

Chinese initiative in the software industry – Quest to leap

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The article presents and analyses the present developmental trends in the Chinese software industry. It identifies the problems encountered and examines the factors which may play a crucial role in its future growth. It is pointed out that while China seems to have outshone India in many high-tech fields, including hardware, India holds an unquestionable edge in the battle for the software industry. It is predicted that by the year 2005 China's share in the world software market will grow from the current level of 1% to 2.2%. The authors conclude that China and India, with their respective strong capabilities in hardware and software, can have a win-win situation through bilateral cooperation.

CHINA'S information technology (IT) industry has become the third largest in the world and a major income-earner of the economy, according to the Ministry of Information Industry (MII), China¹. China achieved a remarkable progress in IT along with the communication sector from 1995 to 2000. The national economy grew at an annual rate of 8.3%, while the average growth rate of the IT industry was 31.4%, three times higher than that of traditional industry. Its contribution to the growth of GDP increased from 5.2 to 12.4% and its share of GDP rose from 2 to 4% in 2000. Export of electronics and information technology products reached \$55.1 billion, accounting for nearly one-fourth of total exports. Total investments in the information and communication sector stood at \$97 billion. Financing from overseas stock exchange for the telecom enterprises amounted to \$20 billion². With its growth potential, its revenues may double in the coming four years to 2000 billion yuan (US \$240 billion)³. In the hardware sector, China is on its way to becoming the world's biggest base for computers, mobile phones and information-products manufacturing. In case of PCs alone it accounted for 36% of the Asia-Pacific market, with 7.17 million PCs sold in 2000, 45% increase over 1999 sales (International Data Corporation, 2001). It recorded this growth despite the fall in demand for PCs in the industrialized countries due to recession in the global economy, as a result of which the global software market could grow only by 6.5% in 2001, generating a total revenue of US\$ 186.5 billion⁴.

However, the software sector is still lagging behind. The total sales of the software industry during the year

2000 were about 20 billion yuan (US\$ 2.42 billion), up from 14.6 billion yuan in 1999 (US\$ 1.8 billion), which was only one-fifth the size of the hardware sector, according to a report from China Software Industry Association (CSIA). The year 2000 was a milestone in the history of Chinese software industry, which has long been overshadowed by its hardware sector. After years of imbalanced growth between the two sectors, the spring for the software industry finally came, as the government recognized its vital role in the IT sector, when the government launched an encouraging document mid-2000 fostering its development. This document, known as the No. 18 document, called for the value-added tax for software companies to be dropped from 17 to 3%. Curbs that blocked software companies from going public were eliminated and all software companies were encouraged to raise money on the stock markets if they met the requisite conditions. The software companies around the country hailed this severe tax cut, which freed them financially to invest in research and development. According to Li Ruxiong, President of Beijing Federal Software Co., the country's biggest software company, the software sales will make a boom in the coming years in China. However, software firms feel that good policy alone was not enough; implementation was the key. The main objective of this article is to analyse the structure and growth trends of the software industry in China. It identifies the problems encountered and examines the factors which may play a crucial role in its future growth. After a brief introduction, the article dwells upon the structure and characteristics of the Chinese software industry and briefs on new policies. The role of IPR protection is discussed and the Chinese software exports are examined followed by future prospects. Challenges to the Indian software industry are discussed followed by conclusions.

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Structure and characteristics of Chinese software industry

