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A Preliminary Study of Electronic Commerce and Its Implications for China

Jie Ding
Department of East Asian Studies
McGill University
Montreal, Canada

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ABSTRACT

Although China is removing barriers to the development of electronic commerce, little systematic research has been undertaken on what strategies it should adopt from the perspective of the government. This exploratory study is founded first upon a working framework of the elements of electronic commerce by reviewing the main literature on the subject, thereby surveying the most advanced experiences and the international regime. Based on comparisons in the selected areas, bottlenecks in the development of electronic commerce in China are identified as the following: the backwardness of the IT infrastructure, a fragmentary payment system, an inadequate delivery system, and an insufficient tax and legal framework. A tentative suggestion is that a strategic alliance be formed between two existing technology and distribution trade networks. More specific suggestions for the Chinese government are to upgrade the IT infrastructure, to integrate the electronic payment system, and to enforce regulations and laws.

RÉSUMÉ

Bien que la Chine élimine les obstacles au développement du commerce électronique, peu d'études systématiques ont été faites sur les stratégies gouvernementales à adopter. Cette étude expérimentale est basée en premier lieu sur les éléments du commerce électronique. Elle passe en revue la littérature principale publiée sur les expériences les plus avancées et le régime international. Sur la base de comparaisons établies sur des zones choisies, on identifie les bouchons suivants dans le développement du commerce électronique en Chine : l'infrastructure IT plus ou moins sousdevelopé, un système de versements fragmentaire, un système de livraison inadéquat et des structures légales et fiscales insuffisantes. Nous suggérons qu'une alliance strategique soit formulée entre les cadres de la technologie et de la distribution commerciale existantes. Plus specifiques sont les suggestions au gouvernement chinois deveiller à amèliorer l'infrastructure IT, à intègrer le système de paiements éléctroniques, et à faire strictement respecter les lois et les règlements.

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CHAPTER 1. INTRODUCTION

Electronic commerce, promoted by the technology innovation in the fields of telecommunication and computer sciences, is expected to transform the way of doing business; it is even changing the current business rules, which have been in place since the industrial revolution. China,[1] a new economy from the perspective that it opened its doors to the world market only about 20 years ago, has shown the world how determined it is to expose itself to the competition of this world market. The latest evidence is that it is trying to adjust itself to get ready for its entrance into the World Trade Organization (WTO). The Chinese economy has developed at a dazzling rate of growth for about 20 years; however, it is now faced with the uncertain impact on its domestic economy of executing the WTO agreements. As well, it is faced with an international market where new business rules are still in formation for the new Internet-based economy. Therefore, how e-commerce come about; what the most advanced experiences so far in this realm are; how China has prepared for e-commerce; and what it needs to do, particularly from the point of view of government administration under the conditions of limited intellectual tools and investment ability—all these are issues for which this paper seeks to find preliminary answers.

[1] Hereinafter, because of the space limitations of this paper, reference to China refers geographically to Mainland China, not greater China, which includes Hong Kong, Macao, and Taiwan.

Prior to elaborating on these issues, I would like to briefly review the main literature on electronic commerce I have employed English and Chinese sources both outside and inside of China.[2]

1.1 Literature Review I: Studies of Electronic Commerce

With the rapid propagation of Internet commercial applications, many new terms have sprung up, and it seems to be the trend to prefix "e" to almost everything, for example, e-auction, e-finance, e-government, e-marketing, e-procurement, and e-retail. However, electronic commerce is not just putting everything online, rather, it is a kind of seamless and secure integration of technology and business. Therefore, there has been more and more research done in this field, from practice to theory, from management perspectives to economic considerations, and from advanced countries' experiences to developing countries' exploration and to international cooperation. Scholars have touched upon almost every facet of electronic commerce, such as definition and framework, applications and supporting policies.

The most comprehensive works include *Electronic Commerce: A Manager's Guide* (Reading, 1997) Ravi Kalakota and Andrew B. Whinston, and then *Electronic Commerce: A Managerial Perspective* (Upper Saddle River, 2000) by Efraim Turban et al., which of course uses the former book for reference in many places. Obviously, from their titles, both books aim to identify the success factors for and barriers to electronic commerce from the management perspective. The latter especially presents many case studies, partly because more corporations had achieved business experiences by that time.

[2] All materials were collected during 2000–2001, but a few are updated up to the end of June 2002.

Born in the early stage of electronic commerce, the former book pays more attention to the technology aspects, such as the applications of intranet, extranet and WWW. In the latter book, with the growth of electronic commerce, the term "business-to-business" is used often. More importantly, there is a special chapter discussing public policies from legal issues to privacy; compared to a chapter on online publishing in the former book, it reflects that the development of electronic commerce have given rise to series concerns about intellectual property (IP) and privacy protection. The latter also devotes a considerable amount of space specifically to economic and social impacts and concerns, and suggests potential research topics for issues raised by electronic commerce.

There are also extensive works on the subject from the financial sector's point of view, for example, *Banking and Finance On the Internet* (NEW YORK, 1998), edited by Mary J. Cronin, which includes articles tracking the history of online banking from its roots in home banking and categorizing the product offerings of the finance industry. Noteworthy among the contributions of this book, an article by Kim Humphreys from Security First Network Bank provides a valuable documentary of the practices of this first virtual full-service bank. There are much more updated points for the financial services industry in *E-Finance Report* (NY; London, 2001), which is edited by Ezra Zask. An example in the area of taxation (from the point of view of the U.K.) is *Taxation of E-Commerce: Fiscal Regulation of the Internet* (Croydon, 2000) by William J Craig.

With the maturing of electronic commerce, more people are paying close attention to the impact of electronic commerce on business rules, and they have found it necessary to adjust public policies and laws to provide a consistent and constant environment for the development of electronic commerce. It seems that the U.K. is well ahead of other

countries, perhaps driven by the increasing volume of online transactions within Europe and faced with more tension in cooperating with the other European nations in dealing with the challenges accompanying the development of electronic commerce. For example, *Cross-Border Electronic Banking: Challenges and Opportunities (second edition)* (London; Hong Kong, 2000), edited by Chris Reed, Ian Walden and Laura Edgar, is a joint perspective of law and cross-border payments, which focuses on payment systems for electronic commerce and the related laws or choices of laws and jurisdiction concerning data security and consumer rights. More comprehensively, *Law and the Internet: A Framework for Electronic Commerce* (Oxford; Portland, 2000), edited by Lilian Edwards and Charlotte Waelde, collects articles covering almost all legal issues, such as electronic contracts, electronic signatures, privacy and IP protection, and other legal regulations.

More theoretically, Donglas F. Aldrich in his book *Mastering the Digital Marketplace: Practical Strategies for Competitiveness in the New Economy* (NEW YORK, 1999), thinks that the tangible container and intangible content elements empowered by technological improvements and information create new sources of value in the digital marketplace, and thus proposes a new business model based on "digital value chains" and a new intermediary—"infomediary."

From a specific country's viewpoint, Alan E. Wiseman in his book *The Internet Economy: Access, Taxes and Market Structure* (Washington D.C., 2000) offers an introduction to Internet-related practices in the U.S.A., and he does a complete and detailed policy discussion on the role of the federal government in the context of theoretical research concerning debated issues such as pricing Internet access and

taxation. On the contrary, Marcus F. Franda's *Governing the Internet: The Emergence of an International Regime* (Boulder, Colorado, 2001) examines Internet and electronic commerce from the perspective of the international relations discipline according to international regime theory. Therefore, this book is noteworthy in two respects: one is its focus on the formulation of all frameworks relative to the Internet and electronic commerce, such as taxation and IP protection; the other is derived from its international perspective—an eye on the role of developing countries, among which it seems that China especially interests him, in the formation of an international regime.

Aside from contributions to the study of electronic commerce that scholars and corporations have made, initiatives on electronic commerce taken by governments and international organizations are also noteworthy. For example, the U.S. government's *A Framework for Global Electronic Commerce* on July 1, 1997, suggested five broad principles for governments to consider when making any new policies involving the Internet, which later has been quoted in various contexts. Canada, standing in the top tier in the area of electronic commerce, has issued numerous guidelines, for example *The Canadian Electronic Commerce Strategy* (Ottawa, 1998) based on private-public partnerships, *Electronic Commerce and Canada's Tax Administration* (Ottawa, 1998), and *Principles for Consumer Protection for Electronic Commerce: A Canadian Framework* (Ottawa, 1999). The Ottawa Ministerial Conference of the Organization Economics Co-operation and Development (OECD) in October 1998 and one of its subsequent reviewing meeting, the third Annual E-Commerce International Forum in Paris in October 1999, fruited a series of important governments' agenda among the OECD member countries, among which one is *Electronic Commerce Taxation*

Framework, and another is a draft *Guidelines for Consumer Protection in the Context of Electronic Commerce*. Another example of international initiatives on specific electronic commerce issues is the Information Technology Agreement of the World Trade Organization (WTO) negotiations.[3]

In conclusion, the study of electronic commerce is becoming theoretically mature, reflecting the elaboration of electronic commerce practices in the real world. However, after the chaos of the heady days of the Internet boom, it is time to sort through this field. As for this paper, to seek a brief but methodical framework for electronic commerce is a foundation for the next study—the economic and policy implications of electronic commerce for China.

1.2 Literature Review II: Implications of Electronic Commerce for Economic Development

Prior to writing this paper, I explored the material on information technology and the management of information systems, which was essential in the preparation of this paper. I benefited most from two of them.

One is *Information Technology and Economic Development: An Introduction to the Research Issues* (Helsinki, Finland, 1998) by Matti Pohjola, mainly based on the U.S. experience. One conclusion of this study answers an important question about the

[3] Other issue-specific international organizations are the World Intellectual Property Organization (WIPO) for IP protection, the United Nations Commission on International Trade Law (UNCITRAL) for model commercial contract law, the International Organization for Standardization (ISO) for IT standards, and the International Telecommunications Union (ITU) for IT infrastructure issues, according to *Electronic Commerce and Canada's Tax Administration: A Report to the Minister of National Revenue from the Minister's Advisory Committee on Electronic Commerce*, 1998, 48-9.

economic impact of information technologies—the so called "productivity paradox"[4]: "There is neither a paradox nor a substantial 'information payoff' associated with investment in computers or other forms of IT in the United States. Computers seem to be 'pulling their weight'." Though further study should be done to verify this conclusion in other circumstances, it confirms that it is worthwhile to develop electronic commerce for the sake of economic development. And it is of significant interest to study why developing countries are far behind and how to prevent them from lagging farther behind or even to narrowing the gap.

The other work, *Digital Capitalism: Networking the Global Market System* (Cambridge, Mass., 1999) by Dan Schille stimulated me to do more critical thinking—to face up to, rather than to go around the political nature of technological innovations and their applications. In his book, Schille examines the telecommunications and network system development in the U.S. and the long process of freeing the industry from governmental monitoring starting from the 1950s until the AT&T divestiture in 1984. This point of view is somewhat different from the mainstream position found in the advanced countries. This permits a better understanding of the political background of the U.S and its supporters who progressively promote the domestic liberalization of the information industry from governmental regulations, but simultaneously impose that very policy on other countries as a precondition for electronic commerce development. As the

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[4] The most quoted sentence to describe "the productivity paradox" is "you can see computer age everywhere but in the productivity statistics" by Robert M. Solow, Nobel Prize winner in Economics, in his New York Times Book Review "We'd Better Watch Out" in July 1982. Five hypotheses of explanation are: no paradox—there are sizable economic externality in IT industry; mis-measurement—a large portion of benefits are beyond the traditional productivity statistical methods; diffusion delay——it will take a long time before the productivity benefits of IT investment are fully realized; small capital share—IT investment is still a small fraction of the existing overall capital stock; and the last mismanagement—high percentage of IT projects failures has kept firms from reaping the benefits of IT investments. For more details see *Information Technology and Economic Development: An Introduction to the Research Issues*, by Matti Pohjola, UNU World Institute for Development Economics Research (Finland), November 1998, 19-22.

result of reading this book, I began to apply deeper thought processes to this study and to consider what the implications of advanced countries' experiences with electronic commerce are for developing countries (and for China).

Regarding the research of Internet and economic development, the United Nations Conference on Trade and Development (UNCTAD) has perhaps made the greatest contribution as an organization. For example, UNCTAD's Policy Issues in International Trade and Commodities Study Series provided some helpful materials, such as No.2: *E-Commerce, WTO and Development Countries* by Arvind Panagariya in 2000, and No.5: *Tariffs, Taxes and Electronic Commerce: Revenue Implications for Developing Countries* by Susanne Teltscher in 2000. Another UNCTAD publication, *Building Confidence: Electronic Commerce and Development* (NY; Geneva, 2000), discusses a working definition and framework of electronic commerce; addresses fiscal, legal, and transport and financial services issues from the point of view of development; and also provides an action agenda for developing countries to fully participate electronic commerce.

In *Understanding the Digital Economy: Data, Tools, and Research* (Cambridge, 2000) edited by Erik Brynjolfsson and Brian Kahin, there are two notable articles from the perspective of economic development. One is "The Growing Digital Divide: Implications for an Open Research Agenda" by Donna L. Hoffman and Thomas P. Novak, which examines the digital divide within the U.S. The other, "Extending Access to the Digital Economy to Rural and Developing Regions" by Heather E. Hudson, extends the research to developing countries and provides policies and strategies for increasing access to information and the Internet.

However, neither the UNCTAD's action agenda nor Hudson's suggestions are one-for-all solutions. There is no such a universally resolution, since every country has its own specific disadvantages and advantages, and more importantly, every country has to choose priority areas in the attainment of its own goals. Therefore, a case-by-case analysis is needed.

As to China's specific experience of and barriers to electronic commerce development, English reference materials are limited or somewhat confusing, partly because of misunderstandings or the language obstacle. A relatively complete introduction of the subject is *China's Emerging New Economy: The Internet and E-Commerce* (Singapore; London, 2001) by John Wong and Nah Seok Ling. However, there are still a few imprecise statements in it, because they are not updated, and several inconsistencies. Most importantly, there are few systematic and deep analyses of problems that China is specifically encountering, and even less of an analysis of advantages that might help China to leapfrog some stages in the progress.

From inside China, with the use of the Internet booming, there is a great volume of publication on electronic commerce. However, only a few of them are informative. Among them, *Electronic Commerce and Its Applications in China (Zhongguo dianzi shangwu yu shijian)* (Beijing, 1999) by Xiang Guan et al. provides a general introduction to the Internet, business models of electronic commerce, and their applications in China. It also analyzes the technology and business environments for electronic commerce in China, and furthermore, it designs a complete transaction system for electronic commerce. *Electronic Commerce and Taxation—Tax Policy and Administration in the Digital Era (Dianzi shangwu yu shuishou—shuzihua shidai de shuishou zhengce yu shuishou*

zhengguan) (Beijing, 2000) by Jinrong Cai et al. focuses mainly on an introduction to the world practices in the field, while leaving little space for discussion of the practices in China itself. The most characteristic perhaps is Guozhang Yao's *Electronic Commerce Development Strategies for Chinese Enterprises (Zhongguo qiye dianzi shangwu fazhan zhanlue)* (Beijing, 2001). Its content is almost all about China, including an analysis of inside and outside environments for Chinese enterprises to join electronic commerce, suggestions to governments for facilitating electronic commerce, and many case studies based on Chinese enterprises. However, the discussion of the Internet and electronic commerce globally and the analysis of the status of the Internet and electronic commerce in China are limited by the availability of updated materials in the field. Hence, few constructive suggestions have been made.

Therefore, taking advantage of the accessibility of English and Chinese materials, this paper would like to do a preliminary study of electronic commerce in the most advanced countries and discussion of the implications of electronic commerce for economic development, whereby to analyze what barriers China should overcome to develop electronic commerce and suggest what priority actions China might take.

1.3 Executive Summary

The purpose of the present thesis is twofold: to do a preliminary study of electronic commerce and to examine problems with and propose suggestions for the development of electronic commerce in China.

After a review of the principle studies in the field in Chapter 1, Chapter 2 will be an attempt to provide the whole paper with a background (a description of the

development of the Internet and its applications) and a foundation (a proper definition, classification, and framework of electronic commerce). In Chapter 3, I will examine how electronic commerce is applied around the world, especially the most advanced experiences, so as to have a comparison with how it is applied in China—the subject of Chapter 4. As well, Chapter 4 will attempt to identify what problems or blocks China faces when developing electronic commerce, and also to suggest potential steps to remove those barriers. In Chapter 5, before concluding the whole paper by suggesting some potential initiatives to China's government, I will discuss the UNCTAD's action agenda for developing countries and Rosen et al's "five umbrella" structure for analyzing the economic and policy implications of electronic commerce for an East Asian economy.

CHAPTER 2. WHAT IS ELECTRONIC COMMERCE?

In this chapter, the first part presents a brief sketch of the technological development of the Internet, its growth, and its most important application—the World Wide Web. The second part provides a brief history of electronic commerce, its definitions, classifications, and growth; and final part proposes a framework of electronic commerce, which will also function as the framework for the description, discussion, and analysis in the next chapter of how electronic commerce is applied around the world.

