

E-Commerce Education in China: Driving Forces, Status, and Strategies

Xianfeng Zhang
Department of E-commerce
College of Economics and Finance
Xi'an Jiaotong University
Tel: +86-029-88598176, Fax: +86-029-82656916
zxf@xjtu.edu.cn

Qi Li
Department of E-commerce
College of Economics and Finance
Xi'an Jiaotong University
Tel: +86-029-85222076, Fax: +86-029-82656916
liq@xjtu.edu.cn

Zhangxi Lin
The Rawls College of Business Administration
Texas Tech University
Tel: (806) 742-1926, Fax: (806) 742-3193
zlin@ba.ttu.edu

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Abstract:

With an explosive growth of e-businesses worldwide, e-commerce in China is booming, leading to the development of e-commerce education. This paper is intended to investigate whether the education system in China well accords with the market demand and the status of e-commerce programs in China, so as to seek for the strategies for China to cope with the challenges from the global e-commerce empowered by fast updated information technologies. First, we construct a four-layer conceptual model to describe the relevant factors influencing e-commerce and e-commerce education. We then present the status of China's e-commerce education in different educational categories. Although we find that current problems in China's e-commerce education can be resorted in quantity and quality aspects, it generally is in the right track. Finally, we propose several main strategies for promoting the development of e-commerce education, in which the education system reformation is of the top priority and the government will play a critical role.

Keywords: E-commerce; Education; China; Conceptual model; Strategy.

1. Introduction

The rapid growth of e-commerce imposes an increasing demand for the professionals who possess the knowledge of conducting businesses in this fast-evolving electronic marketplace (Brin, 1999). To cope with the ever-increasing demand in e-commerce education, in the last decade, the education system has been undergoing a structural evolution in many countries. Taking the US as an example, by February 2001, fifteen schools had offered master programs in e-business related majors, thirty-nine schools had issued master's degrees with the concentration in e-business, seventeen schools had had certificate programs in e-commerce, and seven schools had furnished undergraduate programs in e-business (Krovi and Vijayaraman, 2001). In fact, the e-commerce courses or the courses covering issues in e-commerce are common in colleges in the US and Europe.

E-commerce education has also developed rapidly in China during the recent years, owing to the booming e-businesses with an explosively growing participant population connected by constantly expanding Internet capacity. By July 2003, the number of Internet users in China had reached 68 million, ranked as the second largest in the world next to the US (UNCTAD, 2002). The popularization of the Internet in China, which is reinforced by the ubiquitous wireless network, provides huge e-commerce opportunities for China as well as the world. To further promote the e-commerce, China has drawn an ambitious e-commerce education plan for its 1.3 billion people. Since 2000, various e-commerce programs had been established in many Chinese universities¹.

¹ In China, there are comprehensive universities as well as colleges emphasizing on a specific field. Here in the paper, we normally call them "colleges" for convenience, excluding a few exceptions with peculiar meaning.

According to a citation in People's Daily (2003), the official Chinese medium, there will be more than two million e-commerce related positions to be filled in the next ten years, while currently there are only about one hundred thousand staff members working in the e-businesses. Specifically, the impacts of e-commerce on the education in China are not only in the aggregate demand for e-commerce professionals, but also in the content of the educational programs. Underpinned by the Internet technology, e-commerce has actually made the marketplace more globally accessible. This in turn stimulates the needs for the education of e-commerce in all areas of business administration-- information systems and technology, management, marketing, finance, organizational design, etc.--with the increasing requests for the knowledge of different political, economic, and cultural systems (Hromadka, 2000).

Currently, China's education system is confronted with increasing pressures from the internationalized e-businesses. Consequently, the issues arise: could current education system and e-commerce programs well accord with what schools have committed? What are the key strategies for coping with the challenges from the global e-commerce empowered by fast updated information technologies? The paper is intended to tackle these two questions based on the investigation of the factors driving e-commerce education in China. The organization of this paper is as follows: Section 2 discusses the driving forces of e-commerce education in China; Section 3 presents an overall picture of China's e-commerce education; Section 4 analyzes the internal problems; And finally, a number of strategic suggestions are proposed in Section 5 as the concluding remarks.

2. Driving Forces of E-commerce Education in China

2.1 E-commerce Education Research

So far, e-commerce education research has been mostly case-oriented and commonly stressed on curriculum design. A typical curriculum proposal for the graduate program in e-commerce is based on an e-commerce reference model composed of business level, customer behavior level and IT resource level (Menascé, 2000). In general, e-commerce education is the extension of existing programs by adding extra courses. For example, Jenkins (2000) proposed four courses were needed in the program with the e-commerce concentration: two required courses and two electives, whereas, Cloete (2002) suggested that the course settings should conform to the nation's development. Therefore, it is understandable that e-commerce has been a specific program in many universities in China, which provides curricula at different levels (Yang, 2003).

