

An Analytical View of China as a Software Outsourcing Outlet

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Abstract

While China is recognized as an important software outsourcing outlet today, its growth as a software outsourcing outlet is not without struggle. This article examines the early-day growth of China as a software outsourcing outlet, discusses hindering factors that once constrained China's potential as a software outsourcing service provider, and identifies various enabling factors that contributed to China's growing potential as a software outsourcing service provider. It analyzes the potential impact China's growing capabilities as a software outsourcing outlet may have internationally and identifies what China would need to do to become a greater contributor to the world's software out-

sourcing service industry. While the study focuses on China, its analysis and suggestions can be valuable to other developing countries as well.

1. Introduction

During the last decade, while China played a leading role in providing manufacturing outsourcing services, India undoubtedly led the world's software outsourcing services. Some researchers compared China and India and concluded that it was in the field of transaction costs, not production costs, where China was unable to compete with India in the supply of information technology (IT) outsourcing (Qu and Brocklehurst 2003), while others asserted that it was market fragmentation or small company sizes that kept China's software industry from grabbing a larger share of the global software-outsourcing market (Filippo and Hou 2005; Fraenheim 2005).

Researchers who compared the relative strengths of China's software industry with that of India identified a larger domestic software market, a larger amount of foreign direct investment, a better information and telecommunication infrastructure, and a more stable political and social environment. They further identified China's relative weaknesses as having poorer quality control processes and poorer communication skills. They subsequently suggested that China should speed up the infrastructure construction, build a consistent legal system, increase investment in general education and professional training, improve quality and process control, build correct channels to the global outsourcing market, and cooperate with India during competition (Hu et al. 2008).

China faces formidable challenges in having a lack of workers who could manage international projects and have strong English-language skills and having relatively poor protection of intellectual property rights (Benni and Peng 2008; Wang and Tian 2009). These researchers also analyzed certain unique strengths China possessed such as having two million Japanese and Korean speakers to help the nation's lead in the North Asian market for the "near-shoring" of IT services (Benni and Peng 2008).

After two decades of endeavors since the late 1980s, China's software industry has long grown from its infancy. As an emerging software outsourcing outlet or service provider, China has attracted attention from around the world during the last decade (Ji et al. 2008; Watson 2008; Jang et al. 2010).

Jones (2009) analyzed China's software outsourcing market from the perspective of international outsourcing companies and presented to them opportunities and challenges in the China market, while Jiang (2010) studied particular regions of China and suggested new growth points of outsourcing services in those regions.

Sarma (2005) attributed China's success in garnering investments in the IT services projects as well as for research and development to China's well-educated and cheap labor force. Einhorn (2009) felt that India's Satyam Mess helped China to win international clients.

Some researchers believe that the development of China's outsourcing service capabilities relied on support from both central and local authorities of China while concluding that despite the boom in China's service outsourcing, it would be difficult for China to catch up with India, the giant in the international outsourcing industry (Wang and Tian 2009).

Speculation developed that China would be a major threat to India's supremacy in software outsourcing services (Prasad 2008; Kathawala and Heeren 2009), while others believed China and India would codominate the world's software outsourcing market (Karthikeyan 2009).

Such speculations or beliefs are not without foundation. By 2010, China's software industry was no longer constrained within the lower end of software market (the market of simple or uncomplicated application software development projects); instead, it had successfully obtained a significant share of the middle and higher end of the market (the market of moderately complicated and highly complicated application software development projects) (Ma 2010). A Chinese government report states that during the decade from 2000 to 2009, the total revenue of China's software industry achieved a growth of 20 times, while the total export of China's software industry achieved a growth of 50 times. During the first seven months of 2010 alone, the total revenue of China's software industry reached 723.1 billion Chinese Yuan (¥), a 29% increase over the first seven months of 2009 (Revenue 2010).

While the world marvels at the rapid growth in capabilities and potential of China as a software outsourcing outlet, few understand its struggle in early days. On the other hand, the rapid growth of China's software outsourcing service might be perceived as a potential threat to India because of the lack of understanding of the positive international impact of China's growing capabilities as a software outsourcing outlet. Of course, although China's software industry has grown many folds since its early days, there is still much China needs to do to become a greater contributor to the world's software outsourcing service industry.

An extensive literature review has revealed that few researchers have taken the perspective of China with a growing potential as a software outsourcing outlet in analyzing China's outsourcing service market, few have studied the potential impact China's growing capabilities as a software outsourcing service provide might have internationally, and few, if any, have studied the China's outsourcing service market with a purpose or hope to offer insights to other developing countries.