2.1 The Internet and Its Important Application—The World Wide Web (WWW)

According to the U.S. Federal Networking Council (FNC), Internet is defined as "the global information system that

i. is logically linked together by a globally unique address space based on the Internet Protocol (IP) or its subsequent extensions or follow-ons;
ii. is able to support communications using the Transmission Control Protocol/Internet Protocol (TCP/IP) suite or its subsequent extensions or follow-ons;

iii. provides, uses or makes accessible, either publicly or privately, high level services layers on the communications and related infrastructure described herein."[5]

Technically, the Internet originated from the search for a kind of communications network that could prevent the link between branches of the government from destruction in the event of an attack on the United States; it is a by-product of "the Cold War military-industrial complex."[6] For this purpose, in 1957, the U.S. Department of Defense formed the Advanced Research Projects Agency (ARPA), and the latter was commissioned to develop a system called the ARPANET. In 1969, a digitized message was successfully transmitted between the first two nodes of the ARPANET at the University of California at Los Angeles and Stanford Research Institute, and the Internet was born.[7]

In 1973, the University of London made the first international connection to the ARPANET via Norway. In 1983, the ARPANET split into the ARPANET and the MILNET. To further expand the use of this system to civilian applications, the National Science Foundation began to develop a civilian counterpart backbone network, and the NSFNET was created in 1986. The ARPANET finally ceased to exist in 1990.[8] With the success of privately funded networks, the U.S. government gradually withdrew from backbone provision. On April 30, 1995, the NSFNET Backbone Service expired and made the transition to a new architecture called Network Access Points (NAPs), in which

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[5] Quoted in Alan E. Wiseman, "Chapter Two: What is the Internet?" in *The Internet Economy: Access, Taxes, and Market Structure* (Washington D.C.: Brookings Institution Press, 2000), 7; based on FNC Revolutions: Definition of "Internet", 10/24/95, http://www.fnc.gov/Internet_res.html.

[6] Dan Schiller, "Chapter 1. The Neoliberal Networking Drive Originates in the United Sates," in *Digital Capitalism: Network the Global Market System* (Cambridge, Mass.: MIT Press, 1999), 8.

[7] Wiseman, "Chapter Two: What is the Internet?" 8.

[8] Robert Hobbes Zakon, "Hobbes' Internet Timeline v5.4," cited on 29 October 2001, from http://www.zakon.org/robert/internet/timeline/.

traffic is exchanged at interconnection points and which are currently privately operated.[9] However, to keep U.S. leadership in internetworking technology, the U.S. government, 180 U.S. universities, and 60 leading companies formed a non-profit consortium, known as Internet2, in 1997. Using collaborating institutions and resources from academia, industry, and government, Internet2 is dedicated to developing and deploying "advanced network applications and technology, accelerating the creation of tomorrow's Internet."[10]

Since the Internet's emergence, a variety of important networking technologies, such as electronic mail, file transfer, and newsgroups, have been created to facilitate the original purpose of the Internet: communication. Electronic mail, especially, constituted the major part of Internet traffic during the early period.

However, the most dramatic breakthrough in Internet history is the World Wide Web (WWW), a communication system released by CERN (*Conseil Européen pour la Recherche Nucléaire*, now called European Organization for Nuclear Research) in 1991. The Web "was first developed as a tool for collaboration in the high energy physics community,"[11] and was a way of linking distant documents (hyper linking) and enabling users to work together (collaborative authoring).[12] Based on "the legitimization of the 'freeware' software distribution model,"[13] CERN made public the software source code when the designers had basically completed it. This underlying freeware philosophy

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[9] Library of Congress, "Internet Statistics and Demographics," cited on 12 December 2001, from http://lcweb.loc.gov/global/internet/inet-stats.html.

[10] Internet2, "Frequently Asked Questions about Internet2®," cited on 12 December 2001, from http://www.internet2.edu/html/faqs.html#. And in 2001, China first achieved an Internet2 connection, NSFCNET, quoted in Samuel J. Noumoff, "China: The Great Misperception," unpublished-nd, 31; based on Li Yan, "China Made Great Breakthrough on Study of Internet2," *People's Daily Online*, July 18, 2001, from http://english.peopledaily.com.cn/200107/18/eng20010718_75265.html.

[11] CERN, "An Overview of the World-Wide Web," cited on 12 December 2001, from CERN's web page: http://public.web.cern.ch/Public/ACHIEVEMENTS/WEB/Welcome.html.

[12] Ravi Kalakota and Andrew B. Whinston, "Chapter 3: World Wide Web—Applications", in *Electronic Commerce: A Manager's Guide* (Reading: Addison Wesley Longman, 1997), 64.

[13] Ibid., 65.

tremendously encouraged subsequent programmers to make great contributions to the software debugging and development. In 1993, hundreds of programmers, most from the U.S. National Center for Supercomputing Applications (NCSA), developed the first browser—a user-friendly interface—for the Web. One year later, the key members of the software and browser development team from the two institutes developed the Netscape Navigator, which is the first commercially available browser for the Web, and thereby facilitated the commercial applications of the Internet. Figure 1 shows the rapid growth of the Web. From an estimated 130 in June 1993, the number of Web sites has increased at an average rate of 370.65% per year, to 31,299,592 in July 2001. Figure 2 shows the global Internet population.[14]

The success of the Web has made it "a global information-sharing architecture that integrates manifold online content and information servers in a fast, cost-effective, and easy-to-use manner."[15] The Web is the driving engine for the Internet's rapid application in social, artistic, and commercial fields, and for the Internet's increasing popularity and fast rapid growth all over the world. In the next part of this chapter, there will be details about the impact of the Web on the Internet's commercial application—electronic commerce.

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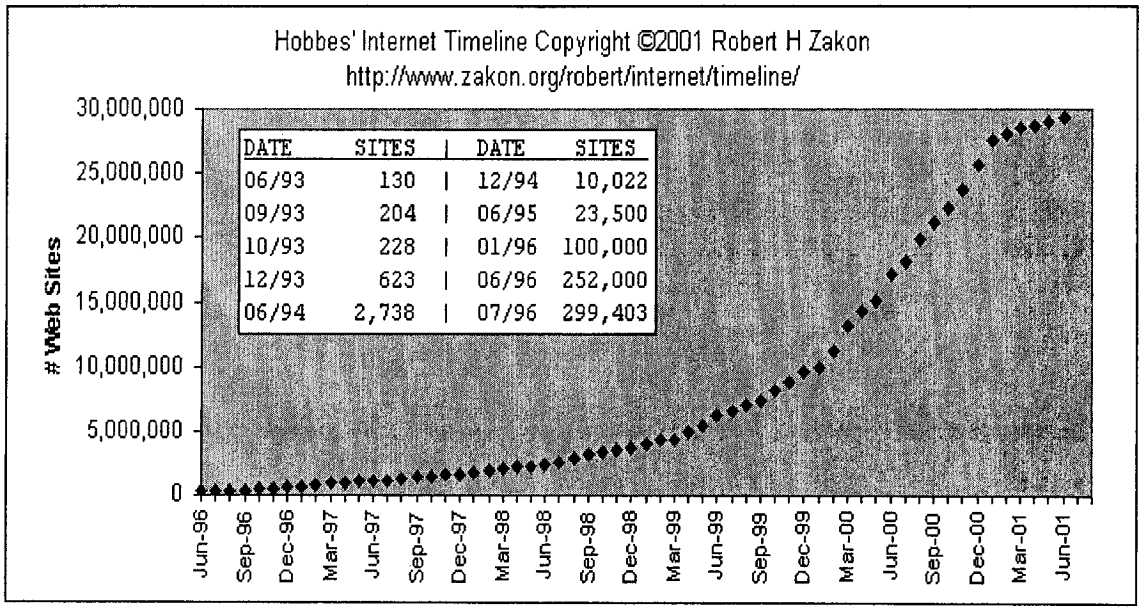
[14] CommerceNet, "Worldwide Internet Population," in "Industry Statistics", cited on 12 December 2001, from http://www.commerce.net/research/stats/wwstats.html

[15] Kalakota and Whinston, "Chapter 3: World Wide Web—Applications," 63.

Figure 1: WWW Growth



Source: Robert Hobbes Zakon, "Hobbes' Internet Timeline v5.4," cited on 29 October 2001, from http://www.zakon.org/robert/internet/timeline/.

Figure 2. World Wide Internet Population

January 2000	
Africa	2.1 Million
Asia/Pacific	40 Million
Europe	70 Million
Middle East	1.9 Million
Canada & U.S.A.	120 Million
South America	8 Million
World Total	242 Million

Source: CommerceNet, cited 12 December 2001, from http://www.commerce.net/research/stats/wwstats.html.

2.2 A Brief History and Definitions of Electronic Commerce

If we regard the term "commerce" as meaning transactions conducted between business partners, it seems natural to see the term "electronic commerce" simply as the "commercial transaction of services in an electronic format."[16] Then, the history of electronic commerce can be traced to the 1970s, when electronic funds transfer (EFT) began to be used between banks, automated clearing houses (ACH), and companies over secure private networks to optimize the remittance system. Today, EFT has many variants, for example, debit cards, and is used ubiquitously in points of sales (POS), deposit of employee payrolls, and various forms of self-service banking.

With more advanced telecommunication technologies introduced during the late 1970s and early 1980s, electronic data interchange (EDI) emerged, a computer-to-computer exchange of standardized electronic transaction documents. Proprietary value-added networks (VAN) were thus formed between banks, financial institutes, and/or business partners over the highly secure EDI. VAN-based EDI was very effective in streamlining business processes and reducing paperwork between business partners, thus optimizing inventory. However, its utilization was limited to large corporations, because the technology was expensive. With the advent of the Web, there were many other electronic messaging technologies applied commercially, such as electronic mail, chat rooms, news groups, and file transfer.

From early 1990s, the Web proliferated the commercial applications of the Internet. Easy-to-use, relatively cheaper (compared to the traditional brick-and-mortar

[16] Transatlantic Business Dialogue Electronic Commerce White Paper, 1997, quoted in United Nations Conference on Trade and Development (UNCTAD), "Chapter 1. E-Commerce and Development," in *Building Confidence: Electronic Commerce and Development*, (New York and Geneva: UN, 2000), 14.

economy), and with an extended market (the Internet linking globally), the Web made electronic commerce available to small and medium-sized enterprises (SME), provided well-established corporations with more strategic competitive advantages and stronger alliances between business partners, and created new business opportunities. In other words, the Web combined so seamlessly with a business environment where customer demand became increasingly sophisticated that almost all industries readily embraced this technological innovation. Today, almost every medium- and large-sized organization in the U.S. has a Web site.[17] It was in the early 1990s that the term "electronic commerce" was coined.

While both the Internet and the Web have a precise definition, there still is no generally accepted definition of electronic commerce. As defined in *The Canadian Electronic Commerce Strategy*, electronic commerce "includes any kind of transaction that is made using digital technology, including open networks (the Internet), closed networks such as EDI, and debit and credit cards." There are many other definitions provided by experts and various organizations, some of them listed in Box 1 and 2; Box 2 is quoted from *Building Confidence: Electronic Commerce and Development* (UNCTAD, 2000).

The UNCTAD thinks that the definitions so far are too descriptive, and even that these descriptions are often heterogeneous and contradictory. To form operational definitions of electronic commerce, the UNCTAD instead thinks that a definition method from both horizontal and vertical aspects would more helpful, and they have produced such definitions. According to the UNCTAD, the horizontal definition is from

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[17] Efraim Turban et al., "Chapter 1. Foundations of Electronic Commerce," in *Electronic Commerce: A Managerial Perspective* (New Jersey: Prentice Hall, 2001), 13.

enterprises' point of view: in the "electronic commerce supply chain" (compared to "normal supply chain"), the sequence of business functions is a model of Marketing—Sales—Delivery—Invoicing/Payment (MSDP). On the contrary, the vertical definition is from governments' point of view: the structure of electronic commerce is composed of (telecommunications) Infrastructure, (electronic) Messages, Basic Rules, Sectoral Rules, and Applications, that is to say, an IMBSA model.

This paper is intended to apply as broad a definition as possible for the purpose of viewing the government as an important participant in the development of electronic commerce (especially in developing countries, such as China), not only as a regulator (as in developed countries). Thus, according to the different nature of the participants, electronic commerce is classified as three types in this paper, as below:

- B-to-C: electronic commerce between enterprises/organizations and customers
- B-to-B: electronic commerce between enterprises
- B-to-G: electronic commerce between enterprises and governments

Of course, using different classification criteria will produce different categories. Even according the criteria used in this paper, some might argue that the category of the relationship between governments and citizens is ignored. Since the relationship between governments and citizens in electronic commerce is not fundamentally different from that between enterprises/organizations and customers, it is classified into the category of B-to-C for the sake of simplicity and clarity.

Among the definitional challenges, another issue is the related term—E-Business. The typical example is the American Institute of Certified Public Accountants (AICPA). In its Audit Risk Alert: E-Business Industry Development—2001/2, it continues to differentiate the two terms as "E-commerce is only a small subset of e-business ...The general public, media, and businesspeople commonly accept an even more restrictive concept of e-commerce by limiting its definition to mean online B2C retail sales conducted over the Internet."[18] The possible reason why the AICPA offers such a classification is for the sake of accounting, however, for developing countries, where the definition begins and where it ends may very well prove to be a political one. From the perspective of governments, electronic commerce is closely related with the development level of the IT industry, and it is the reason why the policy agenda of many countries for promoting electronic commerce development always includes a deregulation restructuring or reformation in the IT industry, and thus a liberalization or even privatization of the telecommunication industry.[19]

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[18] The American Institute of Certified Public Accountants (AICPA), *E-Business Industry Developments—2001/2002* (New York: AICPA, 2001), 3. And its *E-Business Industry Developments— 2000/2001* (New York: AICPA, 2001), 9.

[19] For more information of the liberalization of telecommunication industry in the U.S.A., see Schiller, "Liberalization of U.S. Network Development" in Chapter 1 "The Neoliberal Networking Drive Originates in the United States," 3-13; for its global impacts see Chapter 2 "Going Global: The Neoliberal Project in Transnational Telecommunications," 37-88. For some statement on the subject of the EU member countries, see also Marcus F. Franda, "EU Responses to the Framework Report," in Chapter 3 "Frameworks for E-Commerce and Taxation," and the beginning of Chapter 4 "Investment and Intellectual Property," *Governing the Internet: The Emergence of an International Regime* (Lynne Rienner Publishers, 2001), 89-92 and 109-14.

Box 1. Scholars' definitions of electronic commerce

"...a modern business methodology that address the needs of organizations, merchants, and consumers to cut costs while improving the quality of goods and services and increasing the speed of service delivery. ...associated with buying and selling of information, products, and services via computer networks today." [Ravi Kalakota and Andrew B. Whinston, *Frontiers of Electronic Commerce* (Reading, 1996), 1]

"...the sharing of business information, maintaining business relationships, and conducting business transactions by means of telecommunications networks. ...includes the relationships and transactions between companies, as well as the corporate processes that support the commerce within individual firms." (Vladimir Zwass, "Structure and Macro-Level Impacts of Electronic Commerce: From Technological Marketplaces," 1998, cited on 13 November 2000, from http:www.mhhe.com/business/mis/zwass/ecpaper.html)

"...the conduct of commerce in goods and services, with the assistance of telecommunications and telecommunications-based tools." (Roger Clarke, "Electronic Commerce Definitions," 1999, cited on 13 November 2000, from http://www.anu.edu.au/people/Roger.Clarke/EC/ECDefns.html)

Box 2. Organizations' descriptive definitions of electronic commerce

"As the Internet empowers citizens and democratizes societies, it is also changing classic economic paradigms. New models of commercial interaction are developing as businesses and consumers participate in an electronic marketplace and reap the result benefits. The GII has the potential to revolutionize commerce in these and other areas by lowering costs dramatically and facilitating new types of commercial transactions. The Internet will revolutionize retail marketing. Commerce on the Internet could total tens of dollars by the turn of the century." (U.S. Executive Office of the President, 1997)

"defined simply, is the commercial transaction of services in an electronic format." (*Transatlantic Business Dialogue Electronic Commerce White Paper*, 1997)

"refers generally to all forms of transactions relating to commercial activities, including both organizations and individuals, that are based upon the processing and transmission of digital data, including text, sound, and visual images." (OECD, 1997)

"is about doing business electronically. It is based on the electronic processing and transmission of data, including text, sound, and video. It encompasses many diverse activities including electronic trading of goods and service, online delivery of digital content, electronic fund transfers, electronic share trading, electronic bills of lading, commercial auctions, collaborative design and engineering, online sourcing, public procurement, direct consumer marketing, and after-sales service. It involves both products (consumer goods, specialized medical equipment) and services (information services, financial and legal services); traditional activities (healthcare, education) and new activities (virtual malls)." (European Commission, 1997)

"is the carrying out of business activities that lead to an exchange of value across telecommunications networks." (European Information Technology Observatory, 1997)

"is entering a new era where many unspecified persons including general consumers are involved on the networks. In addition, its contents have come to include not only simple transactions of data concerning placing orders or order acceptance but also to general commercial acts such as publicity, advertisements, negotiations, contracts, and fund settlements." (Ministry of International Trade and industry, Japan, 1996)

Source: UNCTAD, "Chapter1. E-Commerce and Development," *Building Confidence: Electronic Commerce and Development* (UN, 2000), 14.