China began to develop its software industry in the early 1980s. By the end of 2000, China had over 10,000 software companies, among which 3000 focused on research and development. There are only about 70,000 professionals working on software research and development. Most of the 10,000 software companies are quite small and employ less than 50 people⁵. In June 2000, the State Council published policies to encourage development of the software and integrated circuit industries. For the first time, the Beijing International Exhibition was held from 28 to 30 June 2001, in which more than 200 software enterprises participated. This was the first time China's software industry held such a large fair, and software enterprises got a great opportunity to demonstrate their strengths, and show how far China has come, when software industry applications and development are concerned. At present, the Chinese software market has three main segments: Platform Software, Intermediate Software and Application Software. Segment-wise composition of the Chinese software market is shown in Figure 1. This is based on a research report on China's software market prepared by CCID Consulting, which is a standardized joint-stock enterprise directly under the China Center of Information Industry Development (website: <http://www.ccidconsulting.com>). The figure shows that application software is the dominant segment with 64.4% market, consisting of accounting software, word-processing packages, translation tools, anti-virus developments and publishing software. Domestic software developers have outpaced their foreign competitors with better understanding of the home market, localization strategies and cheaper prices. Chinese software vendors have discovered opportunities in five areas: internet-based software solutions, including e-commerce and e-governance; Linux operating system and related applications; development of middleware, which is the basis for large-scale software development; embedded software solutions in consumer electronics; and information security products⁶. The growth of various segments over

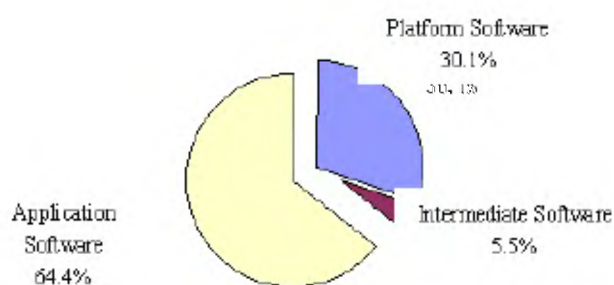


Figure 1. Structure of China's software market 2001. Source: CCID Consulting, February 2002.

the year is shown in Table 1, which brings out that intermediate software is attracting a lot of attention. Intermediate software makes the bulk of infrastructure related to network appliances. It recorded highest growth rate due to rapid growth of internet in China. Platform software lagged behind because of fall in the hardware manufacturing⁷.

The growth of the Chinese software market is shown in Table 2. It shows a continuous increase in software sales since 1999, although there has been a little decline in the rate of growth. This decline in growth rate from 30.7% in 2000 to 23.9% in 2001 is due to the decline in global IT industry and hardware market. However, it is still much higher than the global growth rate of 6.5% (ref. 4).

The Operating System (OS) market, which makes 59% of China's platform software market, is dominated by Microsoft's Windows Operating System (Figure 2). To save money and prevent total control by Microsoft, the government gave the nod for development of the free software, Linux. A dozen domestic software makers formed an alliance, called Linux Support Center Programme in mid-2000 aimed at driving the development of Linux-based operating and application software. This move will break the monopoly of the Windows Operating System in the Chinese market, according to Chen Chong, a senior official with the MII. But even the most enthusiastic Linux developers admit that Linux will never replace Windows, it will only be an amendment and second choice after the Windows Operating System. Besides the Linux operating software, development of professional application software is also significant⁶.

The start of Enterprise Information Construction Project in 2000 encouraged large and medium-sized domestic enterprises to enhance management methods, production efficiency and product upgradation. This

Table 1. Growth of various segments in Chinese software industry

Software category	Total sales for 2001 (billion RMB yuan)	Increase in sales over 2000 (%)
Platform software	8.59	16.4
Intermediate software	1.58	59.6
Application software	18.33	25.3
Total	28.5	23.9

Data source: CCID Consulting, February 2002.

Table 2. Development in China's software market 1999–2001

Year	1999	2000	2001
Total software sales (billion RMB yuan)	17.6	23.0	28.5
Increase (%)	27.5	30.7	23.9

Source: CCID consulting, February 2002.

resulted in increase in demand and utilization of management software. China's entry into WTO also forced Chinese enterprises to conform to internationally accepted rules in their business, and to meet international standards. Sales in China's Management Software market have increased considerably from 1.67 RMB yuan in 1999 to 2.62 RMB yuan in 2001 (Figure 3). At present, financial management software dominates the management software market in China (Figure 4). Many new brands have come up, e.g. Ufsoft in management software, Newgrand for financial software, Digital China, allied with Taiwan DSC have emerged in Enterprise Resource Planning (ERP) market. As for Customer Resource Management (CRM) software, Turbo CRM won high sales achievements despite competition with foreign brands, making it internationally the most popular brand of all Chinese CRM software.