This paper examines the early-day growth of China as a software outsourcing outlet, discusses hindering factors that once constrained China's potential as a software outsourcing service provider, and identifies various enabling factors that contributed to China's growing potential as a software outsourcing service provider. It analyzes the potential impact China's growing capabilities as a software outsourcing outlet may have internationally and identifies what China would need to do to become a greater contributor to the world's software outsourcing service industry. It is the hope of the authors that while the study focuses on China, its analysis and suggestions will provide valuable references and insights to other developing countries as well.

2. Early Days of China Software Industry

2.1. From Zero to a Tier 2 Country

In the early 1980s, China's government defined its strategic principle: "Economic construction must depend on science and technology, while work in these fields must be geared to the needs of economic construction" (Feng 1993). China's computer industry subsequently emerged.

For many years, however, China practically had only a computer hardware industry. In the late 1980s, overseas software companies began to enter China in search of market expansion, which began to draw the attention of China's IT professionals to software development.

During the following years, China's software development efforts dramatically increased. By 1995, Beyond Soft, a Beijing-based company, became the first software company in China to provide software outsourcing services (Dickinson 2010).

In June 2000, China's State Council issued the famous 18th Act—Policies Encouraging the Development of Software Industry and Integrated Circuits Industry—to further promote the growth of the software industry in China (State Council of China 2000). The issuance of the 18th Act established the foundation of the fast growth of China's software industry for the following decade. During the first six years, the total domestic and export sales of the software industry achieved an annual growth of over 30%. Table 1 shows the total software sales of

the country from 2000 to 2005 (Song 2004; Department of Information Industry of Liaoning Province, China 2006).

Year	Total Sales (Unit: billion Chinese Yuan ¥)
2000	59.3
2001	79.6
2002	110.0
2003	160.0
2004	240.4
2005	360.6

Source: www.chinabyte.com/homepage/219001834121986048/20040323/1779910.shtml and Department of Information Industry of Liaoning Province, China

Meanwhile, China achieved a revenue of US \$633 million (or ¥5.064 billion) in software outsourcing services in 2004 and US \$920 million (or ¥7.36 billion Chinese Yuan) in 2005 (NeuSoft 2006).

In comparison with other countries, China was classified as a tier 2 country in the world map of software industry (Carmel, 2003), which was probably an accurate classification.

2.2. Hindering Factors that Once Constrained the Growth of China's Software Industry and Its Potential as a Software Outsourcing Outlet

For many years, China's software industry and its capability as a potential software outsourcing service provider were constrained by a few notable hindering factors.

2.2.1. Language Barrier

Unlike English or other western languages, which are typically based on alphabets or letters, the Chinese language is based on square-shaped characters. To people growing up in a character-based language environment, English is particularly difficult to master. Although the Chinese education system integrated English into its curriculum, English-speaking skills were still very lacking among the Chinese people (Benni and Peng 2008). It was estimated that in 2005, only about 0.77 percent of people in China could speak English (Kathawala and Heeren 2009).

Furthermore, ever since programming languages have existed, they have been English oriented. Developing software requires developers not only to understand English, but also to be able to communicate with international business partners including outsourcing companies. While general communication might get by with broken English, a failure to properly understand project specifications or documentation riddled with inappropriate English would generate serious consequences. The low percentage of people who were English literate in China combined with the fact that most English-literate people in China were English majors instead of computer science majors greatly constrained China's ability to expand into an English-dominant software outsourcing market. As a result, for many years, lack of English knowledge was an impediment to the Chinese software industry's expansion into English-speaking markets (Qu and Brocklehurst 2003; Zhang 2005).

2.2.2. Distrust in China's Government System

For decades, China's government systems remained a mystery to most Western people. Because the ruling party in China is the Communist Party, most Western people viewed China as a communist country instead of what it really was—a socialist country.

Prior to the 1980s, China's economy was essentially a planned economy controlled by the country's central government. In such an economic system, decision-making processes were typically not very transparent to the public, and business practices were governed more by government regulations than by a lasting legal system based on constitutional laws.

In the early 1980s, China adopted the open-door policy. Gradually, China became one of the most entrepreneurial countries in the world (Watson 2008). Because of the historical perceptions of China's ideological system and a lack of understanding of China's modern economic system, however, most Western people distrusted China's government system as a whole. Such distrust caused much hesitation and fear in the minds of Western business executives as they debated whether to outsource to China.