As to the growth of electronic commerce, according to the International Data Corporation (IDC),[20] despite the tribulations of the economy in 2001 in many parts of the globe, electronic commerce revenue grew by 73.4 %, from $354.9 billion in 2000 to $615.3 billion.[21] However, the U.S.A. definitely represents and will keep being the largest single market for electronic commerce in the near future, though its share is slowly decreasing as Europe catches up. In 2000, the U.S.A. accounted for 46%, nearly half, of worldwide electronic commerce revenue, followed by 21% in Japan, and 20% in Western European.[22]

As for China, by September 2001, the banking/finance sector led the use of Web sites, followed by the manufacturing and telecommunication/media/utilities sectors, and more than 50% of companies in all these sectors have Web sites.[23] However, most of these Web sites have not integrated with traditional business processes.[24] It is forecast that the value of electronic commerce in China will increase to $60 billion by 2004, from $2.2 billion in 2000, and with more than 75% of that from B-to-B.[25]

Overall, compared to the offline economy, the number of companies participating in and total revenue from electronic commerce is still small. Although there are various predications about the growth of electronic commerce, it is generally thought that electronic commerce will grow rapidly; in particular, its growth will be driven by its advancement in developing countries, since there will be more room for growth in those countries as they upgrade their information technology (IT) structure.

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[20] IDC's definition of electronic commerce "includes the value of transactions that are committed over the Internet, but for which payment may be made by other means."
[21] Molly Upton, "Western Europe Pulls Ahead of United States," *CIO Newsletters: eBusinessTrends* (from cio@update.cio.com), IDC, January 3, 2002.
[22] Ibid., "Growing Foreign Markets Starts to Lure U. S. Companies," March 22, 2001.
[23] Ibid., "China to Enter World Trade Organization, eCommerce to Benefit," November 21, 2001.
[24] Ibid.
[25] Ibid.

2.3 The Framework of Electronic Commerce

Apart from the definition of electronic commerce, almost all scholars think it fundamental to make a framework for it before they are able to discuss much deeper issues of electronic commerce. Of course, when they make such frameworks, they use different criteria for different research goals. Some frameworks are comprehensive, for the purpose of doing general research, while some are designed to guide specific research on a facet of electronic commerce. Since the purpose of this chapter is to discuss the general application of electronic commerce, I will introduce three frameworks from the former category before I propose one for this paper. These frameworks have become increasingly comprehensive with the development of technology, the maturity of electronic commerce management systems, and the progress of the research in the field of electronic commerce.

In their book *Electronic Commerce: A Manager's Guide*, Kalakota and Whinston develop a generic framework for electronic commerce (Figure 3). The infrastructure of electronic commerce is composed of: [26]

I. *Information superhighway:* "A mixture of many forms of high-speed network transport," which is provided by telecommunication companies, cable TV systems, wireless companies, and computer networks, accompanied by businesses that provide the communication hardware and software tools.

II. *Multimedia content and network publishing:* This architecture enables different kinds of content to be stored in and distributed by network servers so as to be published through the network.

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[26] Kalakota and Whinston, "Chapter 1: Introduction to Electronic Commerce," 13-6.

III. *Messaging and information distribution:* The vehicle between the network server and the end-user application, which can translate and transform data of various formats among a variety of communications devices, interfaces, and networks.

IV. *Common business services infrastructure:* Facilitates and secures online transactions, for example, the payment services infrastructure.

V. *Other key support layers:* These include public policy and technical standards. The former is concerned with issues such as "universal access, privacy, and information pricing." The latter deals with "the specifics of information publishing tools, user interfaces, and transport."

Another scholar, Vladimir Zwass (1998), developed a hierarchical framework of electronic commerce, as shown in Figure 4. The framework consists of three meta-levels, and the three meta-levels in turn consist of seven functional levels:

I. *Infrastructure:* The hardware, software, databases, and telecommunications that are deployed to deliver such functionality as the World Wide Web over the Internet, or to support EDI and other forms of messaging over the Internet or over value-added networks.

II. *Services*: Messaging and a variety of services enabling the finding and delivery (on business terms, if desired) of information, including a search for potential business partners, as well as the negotiation and settlement of a business transaction.

III. *Products and structures:* Direct provision of commercial information-based goods and services to consumers and business partners, intra- and inter-

organizational information sharing and collaboration, and organization of electronic marketplaces and supply chains."[27]

Turban et al. also developed a framework (shown in Figure 5) based on the above two scholars' works. In *Electronic Commerce: A Managerial Perspective*, Turban et al. view electronic commerce applications as being supported by five kinds of infrastructure: common business services infrastructure, messaging and information distribution infrastructure, multimedia content and network publishing infrastructure, network infrastructure, and interfacing infrastructure; and their implementation is dependent on four major areas: people, public policy, technical standards and protocols, and organizations.[28]

Although the above three frameworks are somewhat different, one from the other, in the degree of comprehensiveness, all of them are critical for understanding "the relationships among the electronic commerce components" and to conduct research in the field.[29] Commonly, they agree that electronic commerce applications are based on a physical (technology) infrastructure and a soft (supporting services, legal, and public policy) infrastructure.

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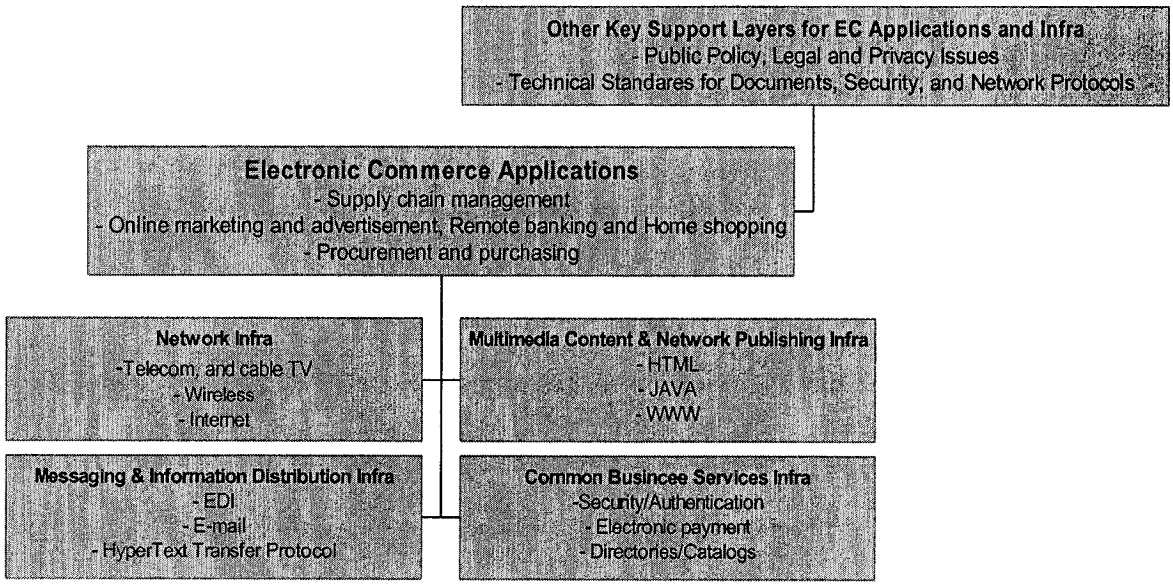
[27] Vladimir Zwass, *Structure and Macro-level Impacts of Electronic Commerce: From Technological Infrastructure to Electronic Marketplaces*, cited on 13 November 2000, from "Zwass: Foundations of Information Systems" web page: http://www.mhhe.com/business/mis/zwass/ecpaper.html.
[28] Turban et al., 6.
[29] Ibid., quoted; based on Vladimir Zwass, "Electronic Commerce: Structures and Issues," *International Journal of Electronic Commerce*, Fall 1996.

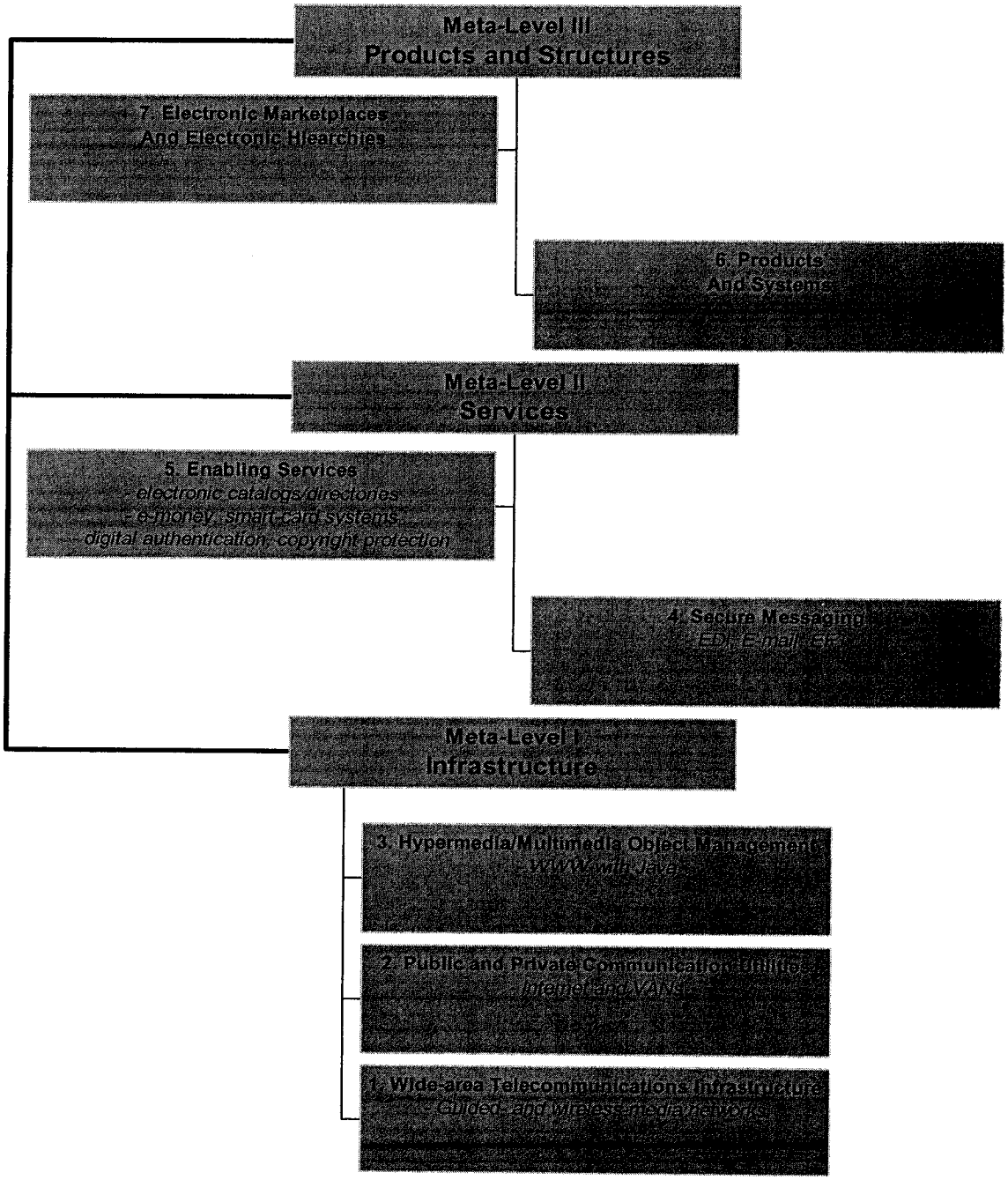
Figure 3. Generic Framework for Electronic Commerce



Source: Kalakota and Whinston 1997

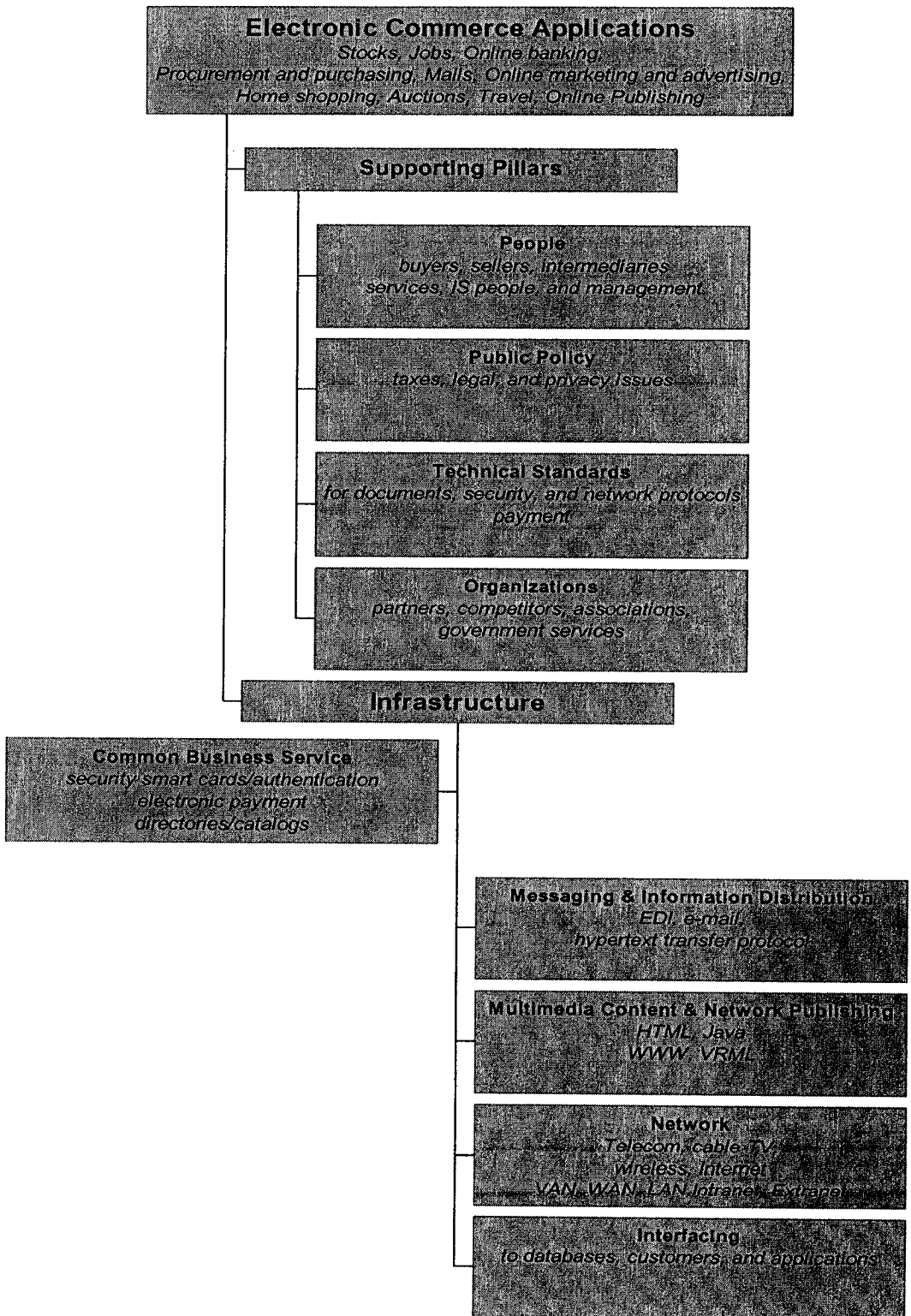
Figure 4. The Hierarchical Framework of Electronic Commerce

And Its Meta-Levels



Source: based on Valadmir Zwass, *Structure and Macro-Level Impacts of Electronic Commerce: From Technological Infrastructure to Electronic Marketplaces*, from the web page of "Zwass: Foundations of Information Systems": http://www.mhhe.com/business/mis/zwass/ecpaper.html.

Figure 5. A Framework for Electronic Commerce



Source: Turban et al. 2001.

Since the purpose of this paper is to examine the problems of electronic commerce application in a specific locality—that is, China—and to try to provide solutions to those problems mainly from governments' point of view, it is necessary to develop a hybrid framework for electronic commerce. More attention will be paid to governments' role in helping to develop a technological infrastructure, guiding formation and implementation of technical standards and protocols, and creating or amending public policy concerned with taxation, privacy, security, intellectual property, and other issues of public wealth. The framework below also provides the structure for the next part of this paper on the global application of electronic commerce, as well as a main line to figure out what actions China should take.

I. Network infrastructure:

i. IT infrastructure: telecommunications and computerization

ii. Networking of computers

II. Supporting services:

i. Common business services infrastructure

ii. Public policy

III. Electronic commerce applications:

i. Electronic markets

ii. Electronic financial services

CHAPTER 3. HOW ELECTRONIC COMMERCE IS GLOBALLY APPLIED

The introduction of the Web, accompanied by the need to satisfy an increasingly complicated customer demand, affects the way enterprises do business in almost every industry investing in an electronic commerce strategy. With the Internet's emergence and development, governments, academic institutions, and enterprises have collaborated in the application of electronic commerce. This chapter, based on the framework of electronic commerce presented in last chapter, demonstrates how electronic commerce is applied—the supporting network infrastructure, the supporting technologies and services used in ordinary business transactions, and the related topics in public policy. The goal of this chapter is to map the global implementation of electronic commerce throughout the world, which is indispensable in order to examine how it has been applied in China. Problems will be identified and possible solutions explored in Chapter 4.