Compared to the above, relatively less research has been conducted regarding the impacts of social, economic and cultural factors on the curriculum of e-commerce. Words on the driving forces of e-commerce education are sporadic and non-methodical. They mostly ascribed the impetus to the rapid growth of e-commerce. In an early explanation of changing divers in education, Williams (1999) classified e-commerce as the technology pull. Jenkins (2000) broadened the meaning of e-commerce and deemed the growing demand for employees with knowledge in e-commerce derived by the expanding e-commerce being the main cause of e-commerce education. Cloete (2002) added the complexity of the multi-disciplinary nature of e-commerce. Luckily, in the context of China there is a richer literature in discussing the influential factors of e-commerce, which may explain the fast growing demand for the e-

commerce education (Turban, 1999; Foster, 2001; Tan and Oyang, 2002). Turban (1999) classified these influential factors into three levels: market and economic pressures, societal and environmental pressures, and technological pressures. Forster (2001) put the factors affecting the adoption of e-commerce in China into four dimensions: top-down, bottom-up, globalization and cultural issues. Tan and Oyang (2002) explored multifold environmental factors that could facilitate or retard e-commerce diffusion in China from the aspects of national environment and national policy. However, how these factors will affect the e-commerce education still remains untouched.

2.2 A Four-Layer Conceptual Model for E-Commerce Education

In light of the above research outcomes, we sketch a four-layer conceptual model to illustrate what affects the evolution of e-commerce education and how this mechanism works (Figure 1). Within the surrounding social, economic and cultural environment, we identify the relevant factors influencing the adoption and growth of e-commerce, which further pushes forward the e-commerce education (Figure 1). There are four main factors in the model: economic globalization, domestic economic growth, IT advancement, and government promotional interventions. These factors influence the growth of e-commerce, which can further push forward the e-commerce education. The four angles are applicable to both e-commerce and e-commerce education.

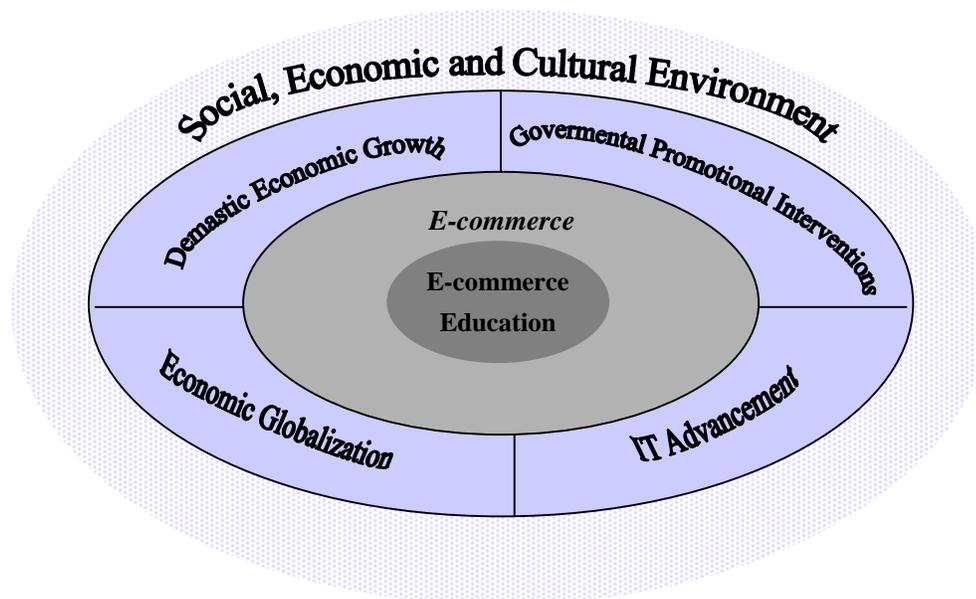


Figure 1: A conceptual model of driving forces for e-commerce education

1) Economic Globalization

Since China started its economic reformation a quarter century ago, its economic system has been progressively migrated to suit the globalizing world economy. Inevitably, the booming e-commerce worldwide exerts critical influence in China's domestic market evolution. Gartner Group reported (ECTSC, 2001) that worldwide e-commerce sales were US\$953 billion in 2000, and that the figure was predicted to be US\$5.95 trillion in 2004. According to a survey conducted by the US Department of Commerce (2003), retail e-commerce sales (B-to-C) in America increased to \$12.5 billion in the second

quarter of 2003, up 27.8% from last year. The e-commerce development of China appears to be highly correlated with a sales value of US\$9.33 billion² in 2000 and a prospected target of US\$43 billion in 2003 (Figure 2). Meanwhile, being a member of WTO also leads to a more rapid growth of e-commerce, especially when China dedicated itself to lowering tariff rates, deregulating previously protected industries, and enhancing overall market competition during these years.

