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**Environment and Policy Factors Shaping Global E-Commerce Diffusion:
A Cross-Country Comparison¹**

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Abstract

This article examines the key global, environmental and policy factors that act as determinants of e-commerce diffusion. It is based on systematic comparison of case studies from 10 countries—Brazil, China, Denmark, France, Germany, Mexico, Japan, Singapore, Taiwan, and the United States. It finds that B2B e-commerce seems to be driven by global forces, whereas B2C seems to be more of a local phenomenon. A preliminary explanation for this difference is that B2B is driven by global competition and MNCs that “push” e-commerce to their global suppliers, customers and subsidiaries. This in turn creates pressures on local companies to adopt e-commerce to stay competitive. In contrast, B2C is “pulled” by consumer markets, which are mainly local and therefore divergent. While all consumers desire convenience and low prices, consumer preferences and values, national culture, and distribution systems differ markedly across countries and define differences in local consumer markets. These findings support the transformation perspective about globalization and its impacts.

In terms of policy, the case studies suggest that enabling policies such as trade and telecommunications liberalization are likely to have the biggest impact on e-commerce, by making ICT and Internet access more affordable to firms and consumers, and increasing pressure on firms to adopt e-commerce to compete. Specific e-commerce legislation appears not to have as big an impact, although inadequate protection for both buyers and sellers in some countries suggests that mechanisms need to be developed to ensure greater confidence in doing business on-line.

Introduction

One of the most significant economic trends of the past decade is the growing use of the Internet for conducting business. Many firms are being driven toward greater adoption of e-commerce by pressure to compete at the global level. In turn, the Internet and e-commerce are important vehicles propelling the process of globalization.

Globalization is generally regarded as the increasing interconnectedness of the world through flows of information, capital and people facilitated by trade and political openness as well as information technology (IT)². Beyond this, however, the nature and impacts of globalization are highly contested (Held et al., 1999). Convergence theorists regard globalization as a universal process of homogenization in which countries tend toward a common way of producing and organizing economic life with resulting common social outcomes (Bell, 1973; Ohmae, 1990, 1995). Divergence theorists argue that national diversity in the pursuit of differing social and economic outcomes will prevail and prevent convergence from taking place (Berger & Dore, 1996; Boyer, 1996; Hirst & Thompson, 1996; Wade, 1996). Transformation theorists regard globalization as an uneven process involving elements of both convergence and divergence, in which countries around the world are experiencing a process of profound change as they try to adapt to a more interconnected but uncertain world (Giddens, 1991, 1999).³

Globalization is being intensified by the spread of the Internet, linking businesses and individuals around the world into a common electronic network. There is great excitement about the Internet's potential for removing geographical obstacles to economic growth and for achieving global integration in developing as well as in industrialized countries. On the other hand, there is concern in many countries that the Internet will be a tool of Western (especially U.S.) economic and cultural hegemony, a long-held fear of many opponents of globalization. A related concern is that uneven diffusion of e-commerce and the Internet is creating a "digital divide" and exacerbating the gap between rich and poor countries.

Therefore, we are interested broadly in understanding the extent to which the Internet and e-commerce are diffusing among different countries, and the nature of their impacts vis-à-vis the globalization debate. However, in this paper, we focus more narrowly on identifying the key factors shaping e-commerce diffusion. Our analysis is based on systematic comparison of case studies in 10 countries. We find that global forces such as competition and global production networks are common influences across different countries. However, country responses to these global forces are varied and uneven due to national characteristics such as information infrastructure, business innovation/entrepreneurship and consumer preferences, and national policies that create different market and telecommunications regimes—variously driving, facilitating or inhibiting adoption (Boyer, 1996; Wade, 1996; Dedrick & Kraemer, 1998).

Conceptual Framework

This paper examines the key global, environmental and policy factors that act as determinants of e-commerce diffusion. We conceptualize determinants as drivers or enablers and barriers or inhibitors. Drivers propel e-commerce growth whereas enablers facilitate growth. Barriers prevent or limit growth whereas inhibitors slow growth. We define e-commerce as use of the Internet to buy, sell or support products and services. Our definition of e-commerce is not limited to financial transactions (buying and selling) but includes other activities such as information exchange, marketing, and pre and post sales support. Also, our definition of e-commerce is limited to Internet-based e-commerce; it does not extend to non-Internet forms of electronic data interchange (EDI).⁴ In addition, we distinguish between business-to-business (B2B) and business-to-consumer (B2C) e-commerce. B2B factors affect the extent to which businesses are motivated and able to conduct e-commerce with trading partners, while B2C factors affect the ability and motivation of both businesses and consumers to participate in B2C e-commerce.

Our framework posits that the *adoption of e-commerce* is driven by forces in the *global environment* that are intermediated by *national environmental* and *national policy factors* (Figure 1). At the *global environment* level, processes such as globalization of production and markets, multinational corporation (MNC) strategies, open trade regimes and global competition more broadly are driving all countries and industry sectors towards the adoption of e-commerce. At the national level, we look at two types of factors that influence e-commerce adoption. The first is the *national environment*, including a country's demographics, economic and financial resources, information infrastructure, industry structure and competition, organizational environment, and social and cultural factors such as consumer preferences. The second is *national policy*, including liberalization of telecommunications and IT markets, government promotion initiatives for e-commerce and IT in general, and e-commerce legislation.

{Insert Figure 1 about here}

This paper addresses the following research questions: What global and national environment and policy forces affect the adoption of e-commerce across countries? Which factors are drivers or enablers and which barriers or inhibitors; and how do they influence B2B and B2C e-commerce adoption? Definitive answers to these questions are not yet available. E-commerce is still in its infancy, as indicated by the fact that e-commerce sales are low, comprising less than 2% of the GDP of each country,⁵ with B2B accounting for 80% of sales and B2C for the rest. Consequently, in this paper we seek to understand which factors are having an impact at this early stage of e-

commerce diffusion as well as whether these factors reflect processes of global convergence or divergence in e-commerce development.