2.2.3. Lack of Confidence in Intellectual Property Protection

China was sometimes criticized for a lack of protection of intellectual property (Filippo and Hou 2005). While the criticisms were understandable, critics often failed to understand the historical root of the issue and the efforts China made to alter the situation.

Unlike Western developed countries, which had long practiced copyright and patent laws, China did not have to deal with intellectual property protection before the 1980s. Traditionally in China, intellectual property was typically owned by the national government and was available to everyone in the country free of charge.

Since privatization was introduced in China in the late 1970s, China has increased efforts by manifolds in educating its vast population to abandon the tradition and to respect other people's intellectual property; however, educating a population of 1.3 billion took time. Although China had enacted laws and established dedicated intellectual property protection bureaus throughout the country to promote the following of those laws, the speed of progress was not fast enough for most Western business executives who demanded a perfect match with Western countries.

One of the consequences was a lack of confidence by foreign businesses in China's intellectual property protection mechanism. As a result, many software development projects that could have gone to China landed elsewhere.

2.2.4. Lack of Competitiveness in International Competition

In the late 1980s, while Chinese professionals were still speculating about China's software market, overseas companies quickly occupied its various segments. Most of these overseas companies were well-established organizations with skilled employees, proven products, and many years of successful software development experience. Once they seized China's software market, they quickly fortified themselves by luring the most talented of China's developers with attractive salaries. Utilizing their management skills, existing products, market experience, and abundant resources, they soon raised the thresholds of market entry for local Chinese companies, their potential competitors. On the other hand, most of the newly founded local software companies did not possess the needed management skills, development capabilities or experience, and financial resources to compete with overseas companies.

A 2001 survey showed that China had over 10,000 software companies; however, only about 5700 of them had independent research and development capabilities (see Figure 1).

Compounded by a lack of experience and lack of financial resources to attract the top-quality researchers and developers, many local companies lacked creativity capability (Chen and Hu 2002). Out of the 5700 software companies that existed in 2001 and had some research and development capabilities, over 70% had a total number of

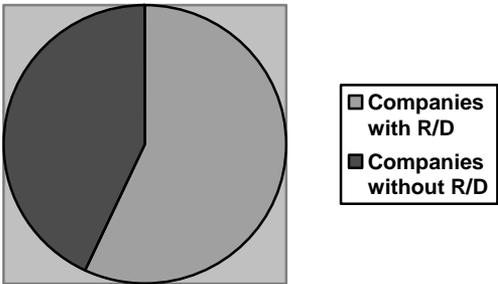


Figure 1. Research and development capabilities of Chinese companies (Source: China Software Industry Association)

staff less than 50, and only 50 of them had a staff size of 1000 or more (see Figure 2) (Chen and Hu 2002).

Taking into consideration the fact that many software companies did not really develop software and the fact that many software companies also engaged in other types of business, such as retail, hardware assembly, realty management, and even hotel management, the true average size of software companies or software development groups was actually much smaller. Such a small size greatly constrained the strength of China’s software companies in global competitions.

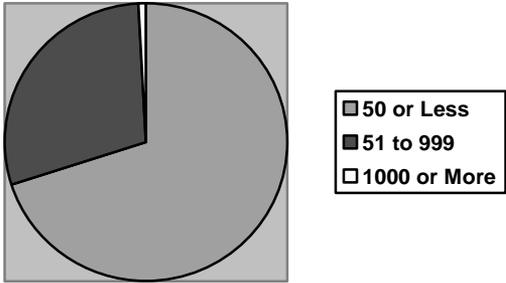


Figure 2. Company Size (Source: China Software Industry Association)

2.2.5. Lack of Investment Interest from Local Business Investors

Software development is resource demanding. On the one hand, it requires not only a large amount of initial investment in hardware and software, but also a large amount of ongoing investment because highly educated developers must be adequately compensated and other operating costs must be covered.

On the other hand, the financially “capable” investors in China typically did not become wealthy developing computer software. Realty, hotel, hardware manufacturing, and many other areas of business in China seemed to offer more immediate and less risky returns. Because software development neither offered any product as tangible as buildings, lands, and machines nor promised any immediate financial yield, investment in the software industry was simply too great a risk for China’s average business investors who typically did not possess the proper understanding of and experience with software industry.