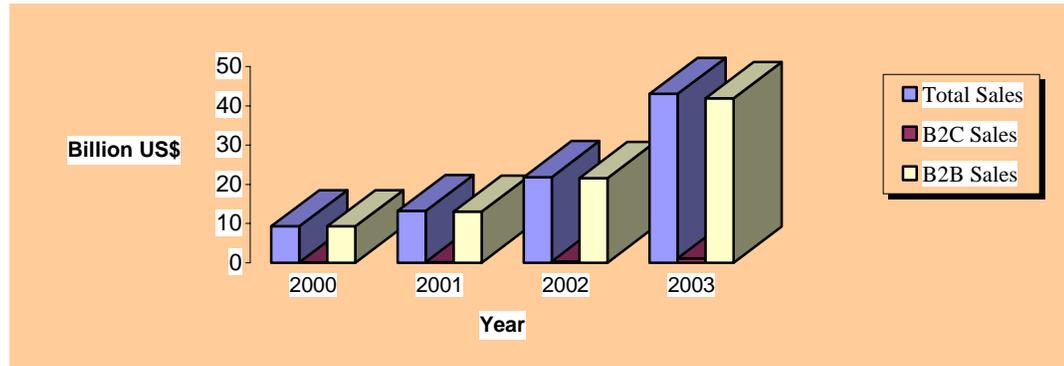


Figure 2: E-commerce Growth in China

(Source: China E-Commerce Year Book, 2002 & 2003)

Accordingly, more and more Chinese enterprises involved in e-businesses are facing challenges in complying with international business laws and conventions. They need to compete with those experienced rivals in the worldwide marketplace. So, the demand for e-commerce professionals is increasing rapidly with the qualification requirements in international businesses, particularly the advanced concepts in e-commerce due to the globalization trend of China's economy.

2) Domestic Economic Growth

The development of e-commerce in China has been accelerated by its booming economy. In recent years, China has been enjoying an average rate of 8% in economic growth. At the end of 2001, China's GDP reached US\$1,160 billion, being US\$912.1 per Capita (Figure 3). Meanwhile, the structure of GDP regarding different industries has been greatly changed, with the primary industry declining and the tertiary industry increasing significantly³ (China National Bureau of Statistics, 2002a). Undoubtedly, Chinese enterprises have to speed up their pace by adopting the cutting-edge information technologies and the advanced managerial ideas in e-businesses, so as to be more competitive in the market. The reported consecutive investment of US\$3.26 billion each year in IT applications since 1996 by China's banking industry is strong evidence (CCID, 2003). Therefore, the demand of e-commerce education driven by China's domestic economy comes from Chinese enterprises in two aspects: to participate in the e-commerce in maintaining sustained business growth and to survive the more competitive marketplace.

² Throughout the paper, the exchange rate of US dollar and Chinese RMB is 1: 8.27.

³ The primary industry refers to extraction of natural resources; the secondary industry involves processing of primary products; and the tertiary industry provides services of various kinds for production and consumption. The above classification is universal although it varies to some extent from country to country.