3.1 Network Infrastructure

Whatever the electronic commerce applications are, they are based on network structure, communication protocols, network technology standards, and security systems. All these issues will be addressed in this section as the network infrastructure for electronic commerce. This infrastructure is composed of two components. One component is the architecture constructed by many forms of Internet-based and high-speed telecommunication, including telephone, cable, and wireless telecommunication.

The other component is composed of various computer networks, like VAN, local area networks (LAN), world area networks (WAN), intranet, and extranet. Each component includes both hardware and software tools that provide relevant services. Both components jointly play a role as the technology infrastructure of electronic commerce.

Admittedly, prior to the era of the Internet, advanced countries (with the U.S.A. as a leader) had invested a lot in computerization, as well as investment in and commercialization of other innovative information technologies. This is the reason why most people in developed countries take computerization for granted, though they may sometimes complain about the IT infrastructure. This is also the reason why electronic commerce in developed countries is much more advanced than it is in developing countries, which are comparatively technologically backward. Therefore, telecommunications and computerization will be discussed before networking technology.

3.1.1 IT infrastructure—telecommunications and computerization

When electronic commerce is studied from the perspective of corporate management in the developed countries, the network infrastructure—or telecommunications, to avoid the outdated word "computerization"—is ignored. The main reason is that the peak of this "outside the sphere of common carrier investment" had passed, and they have evolved to an era of networking—from various private networks to portals accessible to the public through the WWW. According to Schiller, at

the end of 1980s, the annual overall expenditures on telecommunications by the top 100 business users averaged between $50 and $100 million.[30]

As to the main telephone lines installed worldwide, the number "has grown eightfold since 1960, and increased by nearly 60% between 1990 and 1997—from 520 to 800,000,000." [31] The 30 most developed countries in the world (nearly all the OECD members) have on average more than 55 telephone main lines per 100 people.[32] Another principal element of telecommunication capacity, the world undersea cable network, in 2001 is 12.5 times that in 1998.[33]

As for computerization, according to a 1998 study, the average computer investment share among the private non-residential fixed investments in the U.S.A. was 7% in the 1980s and 10% in the mid-1990s at current prices, despite the sharp decline in computer prices.[34] In the U.S.A., the installed base of computers increased from 5,000 in 1960 to about 180,000,000 by 1997.

The U.S.A. is obviously the biggest IT consumer (accounting for 40% of global IT consumption in 1995), but it is also the biggest exporter: over 60% of IT business in the world and fully 75% of the software market are owned by companies headquartered in the U.S.A., and the shares are estimated to rise.[35]

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[30] Dan Schiller, "Chapter 1. The Neoliberal Networking Drive Originates in the United Sates", in *Digital Capitalism: Networking the Global Market System* (MIT, 1999), 14.
[31] Ibid., 37.
[32] And this is five times the level in the relatively advanced Latin America and Caribbean region, according to UNCTAD, "Chapter 3. The State of E-commerce," in *Building Confidence: Electronic Commerce and Development* (UN, 2000), 72. The "digital divide" between the developed and developing countries will be discussed later in page 60-2, Chapter 4.
[33] Ibid.
[34] For example, the price of a new mainframe computer declined 18% a year from 1958 to 1994, PC prices decreased at the same rate from 1974 to 1994, and semiconductors prices decreased at a dramatic rate of 40% annually in the same period, based on Matti Pohjola, *Information Technology and Economic Development: An Introduction to the Research Issues* (UNU/WIDER, Finland: November 1998), 6-17.
[35] Schiller, "Chapter 1. The Neoliberal Networking Drive Originates in the United Sates,"13 and "Chapter 2. Going Global: The Neoliberal Project in Transnational Telecommunications," 82.

3.1.2 Networking of computers

The Internet is physically an interconnected network of thousands of networks. Turban et al. explain the infrastructure for electronic commerce—"networked computing": connecting computers and other electronic devices by telecommunication networks and "emerging as the standard computing environment in business, home, and government". [36] The three major players providing the services to enable these interconnected networks to function are:

(1) Network service providers (NSPs): they run the internationally interconnected backbone;

(2) Internet service providers (ISPs): these local and regional ISPs provide a multitude of delivery sub networks, which connect thousands of private and institutional networks; and

(3) Network access points (NAPs): they function to connect the ISPs and the NAPs.

Since no one is in charge of the Internet, computers and systems run on different hardware platforms and use different kinds of software. The problem is one of internetworking. The solution is for all of the involved parties to agree upon a set of protocols, "a set of rules that determines how two computers communicate with one another over a network," [37] wherever the computers are and whatever hardware or software they run on. The transmission control protocol and Internet protocol (TCP/IP)

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[36] Turban et al., "Chapter 1. Foundations of Electronic Commerce", in *Electronic Commerce: A Managerial Perspective* (New Jersey: Prentice Hall, 2000), 3.
[37] Ibid., "Chapter 11. Infrastructure for EC," 386.

provide such a solution, and the two protocols are the only things that are commonly shared by all computers or systems connected to the Internet. The TCP ensures that two computers communicate reliably with each other. In this TCP communication, a computer sends a request, and the request will traverse an ISP network, move through the backbone(s), and across another ISP network until it receives a response in a reasonable time. The request, or response, must be divided into packets, and the packets are formatted and assigned the addresses of the sending and receiving computers according to the IP. The packets can have different paths. A device, called a router, has updateable maps of the networks on the Internet so that they can determine the paths for the packets.

To access particular computers on the Internet, it is necessary to know either the English-like domain names or the numerical addresses. Until 1999, a U.S. government funded agency, the Internet Assigned Numbers Authority (IANA), controlled the domain name system. In 1999, the U.S. government handed over the administrative authority of the Internet's domain name system to a private international organization, the Internet Corporation for Assigned Names and Numbers (ICANN). The Network Solutions, Inc. (NSI),[38] maintaining the domain name registry until 2003 under the current agreement, issues and administers five of the seven top-level domains——com, edu, gov, net, and org (except mil and int). Although the names are issued on a first-come, first served basis, the earliest trademark wins in the case of disputes. The numerical addresses are assigned by a private and regional organization, the Internet Network Information Center (InterNIC). Usually, users are more familiar with the domain name. It is where the domain name servers come into play. They convert the domain name to the associated numerical address.

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[38] Now it is VeriSign, according to ICANN web page: http://www.icann.org/cctlds/.

Technology is moving rapidly; so are technical standards and other mechanisms for interoperability. For example, since the WWW has become a dominant Internet application, Web browsers and servers have also encountered the problem of communication. To solve this problem, they have established a new addressing scheme—–the universal resource locator (URL)—and a new protocol——the hypertext transport protocol (HTTP). In the case of a URL like http://www.ecommerce.gov/framewrk.htm, the access method is http, the server is www.ecommerce.gov, and the Web page is "framewrk.htm."

In this sector of network infrastructure for electronic commerce, the last but not least important issue is ***Internet security***, which is an extraordinarily complicated task. Generally, the major security solutions are encryption, digital signatures, certificate authorities (CAs), and firewalls. Since for different electronic commerce applications there are different security guides, this paper will only touch on the security requirements specific for the payment systems below.

3.2 Supporting Services

However important computer networking is, electronic commerce is beyond computer networks. The supporting services infrastructure serves as the pillars of the framework of electronic commerce. This infrastructure includes different methods of facilitating online transactions. From the point of view of business, the basic and major issue is the need for a secure, economical, and convenient online payment system. From

the point of view of public policy, the issues encompasses all online trade rules concerning taxation, copyright, intellectual property, and privacy.

3.2.1 Basic common business services—payment system

For a basic online transaction, the major activity is the payment and settlement between the buyer and the seller. Therefore, a secured payment system is critical to the success of electronic commerce. It is the reason why this paper considers the payment system for electronic commerce as the most important supporting service from ordinary business. The payment system covers a wide scope of issues, from payment methods (e.g., Internet-based EFT and electronic checks for corporations, and credit cards and digital cash for individual consumers); security requirements (e.g., transaction protocols and third-party certificate authorities); and other payment-related services.

In accordance with the underlying philosophy of the Internet—an open space—an ideal payment system for electronic commerce would be **free or virtually free** to all parties (payer, payee, and system operator). Aside from this criterion, the payment system would be **safe** and at **high speed**. And it would include the ability to be **cost-effective to handle small value payments (or micro-payments)**, which is necessary for the large transaction volume of online sales of CDs, software, and other kinds of digital information. The discussion that follows presumes all the above criteria.

Figure 6: Comparing Credit Cards, Electronic Checks, and Digital Cash

	For payers		For payees		For system operators	
	Pros	**Cons**	**Pros**	**Cons**	**Pros**	**Cons**
Credit Cards	* legally protected from card fraud;[§] * defer payment; * an existing payment mechanism	* only available to those believed to be creditworthy; * risks from exposing card details: fraud and abuse; * an annual charge, and contingent interest cost	* an existing payment mechanism useful for online transactions	* suffering from fraud; * transaction commission charged; * ill-suited to B-to-B payments	* an existing payment mechanism: limited additional costs on hardware and software	* a credit risk; * an interest cost; * losses from card fraud; * customer disputes as a result of defaulted transactions
Electronic Checks	* similar to the paper check system: easily and readily adopted; * post-paid; * suitable for micro-payments	* interoperability of the hardware and software	* similar to the paper check system: easily integrate with EDI; * more cost-effective for B-to-B payments	* inter-operability the hardware and software	* similar to the paper check system: easier to process; * creating a new market for a trusted third party services	* high standards of security protection
Digital Cash (account-based or cash-based)	* anonymous; * much easier to get smart cards holding digital cash from banks; * supporting multi-currencies and micro-payments	* risks of fraud, and insolvency of the issuer or participating bank; * pre-paid: payment-against-delivery problem; * software needed	* no risk of fraud; * relatively cheap; * banks much more willing to sign merchants up to a digital cash scheme	* the digital cash software needed	* no loss from any fraudulent purchases; * relatively cheap to process;	* software needed; * the security procedures maybe cumbersome for large volume of micro-payments

[§] In the U.S., the U.K., and many other jurisdictions, cardholders are quite well protected in case of card fraud. For more details, see Trystan Tether, "Chapter 7—Payment Systems for E-Commerce," in *Cross-border Electronic Banking: Challenges and Opportunities (Second Edition),* eds., Chris Reed, Ian Walden and Laura Edgar (London; Hong Kong: LLP, 2000), 167-200. See also Saul Miller, "Payment in An On-line World," in *Law and the Internet: A Framework for Electronic Commerce (Second Edition),* eds., Lilian Edwards and Charlotte Waelde (Oxford; Portland, Oregon: Hart Publishing, 2000), 55-77.

3.2.1.1 Payment methods

Traditional money (cash and checks) is very expensive to process, and financial institutions have been seeking an optimum balance between cost and safety. With the increasing investment in information technology, financial innovations have been made to facilitate "the transmission of money which bypasses, in whole or in part, the transportation of money and its physical delivery from the payer to the payee, thereby eliminating or at least reducing costs of storage and transportation as well as risk of loss or theft." [39] Consequently, two sides of a payment are affected.

One is the way in which a payment is instructed. Initially, the development of wire transfer, and then the recent development of networking technology, provided more delivery channels for payment instructions. It greatly shortened the time of payment instruction transfer, thus facilitating remote and/or large value payments. This is the reason why, in value terms, more than 95% of all domestic and international payments are already made electronically. And this is also the reason why there are few concerns about the payment system for B-to-B Internet transactions, since they are using and will continue to use the existing electronic payment mechanism. Domestically or internationally, an EFT occurs whenever a payment order is given by any electronic means. Therefore, as the Internet propagates and becomes one of the major media of data communication, it is necessary to adapt EFT accordingly: the connection with/between cyber-banks and development of security protection, which is called the Internet-based EFT.

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[39] It is the definition of payment mechanism. Geva Benjamin, "International Funds Transfers: Mechanisms and Laws", in *Cross-border Electronic Banking: Challenges and Opportunities (Second Edition)*, eds., Chris Reed, Ian Walden and Laura Edgar, (London; Hong Kong: LLP, 2000), 1-2.

The new forms of financial instruments that have been created to settle transactions electronically, on the other hand, have also affected methods of payment, such as credit and debit cards, electronic checks, and digital cash. These new financial instruments enable remote and/or real-time consumer transactions. However, due to the consideration of cost and security, paper-based payment has been and will continue to be dominant in terms of transaction volumes. Even in the U.S.A., where credit and debit cards and ATMs are most widely used, approximately 56% of consumer transactions are by cash and 29% are by check. Credit and debit card and other electronic transactions account for only 15%.[40] Currently, the credit card is the most popular payment method for B-to-C transactions, compared with other methods like electronic checks and digital cash, which enable online payments as well. But there remain security concerns about "payment against delivery."[41] The demand for a suitable payment system for B-to-C transactions is undoubtedly immense. The pros and cons of the different payment methods are compared in Figure 6, from the perspective of the three online transaction parties: consumers (or payers), merchants (or payees), and banks (or payment system operators).[42]

In conclusion, Internet-based EFT equipped with the benefit of interoperable and highly secured electronic checks will become the major payment method for large-

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[40] Ravi Kalakota and Andrew Whinston, "Chapter 6: Electronic Payment Systems", in *Electronic Commerce: A Manager's Guide* (Addison Wesley Longman 1997), 153.

[41] The "payment against delivery" is "namely the problem that seller does not want to part with the goods without payment while the buyer does not want to part with payment until the goods have been received," according to Trystan Tether, "Chapter 7—Payment Systems for E-Commerce," in *Cross-border Electronic Banking: Challenges and Opportunities (Second Edition),* eds., Chris Reed, Ian Walden and Laura Edgar, (London; Hong Kong: LLP, 2000), 168.

[42] For more discussion on payment methods for EC, see Turban et al., "Chapter 8. Electronic Payment Systems," 274-304; Kalakota and Whinston, "Chapter 6: Electronic Payment Systems," 181-216; Trystan Tether, 167-200; and also Saul Miller, "Payment in An On-line World," in *Law and the Internet: A Framework for Electronic Commerce (Second Edition)*, eds., Lilian Edwards and Charlotte Waelde (Oxford; Portland: Hart Publishing, 2000), 55-77.

amount payments in B-to-B transactions; while in B-to-C transactions, digital cash, as a prepaid payment and the accompanying legal concerns on issues such as withdrawal, insolvency, and fraud, is clearly disadvantageous to consumers, but it is in the interests of both merchants and banks. Therefore, consumers, since they are significantly legally protected when paying by credit card, are advised to only use digital cash where micro-payments are required.

3.2.1.2 Security protection

The U.S. National Computer Security Association has identified four cornerstones of secure electronic commerce: **authenticity**, **privacy**, **integrity**, and **nonrepudiation**. Accordingly, Efraim Turban et al. (2001) suggest four essential security requirements for safe electronic payments:

1) Authorization: to verify the payer's identity before payment is authorized;
2) Encryption: to make messages indecipherable except by those who have an authorized decryption key;
3) Integrity: to ensure that information will not be destroyed or alerted in transmission; and
4) Nonrepudiation: to prevent consumers from denying orders they made, or merchants from denying payments they received.

Therefore, typical commonly used security schemes accompanying electronic payment methods to meet security requirements are:

1) Encryption. There are two types of encryption: **private key** and **public key**. For message transmission in an encryption scheme based on a single private key, a sender (encryption) and a receiver (decryption) use the same key, and only its owner knows this key. However, in public key encryption, two different keys are used. The sender encrypts the message with the public key, which is known to all authorized users, but this message can only be decrypted with the receiver's secret key. The Data Encryption Standard (DES) for secret key and the RSA (Rivest, Shamir, and Adelman) for public key are the most widely accepted algorithms for encryption. If a secret key is encrypted with the receiver's public key, it is called a **digital envelope**.
2) Digital signature and message digest. Just like the handwritten signature, a **digital signature**, attached to the sent message, is used for the authentication of a sender. To make a digital signature, the original message needs to be normalized to a predetermined length; the resultant hashed message is called a **message digest**.
3) Certificates and certifying authorities. A trusted third-party certificate authority (**CA**) issues a certificate to assure authentication and nonrepudiation. Particularly, a **transaction certificate** can be used to attest the conduction of a transaction, and a **time stamp** attests that a document was in existence at a particular time. In the context of credit cards, there are specific certificate authorities for cardholders (CCA), merchants (MCA), and payment gateways (PCA). Nationally, there is a geopolitical certificate authority (GCA) to designate certificates to CCAs, MCAs, and PCAs. Internationally, a brand

certificate authority (BCA) designates certificates to GCAs. It is assumed that a single root certificate authority (RCA) should be at the top of the hierarchy to certify BCAs.

3.2.1.3 Payment security protocols

The most widely used protocol to provide security and privacy is the Secure Socket Layer (SSL). Since SSL is general purpose, Visa and MasterCard have jointly developed the Secure Electronic Transaction (SET), which is specifically tailored to credit card payment on top of the SSL. A big difference between SET and SSL is that SSL is built into the browser, and so no special software is needed. SET requires three kinds of software: a cardholder digital wallet, a merchant gateway, and a gateway for a new entity—payment acquirer. SET also defines its own message formats. As a result, it is no surprise that SET has a list of technical problems, such as interoperability issues, and hence gives rise to several business issues concerning acceptance and transaction costs. SET is still evolving. Currently, most merchant gateways either stay with the SSL protocol or support both.