Methodology

Our approach is grounded in empirical research and analysis about the ongoing and foreseeable influence of various factors on e-commerce diffusion. We posited a conceptual framework of key factors expected to be related to e-commerce adoption based on prior literature and research. We commissioned detailed case studies by scholars and experts in 10 countries to explore which factors in the framework appear to be playing a role at this early stage of e-commerce in each country. We systematically compared the results of these case studies across the countries on each of the factors in the conceptual framework. In the process, we found that some factors were important influences on adoption across countries and some were not. We identified commonalities and differences among the countries, determined which factors were barriers and drivers to e-commerce, and assessed whether these findings pointed to convergence or divergence in the factors shaping diffusion and, ultimately, suggested convergence or divergence in e-commerce outcomes. This paper presents the results from this cross-case analysis. Several of the cases on which this analysis is based are included in this special issue.

The 10 countries in the study -- Brazil, China, Denmark, France, Germany, Mexico, Japan, Singapore, Taiwan, and the United States⁶-- were selected to include developed, newly industrializing and developing nations, and to represent each major region of the world. Two types of data related to the countries are discussed in the paper: (1) qualitative data, or findings, from the in-depth case studies prepared by scholars and experts in each country and (2) statistical data compiled from the cases and secondary sources (IDC, ITU, UNDP, OECD) that enable cross-country comparison.

Determinants of E-commerce Diffusion

We start from the premise that wealth, as measured by GDP per capita, is a key determinant of e-commerce diffusion rates across countries. It is generally the case that new technologies are adopted first and most intensively by richer countries, which have the financial resources to invest in these technologies, the human resources and infrastructure to support their use, and higher wage rates that make it worthwhile to introduce labor-saving technologies (Caselli and Coleman, 2001; Shih et al., 2002).

This premise is supported for e-commerce by data from 33 countries, which show that GDP per capita is highly correlated with e-commerce sales as a percent of GDP, explaining more than half of the variance in e-

commerce sales (IDC, 2000; ITU 2001). Figure 2 illustrates this relationship between e-commerce sales as percent of GDP and GDP per capita, with our 10 countries of focus in bold. The U.S. and Japan stand out as leaders in both e-commerce and GDP per capita. China, Brazil, and Mexico are lagging behind, while the other five countries fall somewhere in the middle. Furthermore, some countries such as Singapore, Taiwan, the U.S., and Japan fall “above” the line, meaning that their e-commerce sales are higher than would be expected based on GDP alone. Other countries, namely, Denmark and France, fall “below” the line, meaning that their e-commerce sales are lower than would be predicted by the country’s wealth.⁷

{Insert Figure 2 about here}

These data suggest that wealth alone does not provide a complete explanation of national differences in e-commerce adoption. Instead, other factors play an important role in e-commerce development, and it might be that GDP per capita is a surrogate for some of these as well as being a factor in its own right.⁸ The initial findings from the cross-case analysis suggest that other factors do have an important impact on e-commerce adoption, especially factors of the global environment and national environment, and to a lesser extent, national policy.

Global Environment

Several global trends have been identified in the cases as common factors creating pressure for e-commerce adoption by all countries. These focus on forces that promote stronger economic linkages across countries, including the rise of global production networks, the increased influence of multinational corporations, the creation of open trade regimes and increasing levels of global competition faced by firms in all countries.

Global Production Networks

Production networks in industries such as automobiles, electronics and textiles are being extended across national borders to become increasingly global. Participation in global production networks is an important driver of e-commerce diffusion, as these networks rely heavily on IT and e-commerce for coordination. Some countries have domestic firms who participate in these global networks as suppliers or subcontractors (e.g., Taiwan) or as bases for subsidiaries of multinational corporations (e.g., Singapore), while others are coordinators of such networks (e.g., the U.S. and Japan). Although the roles differ, the integration of countries into global production networks often involves the adoption of B2B e-commerce by firms in these countries as a condition for participating in such networks.

MNCs

Multinational corporations (MNCs) drive the process of e-commerce diffusion across global supply chains. MNCs are mentioned specifically as drivers of e-commerce in all of the country cases except Denmark. MNCs bring global competition to local markets and provide links to global production networks, as well as transferring technology and knowledge to local firms on how to conduct e-commerce.

Open Trade Regimes

Openness to external trade and investment is expected to enable e-commerce diffusion because openness brings foreign investment, MNCs bring IT-based business practices and IT systems, and local firms adopt these practices and systems to participate and/or compete with the MNCs (Shih et al., 2002). Pressures to liberalize or deregulate national markets are driven by transnational organizations such as the WTO and OECD, as well as regional associations such as the EU and NAFTA⁹. The case studies indicate that countries with a greater degree of trade openness and liberalization, such as Singapore and the U.S., are characterized by greater e-commerce diffusion.

Global Competition

Global competition is perhaps the most significant force driving e-commerce development across countries. A country's integration in global production networks, the presence of MNCs, and the extent of trade liberalization are all factors that increase the level of global competition and therefore the pressure for countries to adopt e-commerce as a means of reducing costs and/or expanding markets.

In summary, global factors by definition potentially influence adoption in all countries. However, they appear to have more prominence in shaping e-commerce diffusion in countries that are part of open trade regimes, have a high proportion of MNCs, have more firms that are part of global production networks and have more firms engaged in global competition. While these factors represent global pressures for countries to adopt e-commerce, their influence will depend upon characteristics of each country. Some countries such as Singapore, which has historically been an entrepot in East Asia, are more trade-oriented, and therefore more open MNC-friendly and part of global networks. Others such as Mexico, which is a supplier to global MNCs, are heavily engaged in production networks by virtue of trade liberalization and location adjacent to a very large market. China, on the other hand, has enormous market potential and trade regimes which require MNCs to set up production to access their markets.

Germany and the U.S., which have high wages, face competitive pressure to reduce labor costs. Despite these differences, the global environment is a force shaping e-commerce towards convergence.

National Environment

The national environment, which is one of the key features of the selection environment of firms and consumers that affect innovation outcomes (Downs & Mohr, 1976; Nelson & Winter, 1975; Perry & Kraemer, 1979; Nelson, 1993), includes a country's demographics, economic and financial resources, information infrastructure, industry structure, organizational environment, and consumer preferences. The case studies suggest these factors that are mainly enablers of e-commerce adoption.