Network security market has also seen a rapid increase due to growing concern for information security among Chinese enterprises. This has resulted in a large inflow of funds in this market. It became the fastest growing segment of China's software industry in 2001 with 61.8% growth over 2000 (ref. 7). Its sales rose from 490 million

RMB yuan in 1999 to 1.23 billion RMB yuan in 2001—almost a three-fold increase (Figure 5).

New policies

China has recently come up with policies to boost its software industry, the core of the information technology sector⁸. The policies mainly emphasize on technology innovation, the training of professional talents and service improvement. In the past decade, China's software industry has increased at a double-digit rate. However, the overall scale of the nation's software industry is still quite small, an essential disadvantage to its survival. With the new policy, some positive changes have taken place, such as the establishment of a management and quality evaluation system. Based on the experiences of India and Ireland, personnel education and training is being given top priority. Apart from paying more attention to the training of technicians at diverse skill levels, efforts are also being made to nurture high-level software development talents in universities and colleges.

The second important area of emphasis is technology innovation. Developing and marketing new products under Chinese software copyright would help China enter and establish a foothold in the world market. Currently,

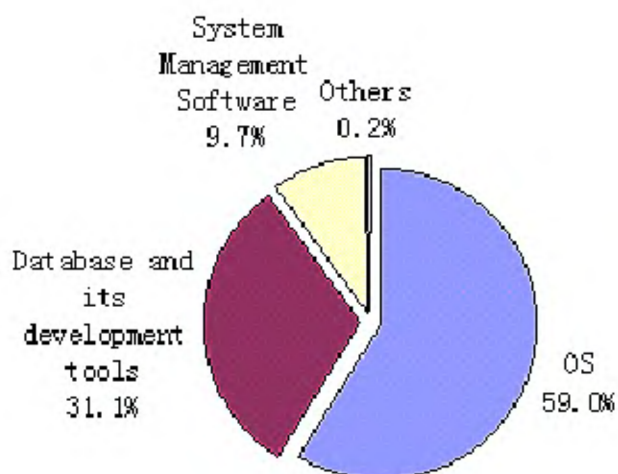


Figure 2. Product mix of China's platform software market in 2001. Source: CCID, February 2002.

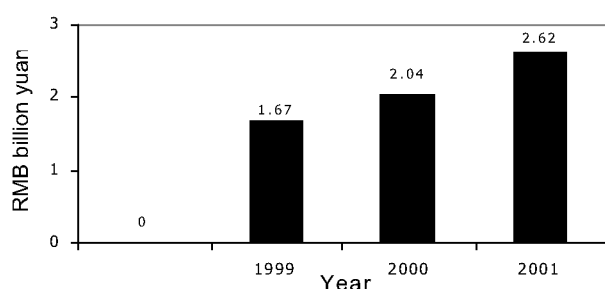


Figure 3. Growth in sales of China's management software market 1999–2001. Source: CCID Consulting, February 2002.

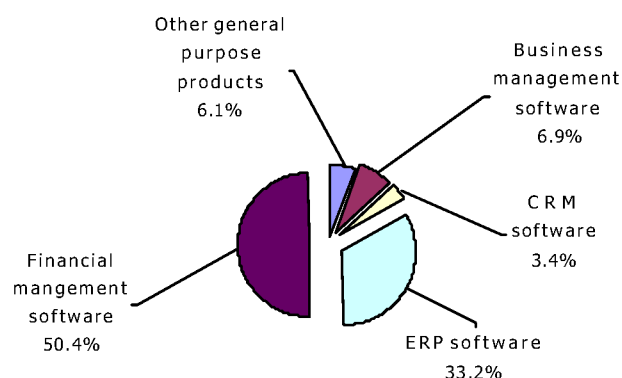


Figure 4. Market share of various categories of management software products in 2001. Source: CCID Consulting, February 2002.