What happened to the IT industry in the U.S. in the early years of the 21st century added more reluctance to Chinese investors. As IT bubbles cracked one after another in the U.S., without a proper understanding of the IT industry, average business investors in China became more certain that the IT industry would not be worth their consideration.

Furthermore, a perceived lack of strong intellectual property protection mechanism in 1980s and 1990s also caused much hesitation in China’s business investors in fueling the country’s software industry. On one hand, software development was so resource demanding; on the other hand, its final products could be so easily stolen away. The potential risk was simply too high for average Chinese investors.

Consequently, the development of China’s software industry was greatly hindered by the lack of investment interest.

2.2.6. Lack of Awareness among the General Public

Although computer information systems were first utilized by China’s business organizations in the early 1990s, their usage was not widespread. Only few government-owned financial institutions had the privilege to use computer information systems.

During the next 15 years, computer prices dropped significantly and keyboard input with the Chinese characters became more user-friendly. As a result, computers found their ways into many ordinary business buildings and private households in cities; however, the agricultural population constituted more than 70% of China’s total population. Because of a lack of knowledge and perceived needs, farmers in China typically would not spend their financial resources on strange luxuries such as computers.

Even to most of China's computer owners and users in cities, computer software still remained a mystery. Computers were generally and simply viewed as means of word processing, news publishing, emailing, online chatting, and gaming, not as a business strategic asset and valuable life-enhancing resource. Most of the public in China were not brought to the awareness of the great potential computer information systems could offer them.

Such lack of awareness among the public hindered the public imagination and desire for computer automation and constrained the domestic demand for more computer software.

Fortunately for China, most of the above-mentioned hindering factors or barriers have partially dissolved during the last six years. While language barriers are unlikely to dissolve completely over any short period of time, with a newer and more English-literate generation of college students joining the labor force and with the returning of numerous Chinese students who have completed their education in English-speaking countries, the size of English language obstacle has been significantly reduced. During the last six years, China has greatly increased the level of transparency in its government structure, legislative processes, and administrative decision-making processes. The establishment and enforcement of business laws have been much better publicized. As a result, China has won a much higher level of trust from foreign companies, although a complete trust in any foreign government would be difficult to achieve. China has also greatly increased its strength in enforcing laws and regulations in the area of intellectual property protection. Many violations of copyright and patent laws have been openly and severely prosecuted. Although many Western governments and companies still have concerns, they do recognize the great progress China has made. As more foreign companies came into China and as more Chinese companies studied the international market, many Chinese software companies have realized their lack of competitiveness in international competition. As a result, international standards are now better followed, and more business consortiums have been formed. However, although some Chinese companies have grown in competitiveness in the international market through following international standards and increasing company sizes, the majority of China's software companies remain uncompetitive. As China has encouraged the growth of its software industry through various government initiatives and especially as more software companies have proven their profitability, China has seen a moderate increase in private investments in software development; however, the majority of business investors still seem reluctant about investing in China's software industry. As more and more medium-sized and small business organi-

zations in China have benefited from the application of computer information systems, the general public is now more aware of the potential capacity of computer programs. However, the growth of public awareness has occurred primarily in urban areas; much of the agricultural population still need to be educated of the potential contributions computer information systems could make to their jobs and lives.

3. Enabling Factors of China's Growing Potential as a Software Outsourcing Outlet

Software outsourcing services in China could be traced back to the mid 1990s. As foreign software companies in China sought to cultivate China's software market, they needed local software developers to help them localize their products, which led to the emergence of early-day software outsourcing service providers in China. Later, the government worked hard to support the efforts of developing China as a potential software outsourcing outlet, and certain policies were implemented for this very purpose, such as the Initiative of Software Export to Europe and America instituted by China's Ministry of Science and Technologies in 2004 (Yuan 2006).

Despite the aforementioned hindering factors that constrained the growth of China's software industry and its potential as a software outsourcing outlet, certain important enabling factors greatly promoted the growth of China's software industry and its potential as an international software outsourcing destination.

3.1. New Domestic Needs Generated by International Competition

As China began to enjoy its rights and privileges of being a member of the World Trade Organization, it also fully opened its door to international business competition. The ever-intensifying global competition environment drove many domestic companies to seek improvement to their traditional approaches to production, management, and market research. Subsequently, computer automation became an important consideration for many business organizations in China (IBM Global Services 2006; Wang and Guo 2010).