Demographic Factors

Country demographics are likely to act as enablers or inhibitors for e-commerce development, as they relate to market size and concentration, consumer needs and ease of access to technology. The case studies show that densely populated nations, such as Singapore and Germany enjoy strong IT infrastructures, whereas large countries with low population density, such as China and Brazil, suffer from underdeveloped infrastructures, plus distribution and delivery problems. Urban density may enable wired cities; however, high density may also lead to strong traditional retail networks that compete with on-line purchasing, as in the case of France and Taiwan. Overall, the cases indicate that larger, wealthier countries such as the U.S., Germany and Japan seem to be most favorable to both e-commerce supply and demand.

The presence of an IT labor force emerges from the case studies as another enabling condition for e-commerce, in that it provides needed skills for IT production and use. For example, China has a large IT workforce whereas countries such as Singapore and Germany import IT workers. Taiwan and Denmark restrict immigration that could supplement their small domestic IT workforces.

General IT literacy enables access to both B2C and B2B e-commerce, and is influenced by demographic factors such as income, education, age, and gender. The cases show that IT literacy is higher among the highly educated across countries, and it is highest among the younger generation as well. The U.S. has an equal gender distribution on Internet use, whereas use is heavily male-dominated in the other countries.

Evidence from the case studies further indicates that the distribution of wealth is a major barrier or limit to IT usage. In Brazil and Mexico, where income is unevenly distributed, a large percentage of the population is cut off from PC and Internet access due to their inability to afford such technologies. A more equal distribution of wealth,

such as in Japan, Germany, France, and Taiwan, is conducive to e-commerce in that a greater proportion of the population is able to participate in e-commerce through access to IT. While the ratio of the richest 20% to the poorest 20% of the population is about 5 to 1 in these countries, in Brazil the richest 20% have 25 times the income of the poorest 20% and in Mexico the ratio is 16 to 1 (Table 1).

{Insert Table 1 about here}

Economic and Financial Resources

Wealth has already been mentioned as a key factor enabling e-commerce adoption as it determines consumer purchasing power. In terms of GDP per capita, the U.S. and Japan form the highest tier of wealth, followed by other developed European countries (Denmark, Germany, and France) and newly industrializing Asian countries (Singapore and Taiwan). Large developing countries (China, Brazil, and Mexico) form the bottom tier (Table 2). In terms of total GDP, the U.S. economy is nearly as large as the other nine combined, followed by Japan, Germany, France and China. The remaining countries have much smaller economies with limited ability to support e-commerce through domestic markets alone.

{Insert Table 2 about here}

The availability of financial resources such as venture capital to support on-line businesses and start-ups is another enabler of e-commerce across countries. Such support through venture capital is more widely available in the U.S., Denmark, Germany, Singapore, Taiwan, and Brazil.

The availability of on-line payment methods is also an enabler e-commerce. Credit cards are used sparingly, despite availability of credit cards in most of the countries, due to a low level of usage in general (in countries other than the U.S.) as well as a lack of trust of giving out credit card numbers on-line. Debit cards are more commonly used in Europe. In Asian countries stored-value cards are used as well as wireless payment, money orders, bank transfers, and COD. In Taiwan and Japan hybrid methods are popular such as ordering goods on-line and picking them up and paying for them through convenience stores. At this point, most on-line purchases are not paid for on-line, except in the U.S.

Information Infrastructure

A widely available and affordable information infrastructure is another important enabler of e-commerce diffusion, which shows up in both the cases and in cross-country comparative data. Availability includes both the extent of coverage and the range of technologies in use. High penetration of multiple technologies (teledensity, wireless,

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Internet, broadband and PCs) enables e-commerce in that several channels are available for conducting it. ITU data (ITU 2001) indicate that the U.S., Denmark, and Germany have high penetration of all of these ICT, while China, Brazil, and Mexico are low on all of them. Availability of ICT tends to be higher in wealthy, smaller, densely populated countries such as Japan, Denmark, France, Germany, Singapore, and Taiwan. The U.S. is a notable exception here, having a highly developed infrastructure despite its large size.

Rapid growth in infrastructure might also be an enabler as suggested by trends for teledensity and wireless growth from 1995 to 2000 (Table 3). Telephone fixed lines are relatively stable whereas the wireless phone infrastructure is much more dynamic. Taiwan and Germany have experienced particularly high penetration and rapid wireless growth since 1995 whereas the U.S. has been surpassed and now ranks relatively low on mobile phone penetration. This is likely explained by the high penetration of fixed lines and higher competitiveness of the local and long distance market in the U.S., compared to Europe and Asia, where mobile phones are more affordable and fixed lines less prevalent. Additional reasons for the rapid growth of wireless in Europe and Asia may be the use of a common standard, namely GSM, and the all digital network that allows for integration of additional features such as text messaging.

{Insert Table 3 about here}

The explosion of the Internet is evident across all countries, although rates of diffusion vary (Table 4). Rapid growth has occurred since 1995, especially in Brazil, China, Japan, Mexico and Taiwan. However, Denmark, Japan and the U.S. are the leaders in Internet diffusion with around 35% penetration; Singapore, Germany, and Taiwan follow with just under 30%; and France lags behind with less than 15%. Internet penetration is extremely low in Brazil, Mexico, and China, at less than 5%, although increasing especially in China.

The PC market has experienced steady growth since 1995 (Table 4). The U.S. is the clear leader with close to 60% PC penetration, followed by Singapore and Denmark. Taiwan ranks low on PC use despite its large computer hardware industry. China has the highest growth rate, albeit from a low base. The cost of PC equipment is a significant inhibitor in Brazil and Mexico, where a large portion of the population cannot afford computers.

{Insert Table 4 about here}

The cost of Internet access can be an inhibitor to e-commerce diffusion. High costs of Internet access limit the amount of time consumers use the Web for information or purchases. Countries with metered access such as France, Germany, Denmark and Japan, have had higher costs of access than countries in which users are not charged

by the minute but pay a monthly fee for unlimited access. High access costs in these countries have, however, been reduced over the past few years and rates have become more uniform across countries (Table 5).