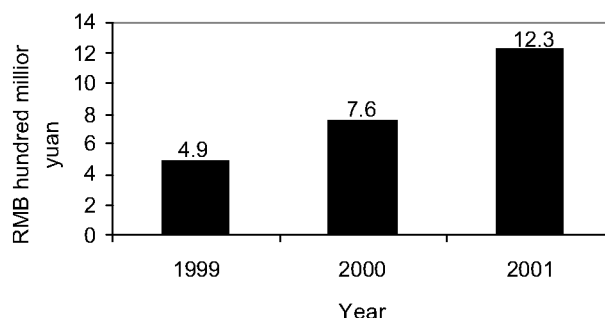


Figure 5. Sales on China's network security software market 1999–2001. Source: CCID Consulting, February 2002.

the Chinese Foundation for the Technological Innovation of Small and Medium Businesses, sets aside one billion RMB yuan every year to these enterprises for technological innovation. It distributes the fund in three ways: Free Appropriated Fund, loans with interest discount, and State investments. The ceiling for the Free Appropriated Fund is two million RMB yuan – a considerable figure for a newly established small or medium-sized enterprise. In the year 2000, the foundation supported 120 software development projects. The Torch Programme, which targets scientific and technological development, provides financial support to the software industry. It has financed more than 600 software projects since 1995. Under the Torch Programme, 19 software parks have been built in Beijing, Tianjin, Shanghai, Xi'an, Dalian, Guangzhou, Wuhan, Fuzhou, Xiamen and Hefei. In 2000, these software parks exported software products worth a total of US\$ 180 million, over 80% of the country's total⁹. By January 2002, China had set up 50 software technology parks that house both local and multinational software companies.

Following encouraging tax reductions, the country's biggest software production base, Zhongguancun Software Group, emerged in Beijing. The software giant was co-founded by the country's four leading IT powers, domestic-listed Zhongguancun Science Technology Development Holding Ltd; the Hong Kong-listed Stone Corp; Founder Group Corp of Peking University as well as Huajian Group of Chinese Academy of Sciences. The four are all influential IT giants and their total investment in the joint venture reached one billion RMB yuan (US\$ 120 million). However, this group is still to show any encouraging performance.

IPR protection

Importance is also being attached to the protection of Intellectual Property Rights (IPR) and technological innovations. But to meet international standards, the government must continue to fight against copyright piracy and create more opportunities for software companies to communicate with multinational corporations. Rampant software piracy is still eroding the meagre profits of domestic software companies. An official with the National Copyright Administration (NCA) said around 90% of the country's software products in circulation was pirated. According to an MII report, software piracy is regarded by 60.8% of software companies as their top enemy. According to Hong Jun, representative of the US-based Business Software Alliance, the most popular software piracy practices were illegally copying and selling patented software, unauthorized software pre-installation, unauthorized software downloading via the internet and end-users software piracy. As China has promised to implement the Agreement on Trade Related Aspects of

Intellectual Property Rights (TRIPS Agreement), Hong said he expected the anti-piracy policies of the government to be more powerful from the year 2001. Wu Haitao, Deputy Director of Copyright Enforcement Division of NCA, said that the government is taking economic, legal and administrative measures to accelerate IPR protection – especially for software products. Most of the revisions have been done in line with the TRIPS Agreement. A pilot project on information security has been completed, which will lay a hard base for protection of computer data. According to Xu Guanhua, Minister of Science and Technology, the project is a first of its kind in China. Its success has laid a solid base for application of information security software dealing with data from financial institutions, the media and the government. The project generated nine system solutions for problems such as viruses, hacker intrusions and missing data. It has already obtained 45 patents and drawn up a local standard for information security technology¹⁰.

A favourable market environment is vital to the development of the software industry, and copyright and intellectual property protection is part of this environment. Vigorous efforts should therefore be made to crack down on pirated software, as piracy can pose serious threats to software enterprises, according to Qiu Xiaoling, the software industrial and management expert in China. Additionally, CMM (Capability Maturity Model) and ISO9000 certification for software enterprises must be conducted to ensure good quality of Chinese software products.