3.2. Unique Needs Resulting from Linguistic, Cultural, and Social Backgrounds

While English-oriented programming languages made it difficult for small Chinese IT companies to compete internationally, the Chi-

nese-oriented market made it difficult for small overseas software companies to compete in China's software market (US Department of Commerce/Commercial Service 2008). Software products developed outside China had some key problems with China's local market. The products were typically designed outside China in a business and cultural environment different from that of China. Despite the localization process, they were more of a translation than redesign. Functions useless to the China market were not removed, and functions necessary to local users were either unavailable or put together by tearing and pasting (China Academy of Science 1997; Su and Lavina 2009). In addition, those software products were often constrained by regulations of the producing countries when released outside those producing countries. Moreover, because of the high development costs in developed countries, those software products typically were priced too high for Chinese users.

Such unique circumstances not only provided native Chinese software companies many opportunities to grow but also accelerated their maturity as software product developers and outsourcing service providers.

3.3. A Seemingly Infinite Supply of Human Resource

Software industry is a labor-intensive industry that needs educated human resource. One of the valuable assets China possessed was its abundant human resources (Li 2011). China had over 1200 colleges and universities, and the vast majority of them offered a computer science or information systems major. Since 1995, China has established many joint software schools between universities and software companies (Webplus 2004; Guo 2006). With a national population of more than 1.3 billion and a fast-growing education system, China possessed not only the largest potential market of the world, but also the largest potential supply of educated personnel for the global software industry.

3.4. Rapid Growth in Experience and Skills

Since their pioneering days in China, foreign software companies have helped educate many local employees (Li 1999; Newell 1999). These companies came to China not only for the country's vast market potential but also for inexpensive labor and IT professionals. As native employees changed their jobs, they also brought with them the experience and skills obtained in those foreign companies.

During the past three decades, tens of thousands of Chinese students have chosen to study or work abroad. Many of them obtained both quality education and employment experience in developed coun-

tries, including practical software development experience. As the IT industry in the U.S. and other developed countries was stumbling in recent years, many Chinese students and IT professionals returned to China for employment opportunities (European Commission and Ministry of Education in China 2011). They understood the Western cultures, systems, and language environments as well as those of China. As they returned to China, they brought with them not only such understanding, but also the experience and skills obtained abroad. They functioned as a bridge between the western world and China, which benefited businesses both in the West and in China.

Most importantly, as the software industry gained national emphasis, IT programs in China's higher education system as well as dedicated software engineering schools throughout the nation tremendously increased their efforts in training needed software personnel. Subsequently, the collective experience and skills of Chinese software developers greatly and quickly increased over the years.

3.5. The Strengthening of China's Intellectual Property Protection Mechanism

To facilitate an adequate software development environment, China not only increased efforts by manifolds in educating its vast population to respect other people's intellectual property during the past 25 years, but also enacted numerous laws and regulations to protect intellectual properties, including the Ordinance of Computer Software Protection in the People's Republic of China. Issued by the State Department on June 4, 1991, this ordinance specifies software user rights and obligations, facilitates software application development, and sets forth the legal relationship between software developers/providers and software users (Lu et al. 2002). In 2004, China enacted even stricter laws on intellectual property rights. Penalties for defiance of the laws have been raised significantly since then (Kathawala and Heeren 2009). These laws and regulations clearly established legal responsibilities of software users in China, which greatly helped cultivate a healthier environment for the development of its software industry.

3.6. The Adoption of International Standards

The IT industry has many standards. To succeed as an international software outsourcing destination, a company must follow international standards. During the past two decades, China greatly promoted the following of international software standards among its domestic software companies. Software companies such as NeuSoft

vigorously enforced the global CMMI5 standard (Xu et al. 2003; NeuSoft 2008). As a result, the capabilities of these companies in providing international software services were greatly enhanced.

4. International Impact of China's Growing Potential as a Software Outsourcing Outlet

There is little doubt that China's potential as an international software outsourcing service provider is still on the rise. Perhaps accustomed to India's leading the international software outsourcing service market, some people (especially those in India) view China as a potential threat to India's supremacy in software outsourcing services (Prasad 2008; Kathawala and Heeren 2009). While such concerns were understandable and respectable, we should also recognize the positive impact China's growing capabilities as a software outsourcing outlet might have internationally.

4.1. More Choices Available to the World

To countries that outsource their software needs, China's stronger presence in the outsourcing service market would provide one additional choice. Japan, for example, has greatly benefited from China's outsourcing services. Cultural and language differences or similarities often call for the availability of more service options.