{Insert Table 5 about here}

Industry Structure

The country cases show that several features of industry structure are likely to have implications for adoption of e-commerce. In each country, some industries are leaders in e-commerce, while others lag behind. Lead industries common across countries (mentioned by at least half) are finance/banking, distribution (wholesale and retail), IT, electronics manufacturing, and automotive manufacturing (Table 6). Other lead industries are those in which the individual country has a competitive advantage, such as health care, agriculture, and shipping in Denmark, or freight forwarding and publishing in Singapore. Overall, industries driving e-commerce tend to be in sectors that are information-intensive (e.g., finance/banking) and/or internationally competitive (e.g., electronics, automobiles).

{Insert Table 6 about here}

Firm size is another factor identified in the cases. Large domestic firms tend to be leaders in adopting e-commerce, as they possess the IT resources (technology, financial, and human) needed for e-commerce and can leverage e-commerce investments over a large revenue base. Although large firms are often the dominant players in on-line transactions, they make up a small percentage of the labor force in many countries. The dominance of small and medium sized enterprises (SMEs) poses a structural inhibitor to e-commerce, since such firms often lack the financial and human resources for IT. In certain cases, SMEs may have advantages such as being more flexible and innovative and able to adapt to organizational changes required by e-commerce than large firms (mentioned in the Germany and Brazil cases). However, for the most part SMEs are mentioned as an inhibitor to the spread of e-commerce due to their lack of technological expertise and lack of funds to implement e-commerce solutions.

Another characteristic of industry structure that may act as an inhibitor to e-commerce is the existence of strong traditional retail networks, such as in France, Japan, and Taiwan. While such outlets compete with on-line commerce, they might also encourage e-commerce because such retail networks are located in urban areas with concentrated economic activity and high Internet usage and they might adopt “click and mortar” strategies of integrating their physical and virtual infrastructures for competitive advantage. An example is Seven-Eleven’s “7dream.com” service in Japan, which allows customers to place orders on-line and then pick them up and make

payment at a local store. This suggests that e-commerce will be better suited as a complement to, rather than a substitute for, traditional brick and mortar retail outlets.

Organizational Environment

The organizational environment impacts both B2B and B2C e-commerce through several factors.¹⁰ The strongest driver of e-commerce is the near universal desire of businesses to extend their markets, reach new markets, protect existing markets or gain advantage over their competitors. Firms view e-commerce as an additional channel for doing business, as a means of reducing cost, as a vehicle for improving operational performance, and/or as a whole new platform for doing business with great prospects for achieving these gains. The U.S. case in particular illustrates the perceived potential, the complexity of realizing that potential, and the positive prospects that still remain for both dot com and traditional companies.

A related organizational aspect facilitating e-commerce is the existence of an entrepreneurial business culture. The organizational and legal environment in the U.S. and Taiwan, for example, encourages entrepreneurial and innovative business cultures, e.g., by making bankruptcy financially survivable so failed entrepreneurs have another chance to try again without being stigmatized by failure. The lack of entrepreneurial support is evident in Japan, Singapore and Germany. For example, Japanese financial institutions are reluctant to fund entrepreneurial start-ups through venture capital or equity. Cultural factors also shape entrepreneurship. The Chinese saying, "It is better to be the head of a chicken than the tail of an ox," captures its entrepreneurial culture (Dedrick & Kraemer, 1998), while the Japanese proverb "The nail that sticks up gets pounded down" reflects pressure for conformity over entrepreneurship.

The case studies reveal that in many countries corporate culture is an inhibitor to e-commerce and IT more broadly. In Asian countries, such as Taiwan, personal relationships are important in doing business, and anonymous on-line relationships threaten to undermine these established interpersonal networks. In highly unionized countries such as Denmark, e-procurement and automation of public services is perceived as a threat to job security by government and public officials. In most countries organizational readiness for e-commerce is still restricted by high perceived costs of IT, security concerns, and lack of integration of information systems with business partners.

Consumer Preferences

The cases indicate that B2C e-commerce is driven by consumer desires for valuable and useful content, convenience, lifestyle enhancements, and greater product and service selection. While the U.S. case epitomizes

these features, other cases document them among the younger generation (Japan, Singapore, China), and others cite their lack as a major inhibitor to greater diffusion of B2C e-commerce (Brazil, Mexico, Taiwan).

High acceptance of ITs and the Internet is a key enabler of B2C. “Internet fever” has caught on internationally and has generated high hopes and expectations for positive economic and social impacts. But inhibitors similar to those in business culture are evident among consumers as well. Consumers have significant reservations about purchasing on-line, which stems from lack of trust in business practices, privacy/security concerns regarding credit card and other personal information, resistance to using credit cards, and preferences for in-store shopping and inspection of products. These concerns are particularly acute in countries such as China where no legal consumer protection exists and buyers and sellers have no recourse for faulty products or negligent payment. Language is an inhibitor among non-English speaking consumers due to the prevalence of English content on the Web, particularly in Asia where the older generation lacks knowledge of English and Western characters. Beyond language, preferences for local content (even among those who speak English) are evident across countries. As the Web becomes increasingly multilingual and incorporates more local content, consumers are likely to participate more in on-line commerce.

In summary, the list of environmental factors affecting e-commerce diffusion is long, and the cases indicate that these factors have differential influence in the countries. Demographic factors (income, education, IT skills) define the size and characteristics of the potential market for e-commerce and the availability of skills to support e-commerce deployment. Economic and financial factors determine whether there are sufficient resources (venture capital) to invest in e-commerce and mechanisms (payment systems, secure systems) to facilitate it. Industry structure reflects both business demand for e-commerce and the capabilities of firms to engage in it. Firms in more information intensive industries and that operate globally are more likely to have need for e-commerce and large firms are more likely to have the capabilities needed to engage in it. Information infrastructure defines a country’s technical readiness for e-commerce, and the cost of on-line access in particular is a critical determinant in that countries with lower costs are more likely to have wider diffusion and use. Most of these environmental factors reflect path dependencies of a country and can be changed only over the medium to long term. An exception is the cost of on-line access, which can be changed rapidly by telecommunications liberalization, and explains its critical role in e-commerce diffusion.