3.2.2 Supporting public policy—taxation and law:

No single body controls the Internet. Networks within different countries are managed according to local law and state policy, and ownership of the networks is distributed between universities, corporations, telecom companies, and governments. However, the world of electronic commerce is moving ahead of traditional business infrastructures. This is particularly obvious in the case of legal infrastructure, where

issues like privacy, intellectual property rights, and taxation have become especially difficult to deal with. Therefore, there have been attempts at international regulation to a common standard to provide electronic commerce applications with a stable and reliable marketplace. Even so, the most quoted principle for electronic commerce governance is what the Clinton administration in the U.S. released in July 1997 as *A Framework for Global Electronic Commerce*: "the private sector should lead." In total, the *Framework* suggests five principles, and they are: [43]

1. The private sector should lead.
2. Governments should avoid undue restrictions on electronic commerce.
3. Where governmental involvement is needed, its aim should be to support and enforce a predictable, minimalist, consistent and simple legal environment for commerce.
4. Governments should recognize the unique qualities of the Internet.
5. Electronic Commerce over the Internet should be facilitated on a global basis.

The *Framework* has provoked widespread international discussion and controversy among the diverse political and legal cultures, with the proposed role of the private sector in the lead. Among the issues raised, taxation, privacy, and intellectual property receive the greatest amount of publicity, while issue of the role of the state looms in the future. Therefore, major global approaches to these issues will be discussed below.

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[43] Available from http://www.w3.org/TR/NOTE-framework-970706.html or http://www.cmcnyls.edu/Papers/WHGIIFra.HTM, checked again on July 14, 2002.

3.2.2.1 Taxation

With regards to taxation of Internet-based transactions, the two major world actors in electronic commerce, the United States and Europe, differ substantially with each other. Although they both insist taxes should be neutral and equitable, it is obvious that they have either a different understanding of this principle or different ideas of how to implement it. In Franda's words, one side is "the maximalist notion of a self-regulatory regime," while the other extreme is "the preferences of traditionalist Europeans that private-sector involvement in Internet Commerce be subject to the same kinds of regulations that had governed previous technologies in Europe."[44]

Domestically, in December 2001, after three years of Internet tax freedom (from October 1998), the U.S. government renewed the ban on any new taxes on Internet transactions for at least another two years. The only amendment is the Children's Online Privacy Protection Act, which is to prevent extension of tax benefits to purveyors of pornography.

As to the U.S. position on international taxation on Internet-based transactions, in October 1999, the U.S. House of Representatives voted for a resolution to seek a permanent moratorium on international electronic commerce tariffs at WTO meetings. Later, the U.S. government lobbied the Organization for Economic Cooperation and Development (OECD) to implement a ban on "special multiple and discriminatory taxation of electronic commerce and the Internet." It also opposed a UN proposal for the establishment of a "bit tax" on electronic transmission of information.[45]

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[44] Marcus F. Franda, "Chapter 3. Frameworks for E-commerce and taxation," in *Governing the Internet: The Emergence of an International Regime* (Lynne Rienner Publisher, 2001), 89-90.
[45] Ibid., 95.

Since electronic commerce transactions are expected to multiply at an exponential rate, all countries and regions want a piece of the pie. The opinion of the European Commission is that "existing European consumption taxes have been and will be modified to apply to electronic commerce."[46] Many nations, especially the developing ones, oppose the U.S. suggestion in the WTO of a global ban on electronic commerce tariffs, since Internet-related taxation is viewed, in some places, as a means of paying for domestic Internet infrastructure costs.

The debated and complicated Internet taxation issues are that several tax authorities may be involved in a single transaction and that the identity of each of the transacting parties is frequently a problem. Since no obvious solution is currently available, opponents of Internet taxation argue that large burdens arising from collecting and remitting such taxes will probably be not cost efficient. And some think that the revenue at stake may not be particularly large, because no data currently exist to examine the likely effects of taxes on purchases in this "infant" industry.[47]

However, the collection of Internet-related taxes is not a big problem for those nations adopting a value-added tax (VAT) system.[48] Those in favour of Internet-related taxation think that the manner in which the VAT is collected makes it easier to collect Internet-related taxes, and that it would be more difficult for opponents to this manner to sort out which portion of a taxable product is Internet related. The fact is that VAT is the

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[46] Ibid., 97.
[47] Alan E. Wiseman, "Chapter Six: Taxation," in *The Internet Economy: Access, Taxes, and Market Structure* (Brookings Institution Press, 2000), 102-3.
[48] VAT is defined as " a series of indirect sales taxes paid on products and services at each stage of production or distribution of services that are folded into an all-inclusive price when the product is retailed to the consumer": ibid, 97. And "its legal structure should be well suited to dealing with e-commerce in that it relies on a commercial chain which passed on the tax cost with each successive transaction as 'value is added' until the consumer at the end of the chain who carries the burden of tax" according to William J Craig, *Taxation of E-commerce: Fiscal Regulation of the Internet* (Corydon: Tolley Publishing, 2000), 22.

world's primary method of indirect taxation; it is a single consumption tax system for the whole of the Europe Union, and every OECD member state except the U.S. has or plans to implement a VAT system.

3.2.2.2 Privacy protection

Regarding privacy protection, there are two broadly accepted rules: (1) the right of privacy is not absolute, and (2) the public's right to know is superior to an individual's right of privacy. Even so, there still are many different and even contrasting approaches to data protection because of different ethics among continents. The substantial conflict (over data protection) is between the Western and Eastern cultures. Compared with Asian countries, many Western countries have a much higher concern for individuals and their rights to privacy over social rights. For example, Sweden and Canada have very strict privacy laws.

In the novel context of electronic commerce, information transferring occurs more often than before across continents and countries and hence gives rise to concerns about rights to privacy. First, considering the diverse literature and values being transferred, it has been suggested that actions to control Internet content and access be taken. On the other hand, human rights activists raise the alarm about the possibility of governments threatening privacy by controlling the Internet code or abusing their authority when countering Internet crime and terrorism and related activities. Both sides are seems moral. Or in a more precise expression, both sides are likely to abuse the issue of privacy protection.

Even within the Western world, the United States and Europe needed to negotiate a means for reconciling two different traditions: the U.S. system of self-regulation by private companies, and the EU system of "restricted and relatively limited" government regulation. The agreement, based on a "safe harbor" arrangement, was reached in March 2000. Once it has agreed to a safe harbor arrangement with the EU, a U.S. company is subsequently bound by the arrangement; but at the same time, it has the opportunity to join whatever safe harbor arrangement is negotiated. In that case, it can transmit data to and from Europe without interruption, and its data is not subject to review by "data policy." Thus, neither the United States nor Europe has to change its own laws.

Technologically, privacy on the Internet is protected with encryption technology and code. Therefore, the issue that governments regulate the use of cryptography and control the import and export of encryption source code has been debated in the context of Internet privacy protection. Prior to the advent of broadly commercial applications of information technology, encryption technology was deployed almost exclusively in the field of military, intelligence, and diplomatic communications. However, with the burgeoning Internet applications, supply and demand has made this state-of-the-art encryption and authentication technology more available, convenient, and popular to end users in the form of a software package. Based on the argument that the use of encryption software by criminals, terrorists, and others would threaten national security, many governments—for example, Russia, Singapore, India, and South Korea—have imposed or are considering the adoption of controls over domestic use of cryptography. Even the United States, with the most advanced information technology and as the leader in electronic commerce, has imposed strict export controls on encryption source code for a

long time. Under pressure from business leaders for it to seek a more competitive involvement in electronic commerce, the U.S. government took some steps to gradually relax export regulations and enlarged the scope of export licensing exceptions. After 20 years of limitation on encryption technology of 56-bit codes, on September 23, 1998, the U.S. government allowed Compaq Corporation to export 128-bit public key encryption for the banking industry. In January 2000, it allowed any U.S. company to export any encryption item to its subsidiaries without prior review. Furthermore, from July of that year, the export of strong encryption (128-bit) technology was permitted to any customers within the fifteen EU members, as well as to select European and Pacific Rim countries.[49]

3.2.2.3 Intellectual property

According to Turban et al. (2000), intellectual property is "the intangible property created by individuals or corporations, which is protected under copyright, trade secret, and patent laws."[50] Internationally, it is assumed that trademarks, copyright, patents, and other intellectual property issues must be respected in Internet transactions the same way as they are in other mediums. The World Intellectual Property Organization (WIPO) has played a major role in intellectual property protection.[51] Below are the accomplishments

[49] According to "E-commerce Gets Banking Certificate in China" (*People's Daily Online*, July 23, 2000, from http://english.peopledaily.com.cn/200007/23/eng20000723_46198.html), the China Finance Certification Authority (CFCA), China's first national-level financial certificate of authority center, takes Entrust Inc.'s Internet security solutions and uses 128-byte encryption technology to provide digital certificates to e-commerce and on-line banking users.

[50] Turban et al., "Chapter 10. Public Policy: From Legal Issues to Privacy," 352.

[51] According to Franda, "Chapter 4. Investment and Intellectual Property," 119, the WIPO, signed by 171 countries, came into existence in 1970 and became an agency of the UN in 1974. It originated from the United International Bureaux for the Protection of Intellectual Property (BIRPI), which was a union in 1893 of the Paris Convention for the Protection of Industrial Property of 1884 and the Berne Convention for the Protection of Literary and Artistic Works of 1886.

of the WIPO concerning electronic commerce in the major intellectual property sub fields—trademarks, copyright, and patents:

1) The Uniform Domain-Name Dispute-Resolution Policy (UDRP) in August 1996: for settling disputes over top-level domain names or Internet addresses ending with .org, .net, and .com.[52]
2) The WIPO Copyright Treaty (WCT) and the WIPO Performance and Phonograms Treaty (WPPT) in 1996: dealing with rights of online transmission, computer software protection, conditions of rental, and technical protection system.[53]
3) The Patent Cooperation Treaty (PCT), effective since 1978.[54]

The existing comprehensive procedure for international enforcement of intellectual property laws in Internet-related areas is the Trade Related Intellectual Property Rights (TRIPS) Agreement of the WTO, which sets minimal standards for the content and enforcement of intellectual property law, as well dispute settlement and sanctions. The developed member countries are required to fully comply with TRIPS since January 1, 2000, and the developing member countries have a five-year deferment.

In the context of the information revolution, however, fierce protection of intellectual property has been criticized. The first movers of the personal computer and software industries could be rewarded greatly by charging for use of intellectual property,

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[52] According to Franda (2001: 124-5), most of the world's trading nations have not yet been able to enact domestic legislation specifically protecting trademarks in cyberspace. The U.S. moved first to make some adjustments, including enacting the *Anticybersquatting Consumer Protection Act* in 1999 and passing two amendments to the *Trademark Amendments Act* and the *Trademark Law Treaty Implementation Act* in the same year, which are fully compatible with the UDRP mechanism.

[53] At present, the two new WIPO treaties have not come into force. The U.S. has signed and ratified both.

[54] It is generally believed that the existing patent law is able to cope with the problem of patents in electronic commerce. For more details, see in Franda (2001: 129-132).

and therefore companies tend to patent everything in sight. For example, a laptop is estimated to contain up to 5,000 patented inventions.[55] The number of patents granted in the U.S.A. has increased 60 % over the last 5 years.[56] The extreme example of this is deemed to be Microsoft, who not only is internationally the target of **the open software movement** for its aggressive business style,[57] but who is also domestically accused of attempts to illegally monopolize the Web browser market, which eventually led to a seesaw lawsuit that began in 2000. Even so, it has been universally accepted that intellectual property protection is essential to the growth of the industry of information technology and so to the development of electronic commerce.

3.3 Electronic Commerce Applications

The Internet has altered many things, and as mentioned before, the invention of the WWW realized the widely commercial applications of Internet. In the terms of sectors, the biggest users of the Web hosting services are manufacturing (32.3%), finance (18.0%), transportation/utilities/media (11.8%), retail/wholesale (11.3%), and healthcare (10.3%).[58]

In this section, I would like to elaborate on two important electronic commerce applications: e-markets—where the general online buying and selling transactions are conducted—and e-finance—how this important service industry has been affected.

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[55] Steve Lohr, "I.B.M. is First Company to Collect Over 3,000 Patents in a Year," *New York Times on Web*, 10 January 2002, from http://www.nytimes.com.
[56] Ibid.
[57] Linux, for example, is one of the achievements of this movement. This open source operating system is open to users and encourages them to help to solve technical problems without imposing a patent or other intellectual property regulations on their involvement.
[58] Geoffrey Dutton, "Web Hosts Mind the Store," *CIO Newsletters: IT Forecaster* (from cio@update.cio.com), IDC, January 9, 2001.

3.3.1 E-Markets

The electronic market, as the term suggests, is an Internet-based "location" where business interactions occur. There are some kinds of commodities that can be effectively translated and delivered digitally. For instance, software, books and magazines, music and video, and these are among the most purchased items online. Many other kinds of commodities cannot be translated or transmitted digitally. However, almost all industries have joined the rush for the electronic commerce, because it is promised that Internet can eradicate traditional time-and-geographical barriers. Companies hope to turn this advantage to their benefit by integrating electronic commerce solutions into their traditional operations.

For manufacturers, the race has begun with using information technology (IT) to efficiently connect to suppliers and customers and to streamline processes. For distributors, the competitive strategy now is to make effective use of communications and information technologies to optimize loading and routing and thus enable just-in-time (JIT) delivery. For retailers, despite the saying, "dis-intermediation of the retailer channel," electronic commerce is helpful in tracking customer-buying patterns and tightening linkage with suppliers and other business allies.

Therefore, in e-markets, there are more interactions with customers so that more customer segments can be identified. On the other hand, sellers need more constant and precise monitoring of overall market trends and, at the same time, need to figure out their targeted customer segments.

In general, there are three models of electronic markets: the supplier-oriented marketplace (e.g., Dell); the buyer-oriented marketplace (e.g., GE); and the intermediary-

oriented marketplace (e.g., Boeing, Wal-Mart, Amazon, and Yahoo). Electronic commerce is not only a process of dis-intermediation; it also creates a large number of opportunities for new intermediaries, for example, the earliest and popular search engine—Yahoo—and the biggest virtual bookstore—Amazon.

Since the technology for all-party electronic markets is in the infant stage, a huge opportunity exists to provide solutions for the requirements that organizations must outsource: technological, human, and organizational. These solutions, including enterprise resources planning (ERP), Internet-based EDI, supply-chain management, and procurement management, to name a few,[59] provide organizations with strategic systems that enable them to increase market share, strengthen negotiation power, heighten entrance barriers against competitors, and tighten relationships with business allies in the context of electronic commerce. The leading vendors in this field are Oracle (U.S.A.), Microsoft (U.S.A.), SAP (Germany), and IBM (U.S.A.).