4.2. Improved Products and Services for Outsourcing Clients

It is an undisputed fact that competition drives improvement. When the market becomes a buyer's market, the outsourcing companies will likely receive higher-quality services at better prices. On the one hand, with China's increasing potential as a software outsourcing service provider, current dominating countries will inevitably seek new ways to improve their products and services while keeping the prices down to safeguard their market shares. On the other hand, to survive and thrive in the market, China would be forced to continuously improve its own products and services while maintaining competitive prices. The outcome will be improved products and services for all countries that outsource their software needs.

4.3. Greater Availability of World's Resources for Innovations in Other Fields

The software industry is a labor-intensive industry, yet labor costs continue to rise throughout developed countries. With China joining the rank of maturity in software services, the world's collective software service capacity will increase tremendously. More and more countries would be able to outsource their lower-end software needs to service providers at considerably lower costs, thereby making available their valuable financial and human resources for innovations in other fields such as biotechnologies.

4.4. Increased Cultural Exchange and Mutual Understanding

As nations of the world become increasingly interdependent, the world needs cultural exchange and mutual understanding more than ever in human history. As pointed out by past researchers, however, distance still matters in our supposedly borderless world. Distance particularly constrains the synching of tacit knowledge, informal information, and cultural values (Heeks et al. 2001). As a result, cultural mishaps still occur within the context of global software development (MacGregor et al. 2005).

The success of cross-border outsourcing requires the cultural adaptation of the bridgehead teams working in the client countries (Krishna et al. 2004). As service requestors in one country and service providers in another country work together on software projects, many opportunities emerge for both sides to exchange viewpoints and gain more in-depth understanding about each other and the environments each other is in (see Figure 3).

With one fifth of the world's population living in China, increased potential for China as an outsourcing service provider means increased business interactions with the rest of the world and increased cultural exchange and mutual understanding among peoples of the world.

4.5. Encouraging Example for Other Developing Countries

Bordering China, Vietnam is similar to China in political, economic, cultural, and education systems. With a population of about 84 million and inspired by China's economic policies and renovations during the past decades, Vietnam became another possible IT outsourcing

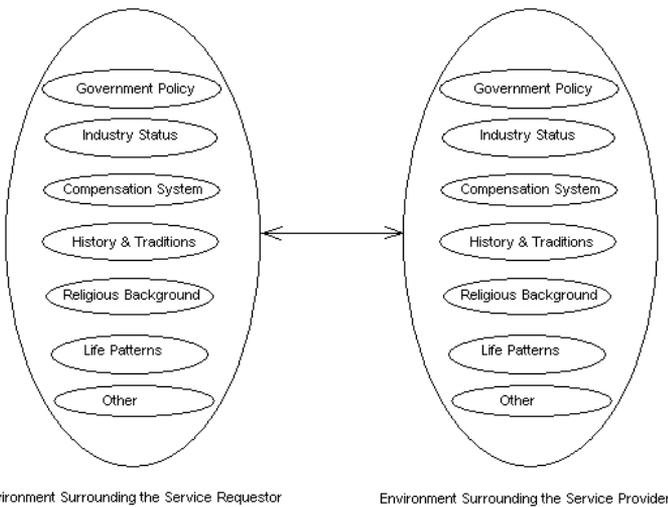


Figure 3. Cultural exchange and mutual understanding take place during software outsourcing

destination for western countries (Gallaugher and Stoller 2004; Yuan 2006). As China improves its potential as a software outsourcing outlet, it will undoubtedly become a valuable model and encouraging example for developing countries such as Vietnam.

5. What China Should Do to Become a Greater Contributor to the Global Software Outsourcing Service Industry

China's potential as an international software outsourcing outlet has been recognized not only by researchers but also by major companies like IBM, Oracle, and Hewlett-Packard (Watson 2008; Dickinson 2010). It is believed that if the IT industry develops as expected, China could capture software outsourcing opportunities worth \$56 billion by 2015 (Kathawala and Heeren 2009).

To become a greater contributor to the world's software outsourcing service industry, China should continue its efforts to overcome relative weaknesses and fortify relative strengths in its software industry.