However, “access” is not “use.” Use is dependent on organizational environments and consumer preferences, which is why these factors are the key environmental determinants. Organizational environments reflect firms’ desires to expand their markets and gain competitive advantage, which motivate both B2B and B2C e-commerce. Firms that are more competitive and entrepreneurial are more likely to adopt e-commerce with suppliers and business partners, innovate with new e-commerce business models to expand their markets, and push competitors in their industry towards adoption (as Wal-Mart, eBay, Amazon and Dell Computer have done in their respective industries in the U.S.). Thus, innovation and entrepreneurship stimulate interfirm, interindustry, and ultimately intercountry competition. Some countries such as the U.S. and, in some industries, Japan, are known as innovators, whereas others, such as Germany and Taiwan, are mostly fast imitators, and still others lag far behind. These organizational characteristics propel e-commerce forward at different rates.

Whereas business desire for expansion and competitive advantage drive B2B and B2C, consumer preferences mainly drive B2C e-commerce. Consumer preferences determine the demand for products and services offered through e-commerce. The greater the content on-line, particularly in the local language, and the greater it meets real needs and wants of consumers, the more likely they are to go on-line, and buy. Consumer concerns over privacy, security, and other risks of on-line sales can be overcome through strong legal protections, as well as through trust in on-line vendors, or by creating mechanisms for payment and delivery that do not require revealing credit card numbers or personal information.

National Policy

In addition to features of the national environment, national policy shapes technological diffusion and e-commerce diffusion in particular. Key policy factors include liberalization of telecommunications, government promotion of e-commerce and IT more broadly, and specific legislation passed on e-commerce and IT.

Liberalization

Market liberalization enables e-commerce by opening up markets to allow for competition that leads to higher quality products and services and lower prices. Firms in competitive markets are motivated to adopt e-commerce technologies in order to enhance productivity and provide better services. Telecommunications liberalization, in particular, encourages IT and Internet diffusion by making rates more affordable and giving consumers a wider selection of services and options. Liberalization is taking place across all of the countries examined here, although countries have liberalized in different ways and to different degrees.

E-Commerce Promotion

Initiatives to promote e-procurement and e-government have been established in most countries and are direct drivers of e-commerce between governments and with businesses that interact with government as sellers or applicants for services (regulatory approval, permits, licenses). They contribute to total e-commerce revenues; pave the way for private sector e-commerce initiatives, and build-up the e-commerce services industry thereby fueling diffusion.

Government and industry promotion is mainly an enabler of e-commerce. New leaders and governments have been instrumental in mobilizing IT initiatives and promotion: the Clinton/Gore administration in the U.S. strongly pushed the Internet, the term “Fox factor” (after President Vicente Fox) has been coined to describe the Internet fervor in Mexico that has prompted public initiatives such as the eMexico program, and France’s new government elected in 1997 shifted the country to an IT focus that embraced the Internet. Industry associations, especially in the IT industry, also have been strong promoters of e-commerce in countries such as Denmark, Japan, Mexico and the U.S.—sometimes in partnership with government. Government and industry promotion takes various forms from country to country, but the most common areas are promotion of IT and e-commerce in businesses, especially SMEs, by providing them with technical support, training, and funding for IT use.

E-Commerce Legislation

At this point, none of the countries studied have developed comprehensive legislation regarding e-commerce. Countries have focused on different issues, but the key areas have been legislation on digital signatures, privacy, consumer protection, copyright and intellectual property, and content regulation (Table 7). All countries except China have passed laws regarding recognition of digital signatures as legally binding. Country-specific legislation tends to reflect cultural values. For example, France and Germany have passed privacy and consumer protection laws, reflecting an emphasis on individual rights. China and Singapore, on the other hand, have focused on content regulation, reflecting a value on social control. Internet taxation is not an issue in most countries because e-commerce is small, but could be a major enabler or inhibitor in the future. The impact of e-commerce legislation remains to be seen. For example, despite the implementation of legislation in the U.S. recognizing electronic signatures nearly two years ago, e-signatures are not yet catching on (Wolverton, 2002).

{Insert Table 7 about here}

In summary, all of the foregoing national policies were found to have influence in at least some of the country case studies. However, market and telecommunications liberalization seem to be significant enablers because they drive down costs of access and use and increase infrastructure availability. Government legislation and promotion could be important enablers or inhibitors but do not appear to have much role currently. Promotion policies seem to be more important than e-commerce legislation per se, as several country cases noted that e-commerce is taking place without specific legislation. However, many of the cases indicated that trust, privacy, and financial safeguards were inhibitors to consumer engagement with e-commerce, and lack of legislation might be hampering the growth of e-commerce.

Assessment of E-Commerce Determinants

The potential drivers of B2B e-commerce that emerge from this analysis are international competitive pressure elicited by globalization, including pressure to reduce costs, and the desire of businesses to expand their markets. Potential enablers are opening of the economy, market liberalization, and government/industry promotion and investment. International competitive pressure seems to be the strongest driver of e-commerce in most of the countries studied. The globalization of business and competition from MNCs pressures firms to adopt new technology to streamline their processes and expand their markets. Market liberalization and deregulation facilitate the internationalization of businesses through opening the economy to greater foreign as well as domestic competition.

Countries with high wages, such as Germany, Japan and the U.S., face competitive pressure to save money on labor costs. Countries that are highly integrated in global production networks, such as Taiwan and Singapore, face international pressure to adopt B2B e-commerce to maintain their strategic positions in those networks. Government/industry promotion and investment enable B2B e-commerce in countries such as France, Mexico, Denmark and Taiwan. Changes in the style of strong, centralized state intervention in France have enabled market deregulation and greater support for small, innovative firms. Government agencies and business groups in Mexico are enabling e-commerce by promoting the IT industry to businesses and providing technical assistance to SMEs. In Taiwan, government investment in new network-based business models is also enabling B2B e-commerce.