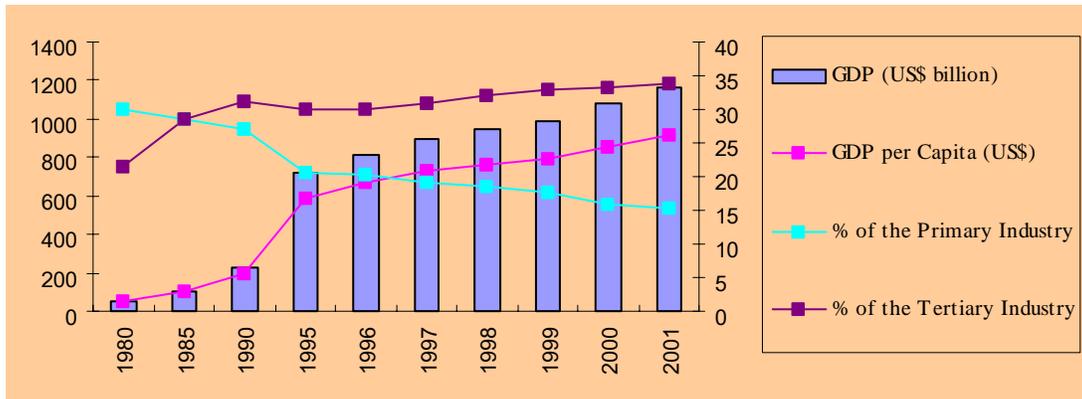


Figure 3: China's Economy Growth

3) IT Advancement

The increasing capacity of telecommunication infrastructures and the popularization of IT applications in China, particularly in the last decade, have refueled the growth of e-commerce. In 1995, long-distance, local, and mobile phone systems had totaled an exchange capacity of 3.52 million routes, 72.04 million units and 7.97 million users. With an average year growth rate of 12.53%, 19.24% and 60.20% respectively, the capacity of the telephone services has increased to 7.04 million routes, 205.70 million units, and 219.26 million users by the end of 2001 (China National Bureau of Statistics, 2002b). In 2000, with its two-digit growth rate for years, China's IT industry revenue reached almost US\$56.38 billion with attributions of US\$22.7 billion from hardware, US\$2.87 billion from software, and US\$3.88 billion from services (ITU, 2001). By the end of 2000, computer holders per 100 capita had improved to 2.32. Telephone and mobile phone holders also reached a level of 20.10 and 6.77 (China National Bureau of Statistics, 2002c). Figure 4 shows the upward changing curves of these indicators.

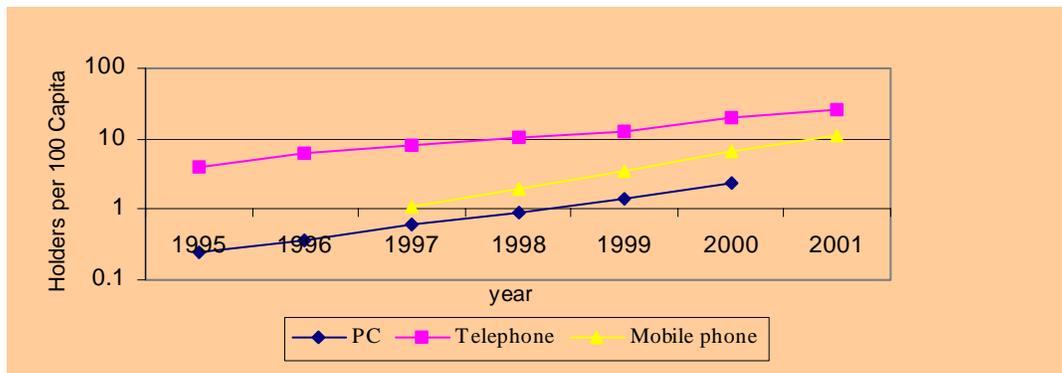


Figure 4: IT Adoption in China

IT factors promoting the e-commerce education can generally be summarized into two aspects: the improved public information infrastructures and the increasing investment in e-commerce education. In 1995, CERNET (China Education and Research Network), the Chinese government sponsored Internet for academic services was put into use. By the end of 2001, a 20,000-kilometer DWDM/SDH

communication network covering over thirty central cities had been in operation. Currently, the backbone capacity of CERNET reaches 40Gbps and the internal user population is over eight million. CERNET provides free access to the Internet for colleges in China and has become an important facility for e-commerce education. Since the late 1990s, most colleges in China have connected their campus network to the Internet via CERNET (CERNET, 2001).

4) Government's Promotional Interventions

In order to improve the institutional infrastructures of e-commerce and e-commerce education, the Chinese central government and local governments have been issuing laws and regulations successively. They also financially sponsored some key academic projects, which greatly benefited e-commerce education. For example, in the first stage of the "211" Project, a core project to cultivate one hundred top Chinese universities in the 21st century, carried out during 1995 to 2000, the central government has devoted an amount of US\$443.37 million in public service system constructions and US\$120.48 million in basic infrastructures for the selected Chinese universities (China Ministry of Education, 2001b). In the "985" Project, another academic project started in May 1998, a total amount of US\$2,656.59 was invested jointly by the central and local governments in China to support the efforts of some key Chinese universities in entering the top tier in the world (Yang, 2003).

In addition, the adoption of e-government in China has further strengthened the demand for e-commerce education. Launched in January 1999, China's "Government Online Project" involves most government agencies in a countrywide Internet-based application system. At the end of 2002, over 7,200 governmental departments had set up websites and deployed some of their public services on the Internet (<http://www.gov.cn>). Because the government employees with the required Internet application skills share the similar qualifications as those for e-commerce, the adoption of e-government in China will fuel the demand for e-commerce education.

3. Current Status of E-commerce Education in China

E-commerce education in China is carried out in three categories: regular collegiate education, continuing education, and professional education. Usually, the students of regular collegiate education are those who have access to colleges after entrance examinations and intend to pursue academic degrees. The main form of continuing education programs is the *Self-Taught with Certifying-Examination* (STCE) program, available to those who have no means to study in colleges but with a desire for academic diplomas. They either take classes in colleges or self-taught and participate biannually the certification examinations of each course required for the enrolled program. An STCE student must pass all exams of certified courses to receive a diploma of associate or bachelor degree. Provincial governments normally administrate STCE programs, because most students in STCE programs are from the local or the nearby area. Professional education mainly offers to those who want to learn more practical skills for better job opportunities. It includes those professional retraining programs offered by all kinds of educational institutions in China. A Qualified trainee will receive the certificate of the specific course he/she has taken.

