with authoritarian regimes. Threatened by the free flow of information on the Internet, authoritarian regimes such as those of Malaysia, China, Singapore, Syria and Cuba have opted for several mechanisms to control the Internet. Authoritarian regimes are also slow to enact laws to recognize digital and electronic signatures (DES). Encryption software, which is an essential component of DES, allows messages to be sent confidentially, making it difficult, even impossible, for the governments to detect politically and culturally objectionable content transmitted on the Internet (Kshetri and Dholakia 2001). Not only authoritarian, but also many democratic governments lack DES laws. By the end of 2000, only about 45 nations in the world had laws recognizing DES (Stephens 2001). Lack of DES laws is hampering online transactions in many countries.

Tariff and non-tariff barriers and regulations in telecom and courier markets are hindering e-commerce development in some markets. Many developing countries treat ICT products as luxury items and impose import duty, surtax, value added tax, sales tax, etc. making these products expensive and unobtainable (UNCTAD 2000b).

Non-tariff barriers related to handling requirement, environmental constraints, pre-shipment inspections, quotas, etc. create obstacles to international e-commerce in developing countries. Governments' concern about the outflow of foreign currency has been another obstacle for international e-commerce growth in some countries such as China and Malaysia. These barriers are compounded by monopoly in telecom and courier markets. In China, for example, when FedEx, UPS, TNT and DHL first entered, they were all required to work with the same Chinese company, Sinotrans, as the exclusive agent (Yan 1998).

### *Supranational Institutions*

International institutions are influencing the locus of global e-commerce in several ways. First, they introduced the Internet for the first time in many developing countries. The developing countries lack market and infrastructures that control the availability (Brown et al. 1976) of the Internet and thus multinationals are likely to enter much later in developing countries. International institutions such as the UN are breaking this 'hierarchical pattern' (Gatignon and Robertson 1985: 858) of Internet diffusion. The UN Development Program (UNDP) introduced the Internet in more than 15 countries by connecting them to the global network and deployed the Internet protocol (IP) network in more than 40 countries (UNDP 2001a). By early 2001, the UNDP also trained over 25,000 organizations and created more than 40,000 websites for governments and civil society stakeholders and 3,000 national and regional thematic networks (UNDP 2001a).

Second, international institutions are influencing national governments to increase the level of competitive activities. This has resulted in the availability of high quality ICT products and services at low prices. For instance, 60 developing countries made World Trade Organization (WTO) commitments to introduce competition in fixed local voice telephony and leased line services for ISPs and agreed to open Foreign Direct Investment (FDI) in public switch telephone networks. Likewise, 13 developing countries signed the Information Technology Agreements (ITA) under the WTO to eliminate customs duties on seven broad categories of products including computer hardware, computer software and telecom conductor, and switching equipment. Most of the countries have shown full or partial success (Bhatnagar 1999). WTO members have also agreed not to impose customs duties on electronic transmissions (WTO 1999). Also, the World Bank provides funding and training under the Information for Development (InfoDev) programme, which aims to show governments and decision makers the economic impact of ICTs (Roy 1997).

Third, international institutions are facilitating Internet adoption by SMEs, which otherwise are less likely to adopt the Internet. Past research has found that economic factors such as profitability and investment and skill-related factors impact negatively on SMEs' technology adoption (eg, Ein-Dor and Segev 1978; Mansfield 1961). The United Nations Conference on Trade and Development (UNCTAD) launched the Global Trade Point Network (GTPN) in 1992 with an objective to facilitate SMEs' access to international markets using e-commerce technologies. As of 2000, its electronic trading opportunity (ETO) system connected more than 20,000 trade organizations worldwide. Through the trade points, SMEs can get access to the latest ICTs, which enables them to get their products known to potential customers and find business partners. UNCTAD smart cards facilitate payment flow. Likewise, ITU launched the E-Commerce for Developing Countries (EC-DC) programme in 1998. Thanks to such programmes, SMEs in developing countries such as Bangladesh, China, Mexico, Pakistan, Russia, South Africa, and Thailand have already sold several products online using secured payment systems (UNCTAD 2000a).

Fourth, international institutions influence national laws, regulations and policies, making them more conducive to e-commerce. The UN Commission on International Trade Law (UNCITRAL) undertook major work leading to the adoption of the Model Law on E-Commerce. Many countries, such as Singapore, India and Malaysia, enacted new e-commerce laws by taking UNICITRAL modal law as the guideline. Similarly, the World Intellectual Property Organization (WIPO) member states approved the establishment of WIPOnet, which provides basic, secure Internet connectivity and services to the intellectual property offices. In addition, WIPO Copyright Treaty (1996) and WIPO Performances and Phonograms Treaty (1996) established rules relating to issues of copyright raised by digital technology. Likewise, the International Chamber of Commerce (ICC) developed model contract for privacy and transborder data flows, a model electronic sales contract, dispute

resolution for e-commerce, etc. In the similar manner, the Organization for Economic Cooperation and Development (OECD) has developed an action plan to address issues related to authentication, certification, consumer protection and privacy in an online environment. OECD countries also agreed not to impose discriminatory tax treatment on e-commerce.

## CONCLUSION

An important contribution of this paper is to identify and synthesize the available evidence on predictors of magnitude, global distribution and forms of e-commerce. The analysis indicates that the twin forces of globalization and multiple revolutions in ICT are fuelling the growth of global e-commerce. On the other hand, economic and infrastructure-related factors, cultural factors, political and legal factors and the activities of supranational institutions determine the proportion of the global e-commerce a country is likely to receive and the forms in which it is implemented. The success of a company is a function of its ability to understand how various environmental factors influence the optimum combination of fixed and mobile telecommunications networks in a country; appropriateness of a product to be sold online; website design; payment mechanism; delivery means; etc.

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