The key inhibitors to B2B e-commerce are business environment and culture, national culture, and political institutions. Organizational readiness to embrace e-commerce is often low due to business cultures that do not support innovation and the use of new technology. Firms are often reluctant to make the requisite changes to their

organizational processes needed for conducting e-commerce. SMEs, in particular, lack the resources and skills needed to adopt e-commerce. For many European countries, cultural resistance to change and innovation is at the root of resistance to B2B e-commerce. German firms are risk averse, being more “imitators” than early adopters of new technologies. Denmark’s e-commerce focus is limited to a national or regional (confined to Northern Europe) rather than global approach. The key inhibitor to B2B e-commerce among mainland Chinese firms is the prevalence of political agendas and short-term goals (due to frequent shifts in power) over long-term business considerations such as investment in an e-commerce infrastructure.

The major drivers of B2C e-commerce that emerge from the analysis are consumer desires for convenience and lifestyle-enhancing products and services (especially among the younger generation) and business desires to reach new markets or protect existing markets. Key enablers are Internet diffusion (high IT literacy and strong IT infrastructure) and government promotion. On-line shopping at night and on the weekend presents a more convenient option in countries such as Germany where shops are closed during these times. The rapid pace of Internet diffusion is also enabling B2C e-commerce, as more people have access and the necessary IT skills to participate. Finally, government has played a role through initiatives aimed at building consumer acceptance of ITs and promoting IT literacy, most notably in Singapore, and more recently in Brazil, Denmark, France and Mexico.

The barriers to B2C are three: lack of valuable and useful content for consumers, inequality in socioeconomic levels and security/privacy concerns. The lack of truly useful content on the Internet, including both products and services, is considered a major impediment to greater use of e-commerce currently in many of the countries. Inequality in socioeconomic levels sets long term limits to the potential size of e-commerce markets and is especially acute in countries such as Brazil and Mexico. Distrust due to security and privacy concerns is a barrier in countries without financial and legal protections. B2C inhibitors include preferences for in-store shopping, the existence of other shopping alternatives and language differences among non-English speakers. Security and privacy concerns pose a significant inhibitor to shopping on-line, even in countries with highly developed IT infrastructures and high disposable incomes, such as the U.S. and Japan. Distrust of on-line purchases is even greater in countries where on-line payment methods (such as credit cards) as well as consumer protection laws are less established (China, Mexico, Taiwan). The existence of efficient and affordable alternatives to Internet-based shopping, such as Minitel in France, and established retail networks in France and Taiwan reduces the incentive for consumers to change their shopping habits to on-line shopping. For countries with a small market size, a lack of local content,

products, and services limits the amount of B2C e-commerce that is possible (Denmark, Singapore, Taiwan). Finally, language differences and difficulties with Western character sets inhibit B2C e-commerce in Asian countries, especially among the older generation (China, Japan, and Taiwan). These factors are summarized in Table 8.

{Insert Table 8 about here}

Findings and Conclusions

We find support for the conceptual framework used in this study in the sense that it captured all of the factors identified as “major” influences in the case studies. Although not all factors were important in all countries, there does not appear to be a major factor that was left out. Thus, we have confirmation that the framework is a useful way of organizing the key factors influencing e-commerce diffusion. The framework needs to be confirmed by more quantitative analyses in the future.

We find that the specific factors shaping B2B and B2C e-commerce vary considerably. For B2B e-commerce, competitive forces are the greatest driver of adoption. Global competition and participation in global production networks create strong pressure to adopt e-commerce. Global competitive pressure is driving greater convergence in business practices through global integration of production networks and supply chains. Countries that are more open to such forces, whether through international trade, trade liberalization, or foreign investment, tend toward higher e-commerce diffusion.

B2C diffusion seems to be less affected by global forces and more affected by variables specific to the national and local environment, such as consumer preferences, retail structure, and local language and cultural factors. We find that consumer preference for valuable content and concerns for security and privacy are the most significant factors. In addition, rather than converging around the world, country preferences for local content, culture, and language differ significantly and shape e-commerce adoption. The existence of dense distribution networks, which can discourage on-line shopping, but also can provide the infrastructure for creative B2C strategies is another local factor. B2C models developed in the U.S. have been transplanted or imitated in many countries, but some of the biggest B2C success stories have been country-specific, such as Japan’s i-mode and Korea’s on-line gaming businesses.

In short, B2B e-commerce seems to be driven by global forces whereas B2C seems to be more of a local phenomenon. A preliminary explanation for this difference is that B2B is driven by MNCs that “push” e-commerce

to their global suppliers, customers and their own subsidiaries. This in turn creates pressures on local companies to adopt e-commerce to stay competitive. In the process, business practices become more standardized across borders. Business education and imitation of best practices reinforce this convergence; as new innovation occurs in theory or practice, firms adopt it rapidly in order to be competitive. It is this continual “push” of innovation and imitation that leads to global convergence in B2B.

In contrast, B2C is “pulled” by consumer markets, which are mainly local and therefore divergent. While all consumers desire convenience and low prices, consumer preferences and values, national culture, and distribution systems differ markedly across countries and define differences in local consumer markets.

This distinction between B2B e-commerce as a global phenomenon and B2C as a local phenomenon has important implications. Theoretically, it gives support to the transformational perspective, which sees globalization as involving elements of both convergence and divergence.

In practical terms, this conclusion suggests that the digital divide between countries may limit the potential value of B2B e-commerce more so than B2C. A country’s position in the global economy is largely dependent on location, labor cost or other endowments, so that the impacts of B2B e-commerce may be limited. Countries such as Singapore, Mexico and Taiwan may enhance or protect their roles in global production networks by adopting B2B e-commerce, but e-commerce by itself will not likely enable outsiders to break into those networks.

However, a country that currently lags in Internet and e-commerce use may still flourish in the area of B2C if it can find ways to provide its citizens with low-cost Internet access and encourage the development of local content. In that event, a digital divide may be turned into be a digital opportunity for local firms who understand local language, customs and culture and are close to the end users so they can discover and produce useful content and services.

In terms of policy, the case studies suggest that enabling policies such as trade and telecoms liberalization are likely to have the biggest impact on e-commerce, by making ICTs and Internet access more affordable to firms and consumers, and increasing pressure on firms to adopt e-commerce to compete. Promotional efforts can also have an impact, especially if carried out in partnership with the private sector. Specific e-commerce legislation appears not to have as big an impact, although concerns in some countries about inadequate protection for both buyers and sellers suggests that mechanisms need to be developed to ensure greater confidence in doing business on-line.