3.1 E-commerce Education in Regular Colleges

E-commerce education in regular colleges in China has undergone four stages in the last eight years in accordance with the pace of Internet popularization since 1995.

Stage 1: Exploratory Stage

Inspired by the early claim of “making money on the Internet” in 1995, the exploration of e-commerce education in China was started mainly in universities. Since 1997, some universities have accordingly established the e-commerce concentrations for Master or PhD students.

Stage 2: Piloting Stage

As early as 1998, a number of electives or required e-commerce-related courses were developed in some universities. Before China’s Ministry of Education formally issued the regulations for e-commerce program administration, some universities allowed students to choose e-commerce as a minor or second major based on these courses. A few leading universities even offered the e-commerce concentration in the programs of MIS, Economics, Management or Computer Science. E-commerce courses in different colleges had also diversified concentrations at that time. Some emphasized on business administration, while others focused more on technologies.

Stage 3: Formalizing Stage

The Ministry of Education had approved 152 colleges to offer the e-commerce programs by the end of 2002. In the meantime, the Association of E-commerce Curriculum for Chinese Colleges (AECCC), affiliated with the Ministry of Education, was founded for coordinating the e-commerce programs. In the First Workshop of AECCC held in Xi’an, Shaanxi during April 23-25, 2002, a goal was set to foster 100,000 college students and professionals in e-commerce during the next few years. The 1st and 2nd AECCC council meeting held recently proposed the guidelines for e-commerce programs in nine topics⁴. In addition, the council suggested an annual training program for senior faculties and a biannual training for junior faculties in e-commerce education to further enhance the quality of e-commerce programs. Two such training sections were already held in 2002 and 2003 respectively.

Stage 4: Popularizing Stage

Currently, e-commerce education has been a hotspot in China and many colleges are actively recruiting students. It is reported that over 10,000 bachelor and associate level students in the e-commerce major have graduated so far with 30,000 more in the school. As to master and doctoral graduates, the total number is no more than 1,000 (Li and Zhang, 2003). The replacement of these graduates has been in a wide spectrum including government agencies, industries, colleges, or research institutes (Wang, 2002).

3.2 E-commerce Continuing Education

STCE programs are the main form in China’s continuing education. Since the commencement of the STCE program in 1983, the participating schools and students had been increasing dramatically. At the

⁴ They are E-commerce Overview and Projects Designing, E-commerce Economics, Internet Marketing, E-commerce Management, Online Payment and Settlement, E-commerce Logistics, E-commerce System Construction and Administration, E-commerce Technology, and Business Laws for E-commerce.

very beginning, only a few public colleges offered the STCE education programs. However, STCE programs evolved significantly after years with the dominant involvements of private colleges, because of their improved educational facilities and flexible curricula. In 1988, there were 40 private colleges nationwide, and the number rose to 880 in 1994 (China National Bureau of Statistics, 2001). It was newly released by the China Ministry of Education (2003) that there were 1,202 private colleges in China now. In 1983, there were only 64,757 registered students in the private colleges. The number rocketed to 6.89 million in 2000. By the end of 2001, the number of STCE students had totaled 103.97 million, in which 3.31 million graduated during the last 17 years. According to Yan (2002), there were 6.4 million STCE students registered for examinations in the first half of 2002, out of which 41% were bachelor degree students and 59% were of associate diploma.

The pilot e-commerce programs for STCE students were established before any official regulations availed. The first regulation for e-commerce continuing education was issued on August 31, 2000. It was further amended to define the assessments of student qualifications, including program contents, credit allocations and examination formats. By January 2003, over sixteen provinces, cities or autonomous regions out of thirty-one in China had established e-commerce programs of associate level for STCE students, of which five co-offered bachelor programs. Currently, the e-commerce program of STCE offers the curricula covering e-commerce basics (E-commerce Overview, Business Laws for E-commerce), e-commerce related technologies (Computer and Network Technologies, Internet-based Software Application and Planning, Web page Designing), and e-commerce applications (E-commerce Cases Study, Online Finance, E-commerce Logistics, Internet Marketing) (STCEC, 2000).