3.3.2 E-Finance

Financial institutions regard information technology (IT) as a critical success factor in their search to increase security and decrease costs. Therefore, the financial sector has been the leader in the field of technology investment for other sectors. For example, as early as the late 1980s, Citicorp's Global Telecommunications Network, the world largest private system, already linked 94 nations, transmitted 800,000 calls each

[59] And of course, secure electronic payment and JIT delivery are important components.

month, and supported $200 billion in daily foreign exchange trading.[60] Now, the average annual spending of the top ten U.S. banks on technology is more than $1 billion.[61]

In this era of the Internet revolution, the financial services industry has been profoundly affected too, but this time, compared to the days of the earlier stages of the rail, electricity, and other technological innovations, the innovative technology directly affects the banking system itself. [62]

According to Lin et al. (2001), electronic finance activities "include all types of financial activities carried out over the Internet or other networks, such as online banking, electronic trading, the provision and delivery of various financial products and services (e.g., insurance, mortgage and brokerage), electronic money, electronic payment, and communication of financial information."[63] IT not only makes existing financial services available through different channels and in different packages, but it also makes available new financial products and services. Because of the deregulation trend of the governments of developed countries since the 1980s, and because of time lag of regulatory structures for these new derivations, the boundaries between different financial institutions have been blurred, and it has driven the industry to be more competitive.[64] While non-financial firms are "encroaching" on the industry, banks and established non-financial institutions are broadening their own range of activities. However, easy-to-enter does not mean easy-to-stay. Electronic finance has been very successful for some

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[60] Schiller, "Chapter 1. The Neoliberal Networking Drive Originates in the United States," 13.
[61] Ibid., "Chapter 2. Going Global: The Neoliberal Project in Transnational Telecommunications", 84.
[62] Setsuya Sato and John Hawkins, "Electronic Finance: An Overview of the Issues," the Bank for International Settlements (BIS) Papers No 7, July 2001, 1. From www.bis.org/publ/bispap07a.pdf.
[63] Lihui Lin, Xiajun Geng and Andrew Whiston, "A New Perspective to Finance and Competition and Challenges for Financial Institutions in the Internet Era," BIS Papers No 7, July 2001, 13. From www.bis.org/publ/bispap07b.pdf.
[64] Ibid.

activities, such as brokering, but it has been slow to catch on in others area, such as electronic money and insurance.[65]

Brokering is the most dramatically transformed financial service. One reason is that brokering activities are relatively simple, and they are time-sensitive. By providing the means to supply investors with low-cost information and new communication and transaction capabilities, the Internet has allowed investors to "dispense with intermediaries (notable full-service brokers) and to interact directly with the marketplace, often with tools that were only available to professionals" until recently.[66] In the U.S.A., online trading now accounts for more than half of all transactions in retail markets; it is also predominant in equity and futures markets. For interbank foreign exchange trading, transactions in major currencies conducted using electronic brokers have been exceeding 90%.[67]

Online brokers are believed to make a profit because of the absence of brick-and-mortar investment and low personnel expenses. The prevailing trend is to develop an online brand in order to seek a maximum number of accounts for future delivery of financial services. As a result, only a few firms are able to win the resultant advertising war. Now, out of approximately 150 online brokers in the U.S.A, the top 10 handle more than 90% of online trades, while the top five brand leaders (notably E*trade) alone account for 80%.[68]

Banking is not affected as much as brokering, though major banks have invested on 7/24 online banking services through their Web sites, which provide customers with

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[65] Sato and Hawkins, "Electronic Finance: An Overview of the Issues," 1.
[66] Ezra Zask, "The Internet Brokerage Industry," in *The E-Finance Report*, ed. Ezra Zask, (New York; London: McGraw-Hill, 2001), 51.
[67] Sato and Hawkins, "Electronic Finance: An Overview of the Issues," 3.
[68] Zask, "The Internet Brokerage Industry," 59.

an extra choice besides customer representatives, tellers, telephone banking, ATMs, and other transaction or communication channels.[69] One reason banks are not affected is that public trust is crucial to banking—customers still prefer to do some physical banking at an institution with an established brand name. It is evidenced by a 1998 research that shows that face-to-face interaction promotes the greatest trust, while e-mail the least.[70] Especially when making more critical transactions and seeking financial information on the Internet, customers are concerned more about reliability and security. This is obvious for banks' advisory work, which is little affected. Another reason is that virtual banking services not only need high initial set-up costs for technology and marketing, but they also need a fundamental restructuring of business models. Currently, it has been realized that providing a combination of an Internet transaction channel and physical bank branches is the wisest course of action. [71]

The **payment system** for electronic commerce, specifically as a basic support infrastructure, has been discussed earlier.

Electronic finance especially raises security concerns. With access to exclusive and confidential customer information, financial institutions should take adequate prevention measures against fraud, hackers, and other security threats by using such methods as cryptography, back-up systems, firewalls, and other emergency procedures. Besides technology improvement, policies to protect customers' privacy right are also required.

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[69] The world's first virtual bank—the Security First Network Bank (SFNB, U.S.A.)—began its operation on October 18, 1995. In March 1998, SFNB sold its online banking operations to the Royal Bank of Canada.
[70] Quoted in Tony Picardi, "Trust: eCommerce Enabler or Achilles Heel," *CIO newsletter: eBusiness Trends* (from cio@update.cio.com), IDC, January 18, 2001; based on i2i trust in eCommerce, Judith Olson and Gary Olson, *Communications of the ACM*, December, 2000, p41.
[71] Sato and Hawkins, "Electronic Finance: An Overview of the Issues," 1-5.

CHAPTER 4. HOW ELECTRONIC COMMERCE IS APPLIED IN CHINA

Having reviewed what electronic commerce is and how it is applied throughout the world in previous chapters, I would like to discuss in this chapter the most pressing barriers to the use of electronic commerce in China, and then to identify what steps China should take, based on the status of its economy and its technological level. [72] This paper is not technology oriented; therefore, all the discussion is from the perspective of the government's role rather than from the perspective of the enterprises' role in facilitating and stimulating the development of electronic commerce. And the discussion is based on the literature produced by the United Nations Conference on Trade and Development (UNCTAD) regarding electronic commerce and its implications for the economic development of developing countries, as well as on English and Chinese literature concerning electronic commerce in China. Among these writings, from either outside or inside of China, the major obstacles for developing countries to benefiting from the new economy have been identified as *backwardness of telecommunication infrastructure* and *inadequate financial services, transport services, and legal support*. Therefore, these issues will be discussed below.

Before elaborating on these issues, I would like to briefly introduce the status of Internet applications in China, and their administration, first.

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[72] Some statistics of the status of electronic commerce in China are cited in pp 23, Chapter2.

4.1 The Status and Four-Layer Administration of the Internet Applications in China

The advent of the Internet in China began with the first e-mail link between Germany and China in September 1987, and China officially connected to NSFNET in 1994. From its first report on of October 31, 1997, the China Internet Network Information Center (CNNIC) releases semi-annual survey reports on China's Internet. According to the first report, in China there were 299,000 computers connecting to the Internet, 620,000 Internet subscribers, 4,066 domain names under .cn, and 1,500 Web sites. According to the updated report of January 2002, of 12,540,000 computer hosts, 2,340,000 are connected through leased lines and 10,200,000 are through dial-up connections; of 33,700,000 Internet users, 6,720,000 use leased line connections, 21,330,000 are dial-up users, and 5,650,000 use both; 1,180,000 use other equipment (e.g., mobile terminals and information electrical appliances). There are 127,319 domain names under .cn and 277,100 Web sites.[73] The growth rate of Internet applications is great. For instance, the number of Internet users increased on average more than 170% annually the end of 1997 to the end of 2001. However, even considering the largest number from the above statistics—the number of Internet users—the number represents only nearly 2.6% of the Chinese population (assuming that the total population is 1.3 billion), asymmetrically concentrated in Guangdong Province, Beijing, and Shanghai. In comparison, the percentage of Internet users in the U.S. was 54% (143,000,000

[73] From CNNIC's web page: http://www.cnnic.net.cn/develst/rep200201-e.shtml, cited on July 14, 2002.

Americans) in September 2001, and growth is at a rate of two million new Internet users each month.[74]

Amended in May 1997, the Computer Linkup Provisions set up a four-layer system for access to the Internet, and designated the Ministry of Information Industry (MII), which was established in March 1998, as the ultimate gatekeeper for transmissions to and from the World Wide Web.[75]

- The top of the system:

  MII-operated international gateway.

- The second level of the system:

  Four government Internet service providers (ISPs):

  - ChinaNet, administrated by China Telecom;
  - China Golden Bridge Net (China GBN), administrated by Jitong Communication Co. Ltd.;
  - China Education and Research Network (CERNET), administrated by the Ministry of Education; and
  - China Science and Technology Network (CSTNET), administrated by the Chinese Academy of Sciences.

- The third level of the system:

  Connected networks by private ISPs, obtaining a linkup business permit from one of the four departments administering the government ISPs, and linking to the Internet through the four government interconnected networks.

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[74] CyberAtlas staff, "U.S. Internet Population Continues to Grow," INT Media Group (http://www.internet.com), February 6, 2002. Cited on 14 July 2002, from http://cyberatlas.internet.com/big_picture/geographics/article/0,,5911_969541,00.html.

[75] Based on Gabriela Kennedy, "E-commerce: The taming of the Internet in China," *China Business Review* (July/Aug. 2000) 27 (4): 34-39. OVID: Full Text Record, Accession No. 01887485 (retrieved on 29 November 2000).

- The final level of the system:

  Internet users obtain Internet access indirectly from a private ISP or directly from one of the four government ISPs.

Below, I will address the some of the bottlenecks in the development of electronic commerce in China, beginning with the backward information infrastructure.

4.2 Information Infrastructure: *backward and uneven*

Recent technology innovations, many of which were initially designed for other applications, have made distance no longer a barrier in rural areas to accessing information. Increased capability of fibre optic backbones and cable TV networks, and especially innovations such as terrestrial wireless technology and satellites, have provided developing countries, where there are far fewer fixed telephone lines and where telephone networks are either outdated or costly and not available in remote regions, with a gleam of hope for the future: they could leapfrog old technologies and install fully digital wireless networks. However, despite the high growth rate in the information telecommunication industry, developing countries still have little share in the world market, and their information infrastructure is still inadequate and unreliable. Therefore, scholars recognize that the so-called "**digital divide**,"[76] also called "information gap" and

[76] This term is also used to refer to the disparities existing within the developed countries: between the rich and poor, the urban and rural areas, and the suburban and inner city. For example, in Donna L. Hoffman and Thomas P. Novak, "The Growing Digital Divide: Implications for an Open Research Agenda," in *Understanding the Digital Economy: Data, Tolls, and Research*, ed. Erik Brynjolfsson and Brian Kahin (Cambridge, Mass.: MIT Press, 2000), 245-60.

"**digital gap**," between information *haves* and *have-nots* could worsen with time, due to economic constraints in the developing countries. Such is the case in China.

China has strongly committed to telecommunications infrastructure construction and has put in place a competent infrastructure, through both domestic and international projects, such as the Asia-European and Sino-American fibre-optic projects, as well as broadband satellite communications.[77] China has 144 million telephone subscribers and a total of 1.25 million kilometres of fibre-optic cable. Several new domestic backbone projects under construction have a total designed capacity of tens of Gigabytes.[78] On the other hand, with its large wired and wireless telecommunications market (second only to the U.S.A.[79]) and huge market potential (considering the size of its population), China is regarded as one of the regions with a potential for rapid growth of electronic commerce. China's government has also made electronic commerce a priority.

However, compared to advanced countries, China is technologically backward. According to a multimedia access-ranking indicator assessed by the International Telecommunication Union (ITU), in 1998, China ranked 102nd in the total of 206 countries.[80] And the digital divide grows wider, rather than narrower, over time. The Internet gap between the U.S.A. and China is 21 times larger in 2000 than it was in

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[77] Xiaoming Jin (Minister-Counselor, Embassy of the People's Republic of China), presentation, "Internet in China," cited on 16 July 2002, from http://www.oit.umd.edu/cans/2001/Archives/jinXiaoming/.
[78] Ibid.
[79] According to Wong and Nah (Singapore; London, 2001: 2-4), China's mobile phone population is the second largest in the world, and 30% of its Internet users are using Wireless Application Protocol to access the Internet.
[80] According to UNCTAD, "Chapter 3. The State of E-Commerce," *Building Confidence: Electronic Commerce and Development* (UN, 2000), 72-7, "the indicator includes the number of telephone mainlines, TV sets, and cellular mobile phones per 100 people as well as the Internet host density per 10,000 people." According to this indicator, Canada and the U.S.A. host 65% of the Internet hosts and the developing world only shares 5.9%. As to the costs of communication, people in developing countries pay three times more than the OECD average; it is much worse when comparing the share of this cost in household disposable income: more than 10 times higher than in the U.S.A., mainly because users in developing countries are paying extra high prices for local calls.

1995.[81] In 2000, the IT industry contributed to the U.S.A. economy 45 times as much as it did to the Chinese, while the U.S.A. GNP was eight times that of the Chinese, based on the 1999 statistics.[82]

Moreover, there is a dual gap in reality; one exists between countries like China and technologically advanced countries, and the other one, an internal gap between major urban centres and rural areas. This internal gap is just described as follows: "While rural telephone access is comparable to the low end of the developing world, the dynamic coastal areas are close to the OECD average indicators."[83]

4.3 Payment and Delivery System: *fragmentary and inadequate*

Since the 1980s, electronic communications have been extensively applied throughout the world in support of large, repetitive, and standard transactions within or between international corporations. The well-known applications for these transactions are EFT and EDI. In the sector of financial services, the biggest inter-bank transfer network—SWIFT (Society for Worldwide Inter-bank Financial Telecommunications)—handles operations worth three trillion U.S. dollars daily.[84] As implied by the narrow or strict definition of electronic commerce, the payments as well as the transmission of an online transaction are required to be able to be conducted online: online payment system and just-in-time delivery (JIT). Therefore, financial services providers, especially payment systems operators, and transport services providers are both challenged by and

[81] Samuel J. Noumoff, "China: The Great Misperception," unpublished-nd, 37.
[82] Ibid.
[83] Quoted in UNCTAD, "Chapter 3. The State of E-Commerce," 73.
[84] UNCTAD, "Chapter 2. Selected Cross-sectoral and Sectoral issues", 55.

connected to the growth of electronic commerce. Driven by the competition in the industry and the booming of electronic commerce, financial services providers have been attracted to the integration of this innovative information technology into their EDI networks. In the transport service industry, companies also look at electronic commerce solutions for their operations in order to increase business opportunities.

However, the development of electronic commerce has been disproportionately concentrated in developed countries; the growth of supporting financial and transport services facilitating electronic commerce has been blocked in developing countries due to economic and technological backwardness. For example, EDI has been applied extensively in the U.S.A., Canada, and European countries, but when EDI was introduced in developing countries, besides the problems of availability and affordability, it encountered problems such as language barriers, adjustments to the local economy, difficult choice of standards, and shortage of software support, to name a few.[85] In China, bottlenecks in the finance and transportation sectors have hindered economic development for a considerable amount of time. More importantly, these bottlenecks are preventing China's economy from benefiting from the inherent advantage of electronic commerce: gaining and expanding access to larger markets through the global Internet-based communities. Below is the status of the two most fiercely problematic systems of conducting electronic commerce transactions in China: the payment system and the delivery system.

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[85] Griff Griffith, "Barriers to Electronic Commerce: Barriers to International EDI Development," in *Global Electronic Commerce: Report on the International Forum on Electronic Commerce, Beijing, China, March 1996* (A Global Information Infrastructure Commission Report) (Washington D.C.: The Centre for Strategies and International Studies, 1996), 66.

4.3.1 Payment system

Among the "Golden Projects" the Chinese government launched in the early 1990s, the Golden Bridge project aimed to wire Chinese citizens "to the national-wide financial network by 2010"; and the Golden Card project aimed "to facilitate national financial transactions and payments by creating a bank-card network akin to the global Cirrus networks and building regional switch centres to link ATMs and POS machines of different banks within regions."[86]

By the end of 1997, China's financial industry had installed more than 300 large and medium-sized computers, 4000 minicomputers, 300,000 personal computers, and 600 satellite communication stations.[87] There were approximately 15,000 ATMs and 120,000 POS machines up to the end of 1997,[88] and these numbers had increased to 27,000 and 240,000, respectively by 2001.[89] However, the numbers are very small, in terms of the numbers of units per capita, compared with those in advanced countries. For example, the number of ATMs in the U.S.A. was already 95,000 in 1993, and it increased to 165,000 in 1998.[90]

With the Internet booming in China, and in order to evade a PBOC's policy that permits banks to open only five new branches per year, banks in China have taken steps

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[86] John Wong and Soek Ling Nah, "E-commerce in China," in *China's Emerging New Economy: The Internet and E-Commerce* (Singapore: Singapore University Press; London: World Scientific, 2001), 64-5.
[87] Xiang Guan et al., *Electronic Commerce and Its Applications in China (Zhongguo dianzi shangwu yu shijian)* (Beijing: Qinghua University Press, 2000), 62. The number of ATMs more than doubled that of 7,000 in 1995.
[88] Ibid. And the number of ATMs was only 7,000 in 1995, which information is provided in Li Ye's "The Computerization of the Chinese Financial Industry" in *Global Electronic Commerce: Report on the International Forum on Electronic Commerce, Beijing, China, March 1996* (The Centre for Strategies and International Studies, 1996), 66.
[89] Xudong Zhang, "Integrating Bankcard Systems *(Liantong yinhangka)*," *South China Weekends (Nanfang zhoumo)*, October 18, 2001. From http://www.nanfangdaily.com.cn/zm/20011018/.
[90] Dan Schiller, *Digital Capitalism: Networking the Global Market System* (MIT, 1999), 13.

to embrace electronic commerce.[91] Although still limited, online financial services, particularly in the banking sector, are growing rapidly in China. In February 1998, China Merchants Bank pioneered online banking in China, and others quickly followed it. China Merchants Bank also provides the country's first Internet financial platform, with corporate and retail banking, online securities trading, and online payments.[92]

Notably, there has been great progress made in the third party trust service for electronic commerce. Several cities and provinces, such as Shanghai and Hunan, have set up their own certificate authorities. In July 2000, China's first national-level financial certificate of authority center was founded, called the China Finance Certification Authority (CFCA), which is under the direction of the PBOC and joint ventured by 13 major commercial banks. It uses the Entrust (Canada) Internet security solutions running on Sun Microsystems (U.S.A.) platforms and supports both SET and non-SET protocols.

As for the Golden Card project, the use of bank cards and ATMs has been promoted and has grown rapidly: since issuing the first card in 1985, Chinese banks have issued 383 million bankcards up to 2001; In 2001, the trading volume amounted to about

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[91] The People's Bank of China (PBOC) plays a role as the central bank of China. Four state commercial banks dominating the market are the Industrial and Commercial Bank of China (ICBC)—the largest, the Bank of China (BOC), the Agricultural Bank of China (ABC), and the China Construction Bank (CCB). The top ten domestic banks ranked by assets in 2000 are: ICBC, BOC, CCB, ABC, Bank of Communications, CITIC (China International Trust and Investment Corporation) Industrial Bank, China Merchants Bank, Sin Hua Bank, Guangdong Development Bank, and Shanghai Pudong Development Bank. There are some other nation-wide commercial banks, such as, China Everbright Bank (CEB), and Rural and Credit Co-operatives (RCC). The only private bank is the China Minsheng Bank. For more information, see *Country Finance: China* (March 2001), The Economist Intelligence Unit (EIU, UK), available from http://www.eiu.com.