E-Commerce Cross Country Comparison

Although Internet-based e-commerce is still in its infancy, this preliminary research indicates that its diffusion is an uneven process across countries and industries: certain countries and industries are driving the process while others lag behind. Moreover, despite the presence of global forces shaping diffusion, local differences in the factors influencing e-commerce diffusion are evident between countries, suggesting that the diffusion process is indeed shaped by national environments and policy rather than taking a universal trajectory.

These findings imply that future cross-country studies of e-commerce might use the framework and variables found to be important here. They also imply that future studies should focus on modeling and quantitative, empirical testing of the relationships suggested herein.

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² IT includes computers, telecommunications, and management science techniques.

³ These views represent three dominant perspectives about globalization and its impacts. We recognize there are other views as well.

⁴ The definition of e-commerce is a source of contention. Definitional issues are important to resolve as they impact measurement of the amount of e-commerce that is taking place and comparability of data. For example, Western European countries such as France, Germany, and Denmark have an established history of EDI use in the banking, automotive, and shipping industries but have been slower than the U.S. in adopting the Internet for business supply chain integration. Our definition excludes non-Internet-based EDI transactions.

⁵ Japan and the U.S. have the leading positions, with 1.7% and 1.6%, respectively. Singapore follows with 1.2%, and Denmark, Germany, and Taiwan each have about 1%. The level of e-commerce sales in France is lower than would be expected given its wealth, at .6% of its GDP. Mexico, Brazil, and China have a very small base of e-commerce activity, making up less than .5% of the GDP in these countries.

⁶ See Chen (2001), Tigre (2001), Palacios (2001), Brousseau (2001), Andersen and Bjorn-Andersen (2001), Tan and Wu (2002), Koenig et.al. (2002), Tachiki et.al. (2002), Fomin et.al. (2002) and Wong (2001).

⁷ Separate analyses find a similar pattern for B2B e-commerce specifically, but show that wealth alone is less predictive of B2C sales.

⁸ For instance, Shih et al. (2002) study IT spending levels in 43 countries. When other factors such as education, infrastructure, openness to trade, and industry structure are taken into account, GDP per capita is only significant for developed countries, not for developing countries or for the full set of countries.

⁹ WTO is the World Trade Organization; OECD is the Organization for Economic Cooperation and Development; EU is the European Union; and NAFTA is the North American Free Trade Agreement.

¹⁰ In B2B, organizations are both buyers and sellers, while in B2C, organizations are sellers.

FIGURE 1
Conceptual Framework

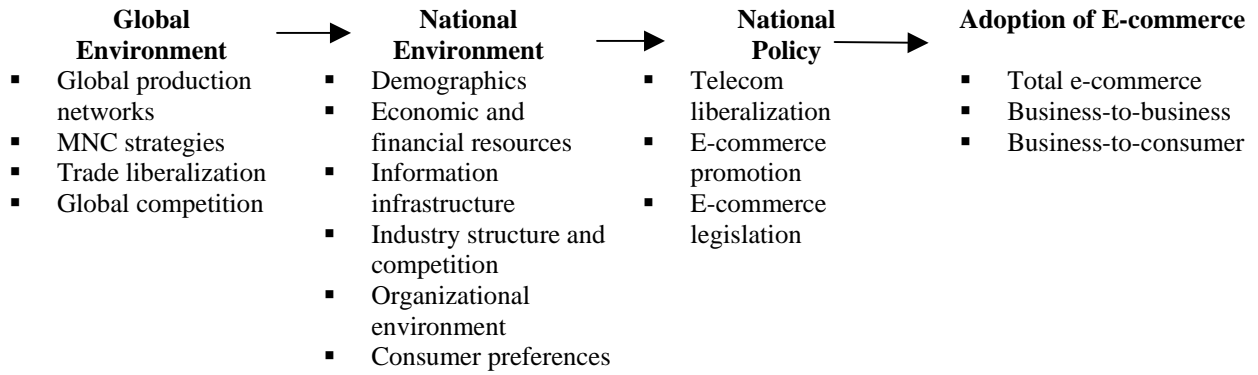
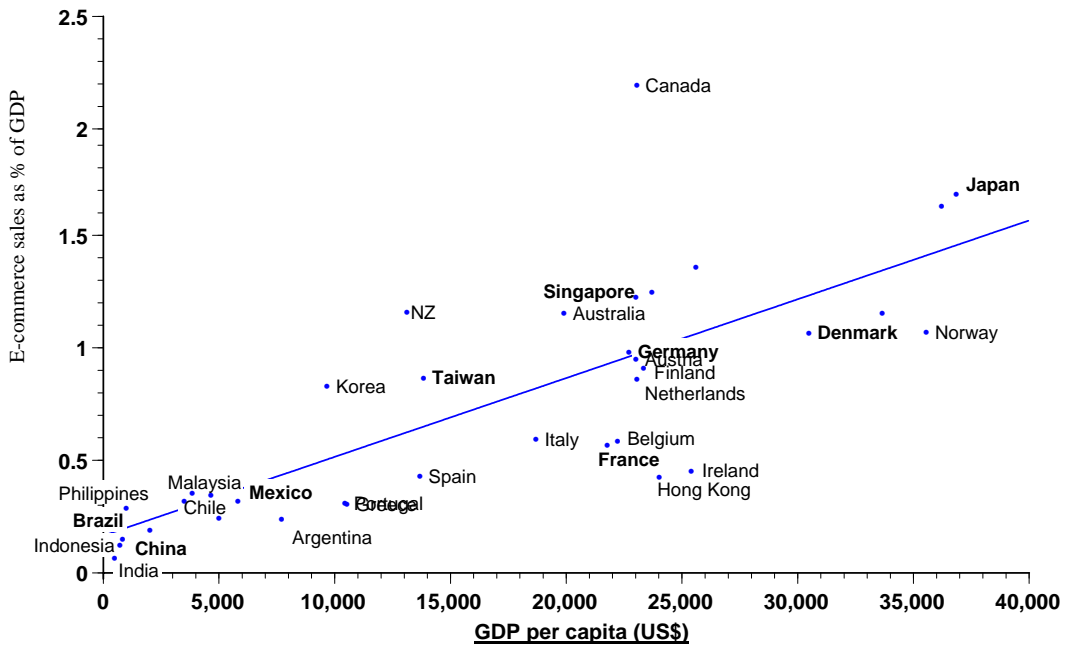


FIGURE 2
E-commerce Sales as % GDP With GDP per Capita, 2000.