3.3 E-commerce Professional Education

As e-commerce education is getting popular in China, an increasing number of Chinese organizations launched training programs in e-commerce with certificates for trainees in different concentrations. In order to standardize retraining programs with required quality, the Occupational Appraisal Center (OAC), affiliated to the Ministry of Labor & Social Security (MLSS), has recently issued several important regulations for the e-commerce education, defining the qualifications of e-commerce professionals on different levels, the formalities to apply the certificates for training centers, and the examination procedures. The regulations further urged to ratify professional training organizations and regulate examinations strictly in order to guarantee the quality of training programs. According to OAC (OAC, 2002), there are core courses: Fundamentals of E-commerce, the Application of IT, Online Marketing, and Electronic Market. Each course has a final test. Students must pass all four tests before they can take a national-level comprehensive exam in order to receive the certificate.

There are two forms of e-commerce professional training programs: on-site training and distance learning. On-site training is conducted by training centers and targeted at non-e-commerce professionals, who intend to gain latest knowledge in e-commerce for businesses. The program is available to both full-time and part-time trainees. Distance learning e-commerce programs are specially designed for those who are practically involved in e-commerce activities. Through visiting the designated training websites, they can join learning procedures in virtual classrooms and take online tests. By the end of September 2003, over 140 institutes in China had been authorized to issue primary and assistant e-commerce professional certificates, and more are under the approval process (see <http://www.chinact.org.cn>).

4. Problems and Challenges in China's E-commerce Education

Although a great success has been achieved in e-commerce education in China, problems still exist in different categories. These problems can be generally classified in either quantity or quality aspects. Understanding the inner causes will help China further draw strategies in e-commerce education to achieve the long-term social and economic development goals.

4.1 Unfulfilled Demand for E-commerce Education

According to previous discussions, we can see a big gap between the demand and supply of e-commerce professionals: the expected demand for e-commerce professionals in the next decade is two million, i.e. in average 200,000 per year, while the number of students enrolled in different e-commerce programs is 50,000⁵. If taking into account the number of students in other relevant programs that can be enhanced to meet the demand from e-commerce job market, the total number of professionals from different e-commerce programs each year in China is about 130,000. It is obvious that the supply of e-commerce professionals is far below the demand. An evident cause for this deficiency is that majority of Chinese colleges either do not have e-commerce programs or do not offer proper e-commerce courses to complement other relevant programs.

Presently there are over 2,598 public and private colleges in China (China Ministry of Education, 2002). However, no more than 400 colleges, 15.4% of the total, have established e-commerce related programs. After adding those who have opened e-commerce related courses or set special focuses in e-business, the total number is still fewer than 800. Assumingly, we could ascribe the solution to the active participation of more colleges in offering e-commerce programs. However, in depth, the main cause in supply side is that many colleges do not have sufficient teaching facilities for e-commerce programs, even though they are responsive to the structural changes of job market.

E-commerce education is interdisciplinary, and requires both theoretic study and practical skills training. One indispensable facility for e-commerce education is computer labs with the Internet access. For a long time, China has highly emphasized the provision of experimental environment for science subjects and long overlooked that for business schools. Currently there are no more than twenty computer labs for e-commerce programs in China with consecutive inputs surmounting US\$12 million. For small and medium sized colleges, including many private educational institutions, building a computer lab is too much to be realistic. Although CERNET has greatly improved the Internet access for many colleges in China, due to the limited budget, the small and medium sized educational institutions have to cooperate with off-campus Internet cafes, which are open to the public for profit-making purposes. Therefore, the insufficient network computing resources and the limited in-campus Internet access have become the major obstacles for many Chinese colleges to operate their e-commerce programs.

⁵ Referring to the facts in the college of Economic and Financial, Xi'an Jiaotong University, the figure is estimated from the approximated capacity of educational institutions offering e-commerce education programs. In average, every year 60 e-commerce students will graduate from each of the 152 Chinese universities that are offering different levels of degrees in e-commerce, and each of the 140 professional educational institutions may issue 200 e-commerce professionals certificates in the same period. We further assume 10 e-commerce students will graduate from each of the 1202 private colleges. Then the total number of e-commerce professionals entering the job market from the three sources is $152*60+140*200+1202*10=49,140$. The figure can be approximated as 50,000.

4.2 Inconsistent Quality among E-commerce Programs in Different Educational Institutions

Quality is another vital problem in China's e-commerce education. According to a survey based on the students in e-commerce related programs, among the 575 undergraduate student respondents, 39.5% did not know what e-commerce is, and 68% could not tell how an e-business works; while among the 38 postgraduate student respondents, 20% could not explain the process of any e-business (Zhang, 2000). It is still common that many graduates of e-commerce programs cannot fulfill the requirements from the employers in practical work, and many certified trainees from e-commerce retraining programs normally do not catch the essence of e-commerce due to the lack of systematic study (Song, 2002). E-commerce professionals familiar with international business laws and regulations are even few, as the report (Beijing Youth, 2003) indicated. Consequently, the existing e-commerce programs in China still do not suit what the market demands. Here are several causes for the undesirable quality problems in e-commerce education.