[92] According to an introduction to partners of the NetEase.com (http://www.163.com), "In 1995, China Merchants Bank was a pioneer in personal financing with the launch of its "*Yikatong*" card, an all-in-one card. A year later, China Merchants Bank took the lead in realizing nationwide automatic deposits and withdrawals for savings accounts. A variant of their IC card was also launched in the same year, allowing for automatic deposits and withdrawals for corporate business. In February 1998, China Merchants Bank launched its "*Yiwangtong*" card, an all-in-one Net card, and became the first bank in China to provide online banking services. In the same year, the Bank launched its ATM nationwide automatic withdrawal network and POS nationwide consumption network, and a modern nationwide financing service network for individuals was born." Cited on 1 July 2002, from http://corp.163.com/partner_eng/001030/001030_383.html.

USD1018 billion,[93] direct consumption by card increased to about USD 15.4 billion, and the deposit balance in bankcard accounts increased to USD 54.6 billion, up by 55.4%.[94] The major Chinese banks have arrangements with international credit-card issuers such as Visa and MasterCard so that global online payment is enabled.

However, so far, card use makes up only 1% of payments, as designated shops allowing customers to use bank cards make up no more than 3% of the total in China. In other words, 97% of shops demand that people pay cash, at a level of only about 15% of world average.[95] Another problem is that the vast majority of the "credit" cards in use are more like debit cards, because the cardholders must deposit a considerable sum of money with the issuer after a stringent approval process; issuing of "true" credit cards is tightly controlled. These "credit," or debit, cards issued by a Chinese bank in one province cannot be immediately or successfully verified and used in another province as yet.

The most severe problem that both China and experts outside of China have identified is the absence of a nation-wide electronic payment system. Because China's modernization of financial-data communications infrastructure is under construction, payments for online transactions are made using mixed mode methods. These methods are the following: payment by credit or debit cards, payment upon delivery, payment by account transfer, and payment via the post office.[96] Among these, China's Merchant Bank's *Yiwangtong* (all-in-one card through the Internet) is the most popular online

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[93] Hereinafter, all calculations needed from RMB to USD use the target exchange rate of 8.28 RMB: 1USD.
[94] PBOC, "Strong Measures to be Taken to Achieve the Target of Connecting Bank-Card Networks This Year," March 27, 2002, from its web page: http://www.pbc.gov.cn/english/news/show.asp?b=84.
[95] Li Yan, "PBOC to Issue *Yinlian* Card," *People's Daily Online*, August 7, 2001, from http://english.peopledaily.com.cn/200108/07/eng20010807_76693.html.
[96] Wong and Nah, "E-commerce in China," 73.

payment method for B-to-C transactions,[97] not only because it is the earliest online payment system and thus a known brand name for Internet users, but also, more importantly, because it circumvents the problems of cross-regional payment; thus, it is almost the only available method of online payment that is technologically applicable and effective throughout the country. However, the capacity of *Yiwangtong* service cannot meet the increasing demand by the entire Chinese market for the bank card service, though China's Merchant Bank is the seventh top bank (but only with assets of USD 14.38 billion at the end of 1999).[98]

China is taking steps to solve the problems caused by fragmentary bank card networks and, of course, this situation is being progressively remedied. According to *Country Finance: China*, the Centralized National Automated Payments System (CNAPS), a national clearing system, has been being established. The PBOC's national automated bank payments system was linked to Hong Kong's real-time gross settlement system in 1997. Besides the PBOC's clearing center, there are five regional clearing centers, and regional link-ups are making progress. As of early 2001, it linked 10,000 ATMs, 100,000 POS centers, and about 100 million bankcards across 16 municipalities and cities.[99]

To solve this problem as soon as possible is becoming critical, for China has become part of the WTO and consequently its banking and other financial services markets are progressively being opened up to foreign competitors. In fact, the huge gap between the availability of and demand for bank cards makes this market particularly

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[97] It was thought to control 95% of China's online payments market, according to EIU, "E-Commerce Needs Workable Payment System," *Asia Research Report*, EIU (http://www.eiu.com), February 2001.
[98] EIU, *Country Finance: China* (March 2001), EIU (http://www.eiu.com), 11.
[99] Ibid.

attractive for foreign banks and other financial institutions, whose number of branches and scope of business in China are currently strictly controlled. For example, Visa International has been eyeing the Chinese tourism market. The number of Chinese who have traveled overseas ranks ninth in the world, with the number reaching 12.13 million in 2001. However, only 3% of them held international bank cards and only 1.74% of transactions were made with bank cards.[100]

As a countermeasure, China UnionPay (*Yinlian*) Company, owned by 85 domestic financial institutions, was set up and started issuing *Yinliane* cards, similar to VISA cards, in five cities—Beijing, Shanghai, Guangzhou, Hangzhou and Shenzhen—from January 10, 2002. The issuance of *Yinlian* allows users of all other bank cards issued by commercial banks to withdraw money and to conduct transactions and settlements on any ATM. There are some concerns about the *Yinlian* card, including how to speed up cooperation among all the financial institutions to promote the smooth connection of the networks and to facilitate the card acceptance nationally, as well as the issue of international acceptance of this card.

In conclusion, regarding the payment system for electronic commerce, a preliminary suggestion as to what China should do is that financial institutions, especially banks, should cooperate with each other on IT investments under a strategic plan by PBOC, and hence to realize a nation-wide network for electronic payment. In this process, outsourcing the available state-of-the-art foreign technology—hardware and software—is perhaps favored and unavoidable, but localized adjustments are necessary. Additionally, the gap is not impassable: established Chinese start-up technology companies could

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[100] Talgalder Asia Limited, "Visa International to join China UnionPay," *News Achieves*, April 27, 2002, from http://209.164.105.233/.

obtain know-how from joint ventures (JV), attain maturity from the competition with foreign direct investments (FDI), and benefit from various forms of strategic alliances.

4.3.2 Delivery system

The problematic delivery system for electronic commerce in China has been mentioned often, but it has been discussed far less. For complex reasons, China's distributive trade and transportation sectors have been behind other sectors in terms of using information technology applications. As for the transportation networks of roads and railways, both are overloaded and congested. Therefore, domestic regular postal and express services are slow and inefficient when handling electronic commerce transactions, particularly when cross-regional delivery is needed. (But postal services still are priority choices, because they are cheaper compared to others.) Some scholars have mentioned approaches to upgrading China's postal services to meet the requirements of electronic commerce. For example, in his *The Electronic Commerce Strategies for Chinese Enterprises (Zhongguo qiye dianzishangwu fazhan zhanlue)*, Guozhang Yao states that China's postal service can potentially be a major third-party logistics service provider for electronic commerce, and he further expands on the approaches that it could take.

According to Yao, by the end of 1999, the Chinese postal service possessed more than 32,000 postal cars, 506 railway wagons, and three postal plans. It had 66,000 post offices and 22,000 postal routes, with a total length of close to 3,000,000 km. Among its 550,000 employees, a majority are experienced workers. Its advantages are a computer-equipped network; a complete consumer-information database; a long-accepted and trusted brand name; a broad business scope, including independent express mail services;

and postal saving and transfer services.[101] Its strategic advantage is its network that reaches even to remote counties and villages, an advantage that other domestic and foreign competitors do not have. However experienced China's postal service in delivery, and even with developmental space to upgrade its technology infrastructure, it is not easy to deal with the distribution trade.

As addressed in *Building Confidence: Electronic Commerce and Development*, the choices of strategy for the provision of transport and logistics services in developing countries are either having domestic enterprises endeavour to develop such services to handle electronic commerce or depending on global services provided by enterprises of developed countries.[102] As for the first choice, there are many factors constraining developing countries from becoming the major provider of transport and logistics services. First, electronic commerce, on a global basis or at least in a large national market, requires integrated transport and logistics services to be provided globally or nationwide. Therefore, the costs of necessary IT and transport facilities, as well as the management of providing such a large-scale service involving horizontal and vertical alliances among carriers, forwarders, delivery service providers, and the postal service, are a huge obstacle.[103] Second, at the global level, the majority of the players in the market are already based in developed countries. North America and Europe together handle 90% of the Internet usage in freight transportation. And the dominant majority of express delivery companies engaged in electronic commerce are also based in either

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[101] Guozhang Yao, "Chapter 12: E-Logistics Strategies for Chinese Enterprises (*Zhongguo qiye dianzishangwu wuliu zhanlue*)," in *Electronic Commerce Development Strategies for Chinese Enterprises (Zhongguo qiye dianzishangwu fazhan zhanlue)* (Beijing: Beijing University Press, 2001), 126-41.
[102] UNCTAD, "Chapter 2: Selected Cross-Sectoral and Sectoral Issues," 53.
[103] Ibid., 54.

North America or Europe.[104] To cross the threshold of the market is difficult. Finally, due to limited volumes of electronic commerce, there is insufficient national or regional traffic for the growth of such services providers. Therefore, domestic enterprises are unlikely to have the advantage in competition with foreign ones.

As for the Chinese market, with the largest number of consumers, depending on foreign or domestic enterprises to handle the integrated transport and logistics service is impossible and impractical. Therefore, it is necessary to take into account China's particular infrastructure and technological capacity.[105] After reviewing selected literature on prospects, especially from inside China, I think that there is a valuable existing distribution network across the country: the Chinese Supply and Marketing Cooperatives (SMCs), The SMCs are comprehensive, trusted (by the common people), and reach even into remote regions. What is needed is to upgrade their communication equipment and, most importantly, to modernize their management system.

My suggestion is a county-and-sub-level cooperation between the Chinese post offices and the SMCs, that is, a combination of the communications network of the former and the established distribution network of the latter.

The Chinese SMCs are farmers' cooperative economic organizations. Under the leadership of the All China Federation of Supply and Marketing Cooperatives (ACFSMC), SMCs consist of 31 provincial, 318 prefecture, 2,100 county federations, and 28,000 primary societies, with a membership of 18,000,000 farm households, 4,300,000 employees, and more than 500,000 business outlets.[106] As well as its

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[104] Ibid., 49.
[105] Ibid., 54.
[106] ACFSMC, "An Overview of the ACFSMC," cited on 1 July 2002, from http://www.chinacoop.com/jieshao/zsgk.htm.

participation in various activities of the International Cooperative Alliance on behalf of cooperatives in China, the ACFSMC itself has 16 subordinate enterprises, eight science and research institutes, and seven institutions and 13 national-level specialized associations.[107] Its Web site, *www.chinacoop.com* (*Jinhe wang*), provides agricultural news, agricultural regulations and laws, supply and marketing information of agricultural products and fertilizers, and technological support for electronic commerce.[108] The business scope of the SMCs is broad. By the end of 2000, SMCs had 181,300 service centers in villages, 26,800 agricultural hospitals, and nearly 3,000 agricultural machinery teams. In other words, SMCs have the most comprehensive network that includes the main body of farmers of all the cooperatives in the world.

The initial mission of the SMCs was to be a major component of the state monopoly in purchasing and marketing in the period of the planned economy, so they were able to establish a relatively complete business-outlets network throughout the country. When economic reforms began and the idea of the market economy began to be accepted on a daily basis, SMCs began to be isolated from the development of other economic sectors of China, and this valuable network has been ignored. Recently, in some economically advanced provinces, such as Jiangsu and Zhejiang, internal and external entrepreneurs of the SMCs have realized the potential value of this network. But their experiments have been limited to introducing traditional business outlets and chain grocery stores in counties, and whether and how to extend the experience to villages is still under consideration.[109]

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[107] Ibid.
[108] The Information Center of ACFSMC, "About *Jinhe wang*," cited on 1 July 2002, from http://202.106.124.208/about.htm.
[109] Ibid., "Brief News," cited on 1 July 2002, from http://www.chinacoop.com/jieshao/zsyw.asp.

The idea of the adaptation of the SMCs' infrastructure to handle electronic commerce has still not been considered. The idea of cooperation between China's postal service and the SMCs does not seem to me to be a wild fantasy. Firstly, none of the domestic or foreign enterprises can provide the transport-and-logistics services needed to handle electronic commerce on a scale significant enough to cover the whole of China, with its rural majority. This cooperation would make use of the technology and economic resources already at hand and would not need the huge investment a new network would require; therefore, it would be economically sounder. Secondly, this cooperation, with experienced employees who are familiar with the countryside, would be helpful in educating rural populations at the beginning stages of electronic commerce by providing communications services (China's post office providing technology support) and acting as information windows (SMCs providing consultant services and business outlets). Finally, this cooperation can gain experience itself at the same time and prepare itself to launch further electronic commerce applications when the regional traffic becomes sufficient.

Of course, the success of this county-and-sub-level cooperation, or even strategic alliance if it came to fruition, would depend on awareness at the top level of both organizations and efficient management within the cooperative.

4.4 Taxation, Intellectual Property and Other Public Policies: *insufficient*

Among the specific concerns of developing countries for electronic commerce, the importance of developments in such areas as taxation, IP, domain names, and

adapting national legal infrastructure to electronic commerce has been repeatedly stressed. China is not an exception. I would like to examine what actions China has taken in these fields before making any recommendations.

4.4.1 Taxation

The current Chinese tax system was established in 1994. The most important revenue compositions are the VAT-based circulation tax and the income tax for enterprises.

The major task for China is still the digitalization of tax administration, described as the "Golden Tax" project, one of the "Golden Projects" launched in the early 1990s. However, to fulfill this task not only requires the "computerization" of tax administration and to the assigning of electronic identification (IDs) to both residents and enterprises on a national scale, but it also depends on the popular usage of electronic IDs and the integrity of electronic data obtained from various enterprises through the country. It may be the reason why Cai et al. use the concept "electronic tax" (*shuishou dianzihua*) when talking about China, after a comprehensive introduction of electronic commerce related tax issues in their book *Electronic Commerce and Taxation—Tax Policy and Administration in the Digital Era (Dianzi shangwu yu shuishou—shuzihua shidai de shuishou zhengce yu shuishou zhengguan)*. However, the development of electronic commerce will provide a good opportunity for China to construct a complete and flexible technology and administration infrastructure for taxation.

As to the taxation of electronic commerce, China has not released any substantial public reports nor taken any active measures, although the State Administration of

Taxation (SAT) has an internal committee looking at the issues;[110] the main reason for this "wait and see" approach is that the volume of electronic commerce transactions and revenue is still not considerable.

4.4.2 Intellectual property

China has issued major laws and regulations on protecting IP rights in almost every year since 1982. Aside from the State Intellectual Property Office (SIPO), the co-ordinating body for Chinese IP is the IP Working Conference of the Chinese National People's Congress. It plans to examine and make coherent IP legislation in China make it to conform to the Trade Related Intellectual Property Rights (TRIPS) Agreement and other legal requirements of the WTO. The electronic commerce related amendments to keep up with new technological developments are: [111]

- The Amended Patent Law and the Implementing Rules of the Patent Law, effective from July 1, 2001;
- The rules for protecting IP rights regarding the design of integrated circuits, effective from October 1, 2001;
- Amendments to the 1991 Copyright Law, more strictly defining infringement in such areas as computer software, exhibitions, and Internet-transmitted information;
- Amendments to the 1982 Trademark Law.

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[110] Colin Farrel and Alex Yuan, "Asia-Pacific Moves Up a Gear," *International Tax Review* (Jul/Aug., 2000) 11(7): 39-42. Ovid: Full Text Record, Accession No. 56975132. Retrieved on 29 November 2000.
[111] EIU, "4.2: Protection of Intellectual Property," in *Country Commerce (Updater): China*, August 2001, page 2, from http://www.eiu.com; and EIU, "Industry Monitor," in *Business China*, 19 November2001, page 11, from http://www.eiu.com. See also page 50 in Chapter 3 for more information about TRIPS.

However, as Marcus F. Franda criticizes, China is "the most intriguing country" that has established "a respectable, if not perfect, legal system" for IP rights, while continuing to massively violate those rights.[112] Although this criticism is hard to accept and, as he continues to point out, there are conflicts of national-cultural traditions relating to IP rights, it conveys some truth. Therefore, as he comments, the central point of the administration and legal framework for IP in developing countries is the question of enforcement of existing IP law and procedures, and the remarkable point is that both developed and developing countries have agreed to the terms of the TRIPS.[113]

Another reality is that, if there is no other reason than to protect China's increasing IP production, it is likely that she will increasingly conform to international norms.

4.4.3 Domain name registration

The China Internet Network Information Center (CNNIC) oversees the registration and administration of country level (.cn) domain names, from May 1997, based on a *Provisional Administrative Rules for Registration Domain Names on China's Internet*. The rules have been amended somewhat, but what has not changed is that, according to CNNIC, "anyone who want to provide the Chinese Domain Name registration service or agent service in the People's Republic of China should obtain the approval from the China's Ministry of Information Industry. Concretely, the

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[112] Marcus F. Franda , "Chapter 4. Investment and Intellectual Property," in *Governing the Internet: The Emergence of an International Regime* (Lynne Rienner Publishers, 2001), 130-1.
[113] Ibid., 134.

telecommunication administrative bureau of the Ministry of Information Industry is responsible for the matters concerning the inspection and approval."[114]

China was ranked seventh in the world in a 2000 survey by the Network Solution Inc. (NSI) in terms of number of registered .cn and .com domain names. Undoubtedly, the phenomenal potentiality of the Chinese market is attractive, so that an ongoing argument is unavoidable between NSI and the CNNIC as regards the Chinese domain name registration service. And it was on the verge of breaking out when NSI planned to provide the service in dispute in October 2000.