Source: IDC 2002, ITU 2001.

E-Commerce Cross Country Comparison

TABLE 1
Income Distribution: Ratio of Richest 20% to Poorest 20%

Country	Ratio Top/Bottom 20% ^a
Brazil	25.5
Mexico	16.2
U.S.	8.9
China	7.9
France	5.6
Taiwan	5.5
Germany	4.7
Denmark	3.6
Japan	3.4
Singapore	N/A

^aUNDP, 2000.

TABLE 2
GDP and GDP per Capita, 2000

Country	GDP ^a (US\$ millions)	GDP per Capita ^a (US\$)
Brazil	595	3500.3
China	1,080	833.6
Denmark	162	30,470.0
France	1,280	21,771.6
Germany	1,866	22,708.9
Japan	4,677	36,851.1
Mexico	574	5807.4
Singapore	92	23,014.7
Taiwan	308	13,831.6
U.S.	9,963	36,210.7

^aTU 2001

E-Commerce Cross Country Comparison

TABLE 3
Telecommunications Infrastructure Trends, 1995-2000

	Telephone Mainlines per 1,000 People ^a			Mobile Subscribers Per 1,000 People ^a		
	1995	2000	% Growth	1995	2000	% Growth
Brazil	85	182	114	8	136	1,552
China	33	111	236	3	66	2,131
Denmark	612	753	23	158	610	287
France	560	580	4	23	494	2,094
Germany	513	601	17	46	586	1,187
Japan	496	585	18	93	526	464
Mexico	94	125	33	7	142	1,839
Singapore	412	484	18	88	684	675
Taiwan	430	568	32	36	803	2,121
U.S.	607	700	15	128	398	210

^aITU, 2001.

TABLE 4
Information Infrastructure Trends, 1995-2000

	Internet Users Per 1,000 People ^a			PCs Per 1,000 People ^a		
	1995	2000	% Growth	1995	2000	% Growth
Brazil	1	29	2,596	17	44	154
China	0	17	34,640	2	16	600
Denmark	38	366	854	271	432	59
France	16	145	780	135	305	126
Germany	18	292	1,493	178	336	88
Japan	16	371	2,229	120	315	162
Mexico	1	27	2,643	26	51	98
Singapore	29	299	936	202	483	139
Taiwan	12	281	2,302	98	225	128
U.S.	76	347	356	328	585	78

^aITU 2001

E-Commerce Cross Country Comparison

TABLE 5
Internet Access for 40 Hours Using Discounted PSTN Rates in US\$ PPP Including VAT

Country	Peak 1999a	Peak 2000a
Denmark	91.53	48.09
France	95.73	59.50
Germany	76.78	50.71
Japan	54.64	49.01
Mexico	60.91	37.40
U.S.	37.30	23.76

^aOECD, 2001. (data not available for non-OECD countries in study)

TABLE 6
Industry Drivers

	France	Denmark	Germany	U.S.	Brazil	Mexico	Japan	China	Singapore	Taiwan
Finance	X	X	X	X	X	X				X
Wholesale/Retail	X	X	X	X	X	X	X			X
IT		X	X	X		X	X	X		X
Electronics Mfg			X	X		X	X	X	X	X
Automotive Mfg	X		X	X	X	X	X			
Health Care		X								
Agriculture		X								
Transportation		X		X					X	
Publishing									X	
Public Services					X	X		X	X	

X = Industry is a major driver of e-commerce in this country.

E-Commerce Cross Country Comparison

TABLE 7
E-Commerce Legislation (laws/amendments)

	France	Denmark	Germany	U.S.	Brazil	Mexico	China	Japan	Singapore	Taiwan
Digital Signatures	X	X	X ^a	X	X	X		X	X	X
Privacy	X		X ^a							X
Consumer Protection	X		X ^a	X		X				
Copyright			X ^a	X					X	X
Content Regulation			X ^a	X ^b			X		X	
Taxation				X					X	

^aEU legislation

^bOverturned by courts

X = Country has *passed* legislation.

TABLE 8
Overall Determinants of E-commerce*

	B2B	B2C
Drivers (D) & Enablers (E)	<ul style="list-style-type: none"> • (D) International competitive pressure due to globalization • (D) Pressure for cost reduction • (D) Government procurement • (E) Opening of economy, market liberalization • (E) Government promotion and investment 	<ul style="list-style-type: none"> • (D) Consumer desire for convenience, lifestyle enhancements, and greater product/service selection, especially among younger generation • (D) Business desire to reach new markets or protect existing markets • (E) Consumer purchasing power • (E) Rapid Internet diffusion: high IT literacy, strong IT infrastructure • (E) Government promotion
Barriers (B) & Inhibitors (I)	<ul style="list-style-type: none"> • (I) Business environment and culture: risk aversion, difficulty changing organizational processes, lack of resources and skills in businesses, especially SMEs • (I) National culture: lack of innovation, slow change, cautious imitator mentality, lack of service mentality • (I) Limited scope of e-commerce, local/regional focus • (I) Education and tax system • (I) Political concerns and instability, short-term focus 	<ul style="list-style-type: none"> • (B) Lack of valuable and useful content for consumers • (B) Inequality in socioeconomic levels • (B) Consumer reluctance to buy on-line & lack of trust due to security/privacy concerns • (I) Consumer reluctance to buy on line due to preferences for in-store shopping • (I) Existence of viable alternatives, e.g., dense retail networks, convenience stores • (I) Lack of on-line payment mechanisms • (I) Lack of customer service • (I) Language differences

*Drivers are conceived of as forces propelling e-commerce growth whereas enabling forces facilitate growth. Barriers prevent or limit growth whereas inhibitors slow growth.