Lacking Enough Qualified Faculties

Many e-commerce institutions do not have enough qualified faculties for their newly established e-commerce programs. Most faculties involved in e-commerce programs were just transferred from other programs and prepared e-commerce courses by self-taught (Liang, 2002). Lacking the working experience in e-businesses and the understanding of the course contents, their teaching is normally ineffective. In order to save the cost, continuing or professional education institutions even hired unqualified short-term lecturers; some of them were irresponsible for the classes they were teaching. Although AECCC has started the training programs for e-commerce faculties, it may take several years to gradually improve the teaching quality.

Lacking Quality Textbooks

On the other hand, the overflow of low-quality textbooks for e-commerce courses worsens the problem. According to Chen (2003), there were over twelve series of e-commerce textbooks, each of which contains, on average, six books for college students during 2000-2002. Since many textbooks were translated and edited from the English versions, their contents could be quite obsolete due to the time lag. The situation of STCE or professional education is even worse, because some colleges may have adopted the same set of textbooks for several years to cope with the certificate examinations.

Lacking Advanced Research to Refuel the E-Commerce Education

A good research in e-commerce will reinforce teaching with the latest e-business ideas. Realizing this, the Chinese government has increased the budget of Social Science Foundation to support more e-commerce research in Chinese colleges⁶ (NPOPSS of China, 2003) and highlighted Internet-based business administration as preferential research area sponsored by China's National Natural Science Foundation (NNSFC, 2001). However, current e-commerce related researches in China, for example, the applied economic research, are still far behind those in developed countries⁷. In general, China has lagged

⁶ Two projects in e-commerce were granted in 1999 and more than twenties in the same category were granted in 2003.

⁷ In a high level forum of Chinese economists held in June 2001, many economists addressed the great deficiency in economic research methodologies (Gong, 2001). Realizing current problems in the academic research, Weiyang Zhang, a prominent Chinese economist in Beijing University, advocated "3C" as the future research principles in China: "internationally compatible,

the world in information systems (IS) research, the upper level of e-commerce research. For example, in the last five years there has been no research paper from the researchers in China accepted by the International conference on Information systems (ICIS), the top conference in information systems research, and no participants from any Chinese colleges in the conference during the same period (AIS, 2003).

4.3 An In-Depth Analysis of the Problems

In general, the problems of e-commerce education can be attributed to systematical causations with an in-depth analysis:

The Unfitness of the Higher Education System to the Advocated Market Economy

Although China has embraced the market economy for many years, the higher education system still does not suit the prospected market economy well. Among the three e-commerce education categories, professional education programs adapt to the job market demand the best, since the training programs usually last only several months and can frequently adjust in accordance with the training demands reflecting the status of the job market. In the other extreme, national higher education, the last fortress of the planned economy, is the most sluggish. Since 1995, the graduate replacement system has been transformed from government planned uniform replacement to market-oriented replacement mechanism. However, all matters regarding student enrollments, major establishments and guideline settings are still planned by the government.

In China, the average higher education admission rate is still fairly low, wavering between 7%-12% (Yang, 2003). The Ministry of Education prospected in its "Tenth Five Year Plan of National Education" that the admission rate was to be raised to 15% in 2005, and furthered to 20% in 2010 (China Ministry of Education, 2001a). The excessive education demand makes the education system never in shortage of student candidates. Thus, colleges in China, whether public or private, seldom worry about student sources, accordingly overlooking the improvements of educational programs. For instance, students graduated from STCE programs are normally less competitive in the job market because of their lower qualifications compared to those who graduated from regular colleges, whereas the STCE programs are seldom accordingly adjusted for that they always have enough applicants.

So far, there still exists plenty of incompleteness and inconsistency in China's education system with the on-going reformation. Courses selection is a typical example. In China, the majority of the schools restrict students to take courses offered by their own, discouraging students to acquire more comprehensive knowledge from other sources. Typically, students in e-commerce programs in the college of business administration are not allowed to take the courses in computer science in the college of natural science, even though the latter might cover more advanced contents in technology.

Insufficient Budget in Education

Generally speaking, the quality of education and research in colleges is positively related to the available financial resources. In China, the general education outlay is rather small. Although in 2000, the

internationally comparable and internationally competitive".

national fiscal budget of education had been raised from the US\$22.52 billion of 1997 to US\$30.99 billion, its percentage in GDP and fiscal expenditure stood only at 2.87% and 13.8% respectively (China Ministry of Education, 2002). In 2000, the overall higher education outlay was US\$11.89 billion, standing 6.18% of the national fiscal expenditure (China National Bureau of Statistics, 2002d). Taking into account the population, the input to the higher education in China is far lower than that in the developed countries. For example, in the US, the total expenditure of higher education had been US\$42.6 billion in 1960, which is four times that of China forty years later. The US\$277 billion for higher education in the US in 2001 is certainly an astronomical figure compared to China (US Census Bureau, 2003). Thus the available funds for Chinese colleges to develop new programs, construct labs and train faculties are rather small.