Besides the NSI and the CNNIC, another .cn domain name registrar is i-dns.net. The complexity of Chinese domain name systems is further complicated by the competing Chinese companies accredited by ICANN to act as registrars in one or more Top Level Domains (TLDs such as .aero, .biz, .com, .info, .name, .net, and .org): Eastern Communications Co. Ltd., Hi China Civilink, and Xin Net Corp.[115]

Aside from the confusing registration systems, competition also exists to provide the domain names dispute resolution, since CNNIC lacks the administrative mechanisms to resolve registration disputes[116]. As an alternative to settlement in China's courts, there

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[114] CNNIC, *China Ministry of Information Industry Declaration on the Administration of Chinese Domain Names on the Internet*, from http://www.cnnic.net.cn/doc/e-2.shtml.

[115] ICANN, "ICANN-Accredited Registrars," cited on July 16, 2002, from http://www.icann.org/registrars/accredited-list.html. Additionally, the status of Chinese-character domain names is confusing too. An attempt to make a distinct Chinese-character domain name system was proved a failure and soon called off in early 2001, according to "Experiment with Chinese-character Domain Name Called off", *China News Digest*, 22 February 2001, from http://www.cnd.org. For more about the NSI and the ICANN, see also in page 35, Chapter 3.

[116] Gabriela Kennedy, "E-Commerce: The Taming of the Internet in China", *China Business Review* (Jul/Aug. 2000) 27(4): 34-9. Ovid: Full Text Record, Accession No. 57244031. Retrieved on 29 November 2000.

are some ICANN-approved dispute resolution providers, and they follow the Uniform Domain-Name Dispute-Resolution Policy (UDRP). They are:[117]

- Asian Domain Name Dispute Resolution Centre [ADNDRC] (approved effective 28/02/2002). It has two offices, in Beijing and Hong Kong.
- World Intellectual Property Organization [WIPO] (approved effective 01/12/1999).
- New York-based CPR Institute for Dispute Resolution [CPR] (approved effective 22/05/2000).
- Montreal-based eResolution (before 16/10/2000 shown as [DeC]) (approved effective 01/01/2000; stopped offering domain dispute services after 30/11/2001).

4.4.4 Other legal issues

Encryption: The State Encryption Management Commission (SEMC) announced the *Commercial Use Cryptography Management Regulations* (referred to "*Encryption Regulations*") effective November 8, 1999. The regulations apply to all products of Data Encryption Standard (DES) and Rivest-Shamir-Adelman (RSA), but not to password-protected devices, browser software, and others, nor for encryption capability contained in mobile handsets and laptops. The regulations have been criticized, because they offer no clearly defined criteria for encryption products, fail to indicate how to hold

[117] Reuters, "Asian Web Dispute Resolution Group Named," *South China Morning Post*, 8 December 2001, from http://technology.scmp.com. The information is also from ICANN, "Approved Providers for Uniform Domain-Name Dispute-Resolution Policy," from its web page: http://www.icann.org/dndr/udrp/approved-providers.htm.

accountable units (manufacturers, distributors, or end-users) for non-compliance, and are not technological applicable. Therefore, they are too confusing to implement. However, it has been noted that it is China's intention to develop its own encryption products. [118]

Internet Content Control: The state Secrets Bureau under the Ministry of State Security issued the *State Secrecy Protection Regulations for Computer Information Systems on the Internet* (referred to "*Secrecy Regulations*") on January 1, 2000.

Contract Law: The new Contract Law was passed by the National People's Congress on March 15, 1999, and took effect from October 1, 1999. It is influenced by the suggested United Nations Commission on International Trade Law (UNCITRAL) Model Law on electronic commerce of December16, 1996. Therefore, it recognizes contacts made by EDI and e-mail.[119]

Two conclusions on this section of taxation and legal issues: 1) for taxation administration, China still offers little guidance for electronic commerce, and what it most needs to do is to upgrade the technological equipment as well as, by drawing on the experiences of advanced countries, to make a prudent plan for providing electronic commerce and future developments within a strategic and flexible network; and 2) regarding legal issues, it appears that China has taken action to adapt its national legal infrastructure to the international regime for the development of electronic commerce, but the crucial question is the enforcement of the laws and regulations.

In brief, this chapter attempts to figure out what position China holds in terms of electronic commerce development. According to the preliminary study of electronic commerce and the overview of how it is applied globally in previous chapters, the

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[118] Kennedy, "E-Commerce: The Taming of the Internet in China."
[119] Ibid.

network infrastructure (e.g., IT infrastructure and computer networking), the supporting common business services (e.g., payment system), and public policies (e.g., taxation and legal framework) are the foundation of electronic commerce applications.

In the case of China, and of most developing countries, a noteworthy issue includes transport services, where the networking infrastructure has lagged so far behind that it has gravely hindered the development of electronic commerce in the country. From the perspective of government administration, it is necessary to open this market to more competition, thereby increasing service quality and decreasing service fees. My suggestion is a strategic alliance between the Chinese post office and the SMCs at the county-and-sub level, which is not only economically sound, but also socially beneficial, since it creates an effective channel, considering China's particular economic and technological conditions, for spreading knowledge of the Internet and electronic commerce to the 80% of the Chinese population who lives in the large area of countryside.

From the point of view of government initiatives, China should taken action to remove the following three barriers in order to be benefit equitably from world electronic commerce development:

- The backwardness of IT infrastructure—not only does IT industry lag behind, but so do IT applications in other sectors, for example, in tax administration;
- The lack of a nation-wide electronic payment system; and
- The problematical enforcement of laws—harmful to the emergence of a fair and trustworthy market for electronic commerce.

CHAPTER 5. DISCUSSION AND CONCLUSION

This last decade has witnessed globalization being transformed by global access to the Internet. Having lured the second largest volume of foreign direct investment (FDI), the Chinese market has become attractive to those who have gained from the fantasy created by the dotcoms or who expect to manifest the fantasy globally. Through many channels, the Internet, with its unique and inherent advantage of being truly global, gives the impression that it has the ability to bring wealth, equality, and integrity to every corner of the world, which is the ideal propagated for years by both the capitalists and the communists. Therefore, it is worthwhile to examine the growth of the Internet in China: how it has been and will be used in a socialist market economy. However, my intention was not to write this paper from a political perspective, though it is necessary to keep in mind the political and social environment. The issues in question may be expressed as follows: What are the elements of electronic commerce and how is electronic commerce applied throughout the world? How has China prepared itself for electronic commerce and what should this emerging economy do to embrace the new economy? The objective of this paper is to answer these questions as thoroughly as possible with the available materials, English and Chinese, outside and inside of China.

The first issue of any study on electronic commerce is definition. Scholars and institutions have proposed various definitions or descriptions for electronic commerce. In this paper, I applied a definition as broadly as possible, whereby the government, especially in developing countries, is required to play a role as an important participant—

a driver, if not a leader—in the development of electronic commerce. Thus, electronic commerce was classified as three types, according to the different nature of the participants, namely:

- B-to-C: electronic commerce between enterprises/organizations and customers
- B-to-B: electronic commerce between enterprises
- B-to-G: electronic commerce between enterprises and governments

Once electronic commerce was properly defined, the next step was to determine its elements. The review of frameworks for electronic commerce in the first part of the main body of the paper provides a thread that runs throughout the study. That is, electronic commerce applications are based on **network infrastructure** and **supporting services**. If the former (i.e., **telecommunications, computerization,** and **networking**) is the foundation, then the latter (i.e., **payment system** and **public policies**) are the pillars. These two areas are also where governments play an important role, and thus they are where overall progress could be achieved from with the aid of governments.

However, developing countries have a common failing in that that their economies have not undergone a well-balanced development. Therefore, they need a mirror; that is, they must comprehensively examine the experience of their own economies versus the experiences of the developed countries and the rest of the world. After a comparison of China with the most advanced countries, based on the network infrastructure—supporting services framework for electronic commerce—one exploratory suggestion was made and three bottlenecks were identified in Chapter 4. As explained in Chapter 4, it was suggested that China's post offices and the Chinese Supply

and Marketing Cooperatives (SMCs) make a strategic alliance at county-and-sub level to make the best use of the two valuable active networks; however, its feasibility depends on awareness of the top level. Additionally, three bottlenecks were identified as:

- In the area of network infrastructure, the accessibility to various telecommunication means and computers is generally insufficient in all sectors and throughout the country, though the situation in some sectors or cities is satisfactory. However, it is dangerous to increase the existing digital gap within the country.
- In the area of supporting services, on one side, a national electronic payment system is a must either for electronic commerce development or for China's banking sector to compete and cooperate with its foreign counter partners. And
- On the other side of the area of supporting services, China has adapted its regulations and laws to the international regime to a great degree; however, the inconsistency in its legal framework causes confusion in implementation. Therefore, the enforcement of the law is a linchpin.

Even though it is obvious that it has been backward in terms of updating its technology infrastructure and providing supporting services, China has still been a pioneer in some fields of electronic commerce applications. For example, Beijing first conducted an online auction for a property left over in a settled lawsuit in November 2001.[120] Furthermore, there are a total of 61 government Web sites for government

[120] Xinhuanet, "Beijing Court Auctions Property on Net," *Xinhua News Agency*, 1 November 2001. From www.xinhuanet.com/english/

procurement or online auctions.[121] Therefore, it is necessary to look at the overall picture before approaching any conclusion as to what China should do next. Thus, before concluding this paper regarding the implications of electronic commerce for China by making helpful suggestions for the Chinese government to facilitate the development electronic commerce, it is necessary to have a general view of what scholars and international organizations have recommended at first.

5.1 Discussions of Electronic Commerce Actions Agenda for Developing Countries

Sue E Eckert, Catherine L. Mann, and Denial H. Rosen (1999) developed a "five umbrella" framework for analyzing the economic and policy implications of electronic commerce for the East Asian economy.[122] Compared with other studies, this framework is characterized by its perspective from an East Asian economy. Furthermore, based on an overview of electronic commerce environments in Hong Kong, Taiwan, and China, Rosen complements the structure by considering China's status:

1. A competitive telecommunications environment. Rosen thinks cost and speed are the major hurdles in China's telecommunications system, and the solution lies in competition. So, he argues for greater openness to foreign investment in basic and value-added service, and more promising, greater domestic competition in parallel networks, such as cable and wireless.

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[121] The Standing Committee of the National People's Congress passed the Government Procurement Law in June 29th, intended to improve transparency, according to EIU, *Business China* (08 Jul 2002), from http://db.eiu.com/search_view.asp?from_page=composite&doc_id=DB1055136&topicid=CN

[122] Daniel h. Rosen, "Hype Versus Hope for E-commerce in China," *China Business Review* (July/August 1999) 26(4): 38-41. Ovid: Full Text Record, Accession No. 01858339. Retrieved on 29 November 2000.

2. A payment network. Rosen identifies problems as follows: the low penetration of credit (or debit) cards in China, the intention of developing a state-managed store value card for payments over a network to which the government has access, and closed capital accounts sacrificing greater efficiency and perfect competition in the Internet marketplace.
3. Adequate trust in privacy and security. Rosen focuses on privacy and security problems derived from China's low rates of tax compliance, no official national model for managing certification and identification, and the gap between the leading cities and their neighboring provinces in China.
4. An encompassing legal infrastructure. In Rosen's opinion, there exist no old laws in China as do in many other countries; hence, wholly new legislation to facilitate EC is needed. And China should do more to protect consumer welfare and interests.
5. The completion of certain government-specific tasks. Rosen insists on private-sector leadership and limiting the authorities' involvement in technology neutrality and maintenance of system flexibility. He specifically states that the government should offer clear principles for private-sector investment in EC, set up a pro-competitive regulatory regime, and "resolve its conundrums about Internet content and social agendas."

After the intensive consultation and discussion process on "E-commerce and development", the UNCTAD also recommends three key preconditions for developing countries to participate in electronic commerce, taking into account their particular

infrastructure and technology capacity. The identified priority areas fall along the line of this trilogy: access—know-how—trust.[123] Accordingly, in a report that the UNCTAD released in 2001 on electronic commerce and development, China's e-commerce was considered to be still in its early stage, and a significant growth in e-commerce would require major efforts in:[124]

a. Enhancing the Internet and PC penetration rate;

b. Liberalizing telecommunication services, to create a competitive environment to improve services and reduce access cost;

c. Creating an efficient electronic payment system;

d. Establishing a comprehensive, uniform legal framework providing adequate protection of security, privacy, and intellectual property rights; and

e. Accelerating human resource capacity-building, including language skills.

The two sets of recommendations above are commonly located in the areas of telecommunication services, payments system, and legal framework. The only differences are that Rosen has specific recommendations on issues such as Internet content control, while the UNCTAD puts more emphasis on the penetration of technological equipment as well as on knowledge like language skills. Both analyses are helpful to make the conclusion below.

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[123] UNCTAD, "Chapter 3. The State of E-Commerce," 7. The trilogy is: 1. Access: including "both physical access (to telecommunications infrastructure and networks such as Internet) and economic access (whereby the price structure through which potential users can access Internet—hence e-commerce—is not prohibitive)"; 2. Know-how: requiring "the proper knowledge and experience be shared among potential users"; and 3. Trust: including all issues related to the security and confidentiality of transactions, authentication and encryption issues, and other relative themes, for example, IP, contracts, legal and regulatory frameworks, and consumer protection.

[124] UNCTAD, "10. China's ICT Strategy and E-Commerce," in *E-Commerce and Development Report 2001: Rends and Executive Summary (Internet Version)* (UN, 2001), 57, available from http://www.unctad.org/en/docs/ecdr01ove.en.pdf.

5.2 Conclusion

After a preliminary comparative study of the most advanced experiences in and internationally accepted regime for electronic commerce around the world and the case in China according to the **network infrastructure** and **supporting services** framework, and using Rosen's "five umbrella" structure and the UNCTAD's trilogy for reference, I recommend the following three priority areas, brief comments following, from the point of view of the role of the government in the development of electronic commerce in China:

1. More efforts in telecommunications penetration and computerization, and providing guidance for the development of networking technologies:
   - To encourage greater domestic competition in the telecommunications industry in parallel networks, such as cable and wireless. The openness to foreign investment in basic and value-added service is perhaps not a strategic choice, considering China's vast area and the diverse economic and geographical situations among regions.
   - To increase the Internet and PC penetration rate by investments, including JVs and FDIs.
   - To localize imported hardware and software technologies, as well as acquire know-how from JVs and FDIs.
   - To encourage start-ups in the fields of microchips, security technology, standard bank software, and knowledge management software.

- To computerize taxation administration, as well as to upgrade the technological equipment of other sectors; that is to extend the usage of electronic data.

2. A nation-wide electronic payment system and an integrated transport and distribution services provider at the national level:

- A national electronic clearing network enabling cross-banks and regions payments.
- The completion of the China Finance Certification Authority (CFCA), and the promotion of the broad acceptance and usage of CAs; as well, the consideration of compatibility with relative international technical standards.
- The completion of the credit card system and the promotion of credit cards issuance, and dealing with the issue of international acceptance.
- As to the provision of integrated transport and distribution trade services, as I have suggested, a strategic alliance between the post office and the Chinese Supply and Marketing Cooperatives (SMCs) at county-and-sub levels is economically sound, and it opens "windows" to spread "appropriate knowledge" in the countryside, which is a solution to the problem of narrowing the domestic digital gap. Therefore, JVs and FDIs are encouraged, as the first steps towards maximizing localization to the extent possible.

3. The enforcement of existing laws and regulations.

- The establishment of a uniform legal framework providing adequate protection of security and intellectual property rights.
- The enforcement of existing laws and regulations to clear up confusion about definitions and accountability, and re-examination and adjustment of the laws to be technologically neutral and applicable.
- The development of taxation, contractual, and other legal cultures.

It should be noted that, among the remaining outstanding issues is the extent to which China will retain the capacity to control the inevitable "e" world as opposed to it falling under external control. Will China be forced to compromise self-control in the process of adapting knowledge gained from foreign experiences as she invariable encounters the problems emerging from her WTO accession? Additionally, the growth rate in China's markets has been so great that it is difficult to make forecasts and recommendations.

By and large, despite its preliminary character, this study offers some insight into what China's situation is in terms of electronic commerce development and what barriers the Chinese government should remove, and this study may also open up new prospects of solutions, notwithstanding its limitations. More aspects await analysis in future research to complete the study of electronic commerce and thus broaden and deepen its implications for China, other developing countries, and other circumstances.

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CERN	*Conseil Européen pour la Recherche Nucléaire*, now called European Organization for Nuclear Research
CNNIC	The China Internet Network Information Center
EIU	The Economist Intelligence Unit
ICANN	the Internet Corporation for Assigned Names and Numbers
IDC	International Data Corporation
PBOC	People's Bank of China
UNCTAD	the United Nations Conference on Trade and Development

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