Exports

China has taken relevant steps to boost software export. This includes preferential rates in credit and credit insurance for software exporters from the state banks. The software-exporting enterprises that import equipment for projects can have the benefit of tax-protection. Enterprises that export software worth one million RMB yuan can acquire export autonomy. The idea behind software export is not only to earn foreign exchange and therefore boost the economy, but also learn advanced international technology and management. That is the best way – and the only way – to keep up with international trends in the software industry. Meanwhile, in order to improve and regulate software-development projects, CMM certification becomes favoured by domestic software producers. In 2001, lectures and seminars about CMM certification became popular. At present, 12 domestic companies have got the CMM certificate⁷.

Relevant steps have been taken to broaden China's software industry base. For instance, a software export and processing experimental zone has been set up in the Ningbo International Software Park, and Shanghai, Tianjin and Xian have established software export federations. Many companies in Beijing also collaborate with

the United States and Europe to boost their software product exports. Domestic software vendors have also landed overseas. Kingsoft, Founder and Huajian Group are flagships of overseas exploration. The three have entered international word-processing, publishing and computer translating software markets. According to CSIA, the software sector is expected to sell products worth 120 billion RMB yuan (US\$ 14.49 billion) in 2005, which is six times the present level. China's software industry will keep a growth rate of over 30% in the coming years, according to Zhu from CSIA. As the country owns many software talents and the labour cost is still quite low, China should become a major power in the international software market.

Future prospects

Huge development space in China's software market has attracted more and more foreign enterprises, which has led to increase in software supply. The market competition, therefore, is expected to grow as a result of the impact of technology, service and capital. People have gradually accepted the 'software is service' concept. Services have become an important factor when a Chinese user is choosing software products. Especially for large-scale application software, service directly influences the success and failure of products. The involvement of capital may effectively relieve the financial bottleneck in the development of China's software producers and thus accelerate the expanding of the scale of China's software industry. As China's software market grows more mature, in the future the capital market would have a more obvious effect on the development pattern of China's software industry. Growth of the internet will encourage more enterprises to do business through the internet. There are over 11 million companies in China⁷. Their need for information construction presents enormous market potential for the software industry. At present, 50% of China's medium- and mini-sized companies are equipped with computers. Only 4% of these companies have started information construction to various extents. CCID predicts a 26.9% increase in IT applications in medium- and mini-sized companies in 2002. In terms of product structure, the IT market for medium- and mini-sized companies will focus on software instead of today's hardware. The potential market in software systems will be further exploited, and the market share of enterprise software and service will increase. Economic globalization will force enterprises to look for integrated solutions. CCID predicts that in the year 2002–6, the growth rate of China's software market will remain at 25% (ref. 7). Growth in sales of computers and related products will also help the software industry to sustain its growth. The sale of computer and computer-related products will rise from 250.2 billion yuan (US\$ 30.1 billion) in 2001 to 700

billion yuan (US\$ 84.6 billion) in 2006 (ref. 11). China's PC market will also grow steadily during the next five years. The average annual growth rate for China's PC market will remain at 18.8% for the next five years. According to CCID Consulting, the shipment of desktops will see a breakthrough with 10 million units in 2003. The starting of preparations for 2008 Beijing Olympics will also spur the demand for PCs. In the next 5–10 years more and more international players will shift their plants to China, which will become a centre for PC manufacturing and exports. China's entry into the WTO and initiation of the nation's 10th Five Year plan (2001–5) would be the driving force for the sustained growth of PC market in China¹².

Chinese challenge to Indian software industry

While China seems to have outshone India in many high-tech fields, India holds an unquestionable edge in the battle for the software industry. According to a report from the World Bank, India now ranks first in the world in terms of scale, quality and cost of software products export. Indian statistics shows that the country's software export volume was only US\$ 4 million in 1980, which increased to more than US\$ 2.7 billion in 1998. India has set a fine example in the development of the software industry. India now has the largest pool of English-speaking software engineers outside the United States, with operating costs at roughly 25% of US levels. The resource pool consists of about 300,000 high-level software professionals compared with estimates of about 30,000–35,000 in China, according to India's National Association of Software and Services Companies (NASSCOM). China's software exports were close to US\$ 1 billion, while India's software exports were around US\$ 6.24 billion in the fiscal year of 2001–02, and US\$ 6 billion the previous year. Indian software companies have also penetrated the Chinese market with many engineers taking part in the software development of China's telecom, aviation, textile, transportation and financial industries.