5. Concluding Remarks

In this paper we analyzed the driving forces of e-commerce education in China, presented its current status and discussed the major problems regarding the quantity and quality of e-commerce education in meeting the job market requirements. The proposed four-layer model indicated that the demand of e-commerce education was the consequence of the fast growing e-commerce that was driven by four factors: government intervention, economy globalization, domestic economy growth, and IT advancement. From the system point of view, government promotional intervention is a controllable factor when contrasted to the other three. Hence, Chinese government should take into account the other three factors to choose proper actions so as to promote e-commerce education and in turn benefit the e-commerce industry as well as the whole economy. In another aspect, to maintain an innovative e-commerce program, an educational institution must investigate the trend of four driving forces and their effects on the e-commerce evolution and thereafter make proper decisions.

In order to help e-commerce education in China to keep pace with the economy growth, we need to clarify several strategic issues with the guidance of the four-layer model. Although the following three perspectives are based on China's case, we claim that the main ideas are applicable for other developing countries.

The Intervention of Government: A Necessity in Driving E-Commerce Education in China

Government interventions, such as issuing legislative regulations, drawing promotional policies, and providing subsidies in research and educational projects, are critical to e-commerce education in China. First, the government plays a key role in education reformation that will guarantee the sustainable and healthy growth of e-commerce education. Although China has achieved a great success in education system reformation, the problems in current e-commerce education indicate that China's education system still needs major improvements to adapt to the market economy. The top priority issue in the reformation agenda is to resolve the inconsistency between college admission system and the replacement system. As the Chinese government has transformed the graduate replacement from a planned system into a market-oriented system, the government needs to step forward to deregulate the centralized control of education program planning and allow all colleges to face the market. Second, the government needs to sponsor some non-governmental administrative facilities for the education system, which are particularly

important in the process of the education system to be transformed to being market-oriented. For example, the government may encourage the establishment of non-profitable organizations for educational programs that should be rather independent but take over previous roles of the government in servicing educational program standardization and educational institution accreditation in China. This semi-official form of organizations will match better to the further transformations of education system and reduce the excessive governmental interventions.

The Structure of E-commerce Education System: Dedicated Programs vs. Add-ons Programs

It is reasonable that China's e-commerce education has adopted an educational system with the coexistence of the dedicated e-commerce major and the extensions of e-commerce to relevant programs, i.e. add-on programs. E-commerce is considered an interdisciplinary and applied subject (China E-commerce Year Book, 2003). With a combination of economic, administrative, technology and legal knowledge, those prospective graduates in the e-commerce programs are to have a solid theoretical background, comprehensive understanding of administrative context of organizations in e-business, certain technical skills, and will be able to cope with the major demand for e-commerce professionals from the market. Meanwhile, retraining in e-commerce is a necessity for both employers and employees. Though now in China, only a small percentage of working staffs have participated in the e-commerce professional retraining programs accredited by the Ministry of Labor and Social Security, the potential trainee population is still large. With the growing trend of high flexibility in the labor market, it is more individuals' liability to improve themselves than a company's responsibility to train their employees. Consequently, the demand for e-commerce retraining will be sustainable. Based on the above e-commerce education system structure, both the government and the involved institutions in different educational categories might conduct proper actions to take their piece of pie.

The Effort by Educational Institutions: the Original Impetus

Whatever the external environment is, the most essential point for the healthy and effective evolution of e-commerce education is the persistent efforts by all kinds of educational practitioners: public and private colleges, STCE program operators and professional training centers. When the market mechanism is becoming more coherent and complete, educational institutions of China, especially those public colleges, which may have many legacy problems, must take proper strategies to adapt to the changing environment. First, they must keep pace with the education system reformation and become more market-oriented. With the improved market mechanism, keen insights and fast responses with regard to environmental changes are of vital importance to educational institutions to be successful in the more competitive education market. Second, they must accordingly transform their internal administrative system to adapt to the changing external environment. This includes student's academic credit systems, the public relationship with the industry, the adjustments of educational programs, etc. The third is that faculty training must be set at a high priority. A good faculty team is the determining factor to quality education for e-commerce programs. Finally, we suggest that educational institutions must pay attention to the academic research in accordance with their long-term goals. Although colleges have different research agendas and interests, there is no doubt that e-commerce research will increase significantly in the future (Ngai and Wat, 2002). The more effort in the e-commerce research will certainly reinforce the e-commerce education with good quality.

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