5.1. Prepare for Increased Software Outsourcing Needs from Japan

Table 2 lists the major countries that outsource their software needs as well as the primary service providers that service these needs. It has been noted that Japan has the second largest software industry in the world and yet only 1% of its software needs have been outsourced, and that 70% of Japan's software outsourcing needs have been serviced by China (Yuan 2006). As a leading country in software development in the world, Japan was one of the earliest countries in the world to have deployed information systems in its business world; however, as the country becomes ready to replace or update their legacy systems, and with personnel costs in Japan being considerably higher than those in developing countries, more software projects can be anticipated to be outsourced. With geographical and language proximities between China and Japan, and with past success servicing Japan's software outsourcing needs, China would be a logical potential outlet for Japan's increased needs. China's active preparation would undoubtedly strengthen its candidacy as a service provider for the anticipated software outsourcing needs in Japan.

Table 2: Major Outsourcing Countries and Corresponding Service Providers	
Major Service Requestors	Major Service Providers
U.S.	India
West European countries	Ireland
Japan	China

Source: CSIACW 2006 and Yuan 2006

5.2. Upgrade the Size of Software Companies

As established by the Software Engineering Institute, the Capability Maturity Model (CMM) measures the ability of software development companies to produce quality software within budget and on schedule (Saiedian and Kuzara 1995). The capability maturity level is one comprehensive index software outsourcing companies carefully examine in software service providers.

In well-cited research, Bharadwaj (2000) defined a company's IT capability as "its ability to mobilize and deploy IT-based resources in combination or co-present with other resources and capabilities." In his classification of the IT-based resources, human IT resources comprising the technical and managerial IT skills were ranked second.

Compared with software companies in India, the competitiveness of Chinese software companies in servicing large-scale software projects has been typically constrained by their relatively small company sizes. Table 3 compares the number of software service companies and the number of large software service companies in China and in India as of 2006. Although certain mergers have taken place during the past few years in China, compared with India, China still does not have many large IT companies (Einhorn 2009).

As larger companies tend to generate in customers a feeling of assurance of higher credibility and lower business risk, they will more likely succeed in winning larger and upper-end contracts from potential outsourcing clients. For example, India's top 10 companies service about 45% of the world's software outsourcing needs (Kathawala and Heeren 2009).

	China	India
No. of software companies	8000	3000
No. of software companies with at least 2000 employees	5	15

Source: CSIACW 2006

To become more capable of servicing larger software projects from other countries, China needs to continue upgrading the sizes of its software companies. Possible approaches include mergers and consortium formation.

Market economy has been practiced in modern China for only about 30 years, and merger is a relatively new concept; however, numerous mergers have already successfully taken place in other business areas in China. Through mergers, small groups of resources could be combined into major source of strength in global competition.

One alternative would be to form consortiums among software companies. Software companies within a given geographical location typically complement, rather than compete with, each other. The formation of a consortium with these companies allows them not only to share the responsibilities and risks collectively, but also to serve the market with their collective strength. As a result, the perceived risk in service requestors' outsourcing software projects to them would be significantly smaller, and their chance of winning the confidence of potential service requestors would be greatly improved.

5.3. Continue Improving Quality of Products and Services

The global software outsourcing service market is no different from other areas of business in that superior product and service quality sustains lasting business relationships. Software companies in China must constantly improve the quality of their software products and services to become more significant contributors in the global software outsourcing service industry.

To improve quality of products and services, software companies in China must follow widely-accepted international standards. As depicted in Figure 4, as of 2006, among the 30 largest software companies in China, only 6 achieved the level 4 or 5 of CMM Certification; in India, 100% of its 30 largest software companies made such achievement. More disturbing was the finding by a 2006 survey of the Chinese Software Industry Association that most of the Chinese software companies expressed a lack of interest in CMM standards (CSIACW 2006).

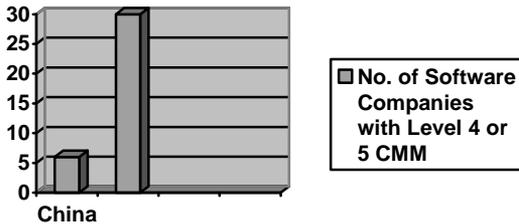


Figure 4. CMM Certification of 30 Largest Software Companies in China and India (Source: CSIACW 2006)

A lack of standards often indicates no quality assurance. As the IT industry is an industry of standards, widely accepted international standards must be followed if a software company or a country wishes to become a significant player in the international market.

To motivate Chinese software companies to follow widely accepted international standards, China must educate its university faculty and IT professionals about the value of the CMM standards to China's software industry and the importance of following those standards in their efforts to expand into the international market.