With such a skilled labour pool and a mature IT professional education system, India has steadily produced so-called 'IT blue-collars' to fill the large-scale assembly line of software programming in the country, which Chinese companies do not have. In India, almost 90% of IT professionals are blue-collars. By contrast, China's IT education has, for decades, focused on college students, following an approach of elite cultivation. The result is the output of only 50,000 IT-related graduates each year, compared with the market demand of at least 400,000 per year. Almost half of them pursue senior technological or managerial positions after a couple of years of work experience. This makes it difficult for the industry to grow. Most Chinese argue that the important difference is

the language. This is a significant advantage that will take years for China to catch up with India¹³. China's software development level lags behind that of India. Among the world's 58 software institutes that satisfy the demand of CMM5, or the fifth-grade of CMM for software, which measures the development ability of software makers, 32 are in India while China has none. During a recent visit to India, Chinese Premier Zhu Rongji called for a synergic relationship between India's strong software industry and China's strong hardware sector. 'Indian companies are welcomed to come to China, while Chinese firms must increase ventures with Indian counterparts', said Zhu¹³. Chinese software makers could gain technology and management experience from their Indian counterparts, to advance faster. In this direction, many Indian software-training centres are also planning to open engineer-training schools in China. China needs at least 120,000 entry-level software engineers per year, yet less than 60,000 are available at present. On the education front, the Chinese government has placed great emphasis on teaching English to students and IT workers, and China has a much larger number of American IT managers than India. This, of course, is an extremely important skill requirement for American firms looking to outsource. What is more noticeable is that the Chinese government has formulated a policy to give priority to research and development in the software industry in the 10th Five Year Plan (2001–05), including major tax incentives to software development firms. With more entry-level software engineers or the so-called software blue-collars, China's software industry will catch up with world standards faster¹⁴.

China's big overseas talent pool could also pose a threat to India. In the Silicon Valley and other high-tech zones there are more Chinese immigrants than Indians. For example, about 2000 Chinese head firms in Silicon Valley – far more than Indians do. Further, one of China's largest software companies, Huawei Technologies has established a branch in Bangalore that employs 536 people and is Huawei's biggest unit outside China. At the unit, 180 Chinese work alongside Indian programmers, learning how Indian programmers work together, and how well they coordinate, said Kang Jian-chu, Beijing University of Aeronautics and Astronautics. NASSCOM President Kiran Karnik views China as offering the greatest challenge, and warned that India would have to speed up product delivery to improve its competitiveness. It is predicted that annual growth of the Chinese software industry will be more than 30% in the next five years, and by 2005 market sales will amount to 175 billion yuan (US\$ 20 billion). China's share in the world

software market will grow from the current level of 1% to 2.2% (ref. 15). To speed up the internationalization process of China's software industry, the Chinese Ministry of Science and Technology is planning to create an 'Internationalization Window' for promoting massive software exports, widening software export channels and introducing internationally acknowledged quality control system in the country (Report, Ministry of Science and Technology, 2001, p. 1). India, while maintaining its edge in the software service sector, will have to explore other areas like software product development.

Conclusions

China is already moving on a fast track to challenge India's dominance in the industry. Will China be able to overtake India in software exports is an open question. However, at the domestic front, in the present scenario of globalization and increasing competitiveness, applications of information technology are playing a vital role to enhance the overall efficiency in different sectors of the economy, both in India and China. In this direction, the role of the software sector has become all the more important. At present, China excels in hardware production while India's competence in software is unquestionable. With a combination of hardware and software, both countries may have a win-win situation. This calls for extensive joint effort and bilateral cooperation.

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