To improve quality of products and services, software companies in China must also maintain stable and quality human resources. It was reported that the annual turnover rate in China's software companies

reached as high as 20% (CSIACW 2006). With the relatively young age of China's software industry and with the emergence of so many software companies in the recent years, the seemingly abundant opportunities do present much attraction to software developers; however, companies could maintain relatively stable development forces by offering employees various incentives such as profit sharing, stock options, or dual-career in which employees are offered a non-management, technical advancement track with compensation packages identical or comparable with those of the management advancement track.

The IT industry is one of quick updates and frequent renovations, and the software industry is no exception. China's software companies have not paid much attention to ongoing training of their current employees. To maintain continuously qualified development forces and to assure high quality in products and services, software companies must invest in the ongoing professional development of their human resources.

To improve the quality of products and services, software companies in China should specialize instead of generalizing. Driven by a desire to diversify their revenue channels, many software companies in China engage in large varieties of software production. Consequences usually include weakened research and development forces and software products that lack international competitiveness. Unless a company has sufficient human resources to effectively thrive in multiple fields of software development, it should carefully select a field of specialization and establish itself in that field before it attempts to expand into other areas. Through specialization, a company will be able to improve the quality of its software products and services more easily.

5.4. Explore New Service Areas

While specialization would benefit individual companies, China as a country should expand its software services. As a country, China has been relatively weak in systems software development, and most of its software companies have chosen application software development. Therefore, China's software companies have not been very competitive in winning large contracts that usually include the integration of systems software. A possible remedy would be for larger companies that have sufficient human resources to dedicate special development forces, or to join efforts with other companies, to explore the sector of systems software, especially system software integration. Once they are experienced, these companies would be positioned to service larger and more complex software projects.

5.5. Strengthen the Enforcement of Intellectual Property Protection Laws and Regulations

During the past years, China has enacted various laws and regulations protecting intellectual properties. While these laws and regulations have clearly established legal responsibilities of software users in China, the enforcement of these laws has frequently become a target of criticism from other countries. Although many understand from China's historical background that intellectual property used to be owned by the national government and made available to everyone in the country, most countries expect a complete conformance of international standards from China now if China is to participate in international business. Therefore, China must on the one hand accelerate its efforts to educate its citizens, and on the other hand, strengthen the enforcement of the laws and regulations already established.

5.6. Understand business process and culture in the U.S. and the E.U.

With China's doors opened to the world only three decades ago, the typical U.S. and E.U. ways of conducting business are still quite unfamiliar to the majority of business people in China, yet most of today's software outsourcing needs originate from the U.S. and the E.U. countries. To improve their competence in meeting outsourcing needs from the western world, China's software service companies must understand the typical business processes and the culture specialties of the western countries.

5.7. Native Chinese Companies Must Know How to Win Trust from Clients

It is common knowledge that personal relationships play an important role in business in East Asian countries including China (Jang et al. 2010). Such reliance on personal relations tends to generate an element of unpredictability and create distrust in western clients as they typically lack such relationships in foreign countries such as China. To win client trust, Chinese software service companies must learn to base their business operations on well-accepted and well-followed international business standards. Furthermore, they should maintain good relationships with their clients even after the conclusion of their present service contracts.

6. Conclusion

One of the most important factors outsourcing companies consider when they select potential service providers is risk diversification. While countries such as India and Ireland have long established themselves as major service providers in the international software outsourcing market, more and more companies are willing to consider newly emerged service providers such as China. Given China's steady supply of human resources and rapid growth in experience and skills, China is expected to play a more important role in the global software outsourcing service industry.

As China increases its efforts in software outsourcing services, international competition in this field will inevitably intensify; however, the increased competition will bring to outsourcing companies or countries greater choices of business partners, improved products and services, and greater availability of resources for innovations in other fields. In addition, the world will enjoy increased cultural exchange and greater mutual understanding. To developing countries such as Vietnam that have political, economic, and education systems similar to those of China, China's success would undoubtedly serve as an encouraging example.

To become a greater contributor to the global software outsourcing service industry, China should prepare for the upcoming increase of software outsourcing needs from Japan; continue to upscale the sizes of its software companies by mergers or consortium formation; continue improving the quality of its software products and services by following widely accepted international standards, maintaining stable and quality human resources, encouraging individual companies to specialize in specific areas of software development, expanding service scope as a country; and toughen the enforcement of intellectual property protection laws and regulations already enacted. China's software companies need to better understand the business processes and business culture of American and European countries and win the trust of business people in these countries. Although this study focuses on China, its analysis and suggestions can be valuable to other developing countries as well.

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