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A Comparative Assessment of the Information Technology Services Sector in India and China

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ABSTRACT *The purpose of this paper is to assess the nature of competition in the information technology (IT) services sector between India and China. Using primary and secondary data sources, we compare and contrast the strengths and weaknesses of the IT services sector in the two countries along the main dimensions of Porter's competitive advantage model. The principal findings indicate that the IT services sectors in the two countries are distinctively different, have developed along different paths and are highly complementary to each other. China has a well-established hardware sector and its IT services sector focuses mostly on servicing its domestic market. India's IT services sector is predominantly export orientated with focus on the US and Western European markets. Contrary to popular beliefs, given the complementary characteristics of the IT services sectors in India and China, it is unlikely for the two countries to compete against each other in the near future and greater strategic co-operation between IT service providers in the two countries is a more likely outcome.*

KEY WORDS: Information technology, IT service providers, competitiveness, India, China

It is now well documented that the world-wide information technology (IT) services sector has been one of the fastest growing industries over the last decade (Chadee and Raman, 2009; Oshri et al., 2009). For the purpose of this paper, information technology services include software development services, system services and a broader range of IT-supported business services commonly referred to as IT-enabled services or Business Process Outsourcing (BPO) .Within this sector, the international outsourcing of IT services has been estimated at around US$55 billion a year with annual growth of between 15% and 20% annually (Oshri et al., 2009: 192). A number of countries, such as China, India, Malaysia, the Philippines, Russia, Israel and Ireland, have developed successful IT services sectors. Among these, the four leading exporters of IT services in 2005, in terms of world market shares were Ireland (20%), India (16%), Israel (5%) and China (2%) (UNCTAD, 2006). However, in

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terms of "country attractiveness," India and China are regarded as being by far the two most attractive locations for IT service providers (Kearny, 2009). [1] India has become a dominant global provider of IT services in a relatively short period of time and accounted for approximately 50% of the world's IT services market in 2008 (see Oshri et al., 2009: 192). Although China is still a relatively small exporter of IT services, it has the capacity to grow rapidly. The information presented in Table 1 confirms that while both India and China have experienced rapid economic growth over the last two decades, China has a more developed economy with higher GDP, stock of foreign direct investment (FDI) and exports. China's economic growth has been driven mainly by its export-orientated manufacturing sector, while the service sector has been the main driver of growth in India. Within India's service sector, the export of IT services has grown rapidly to account for an estimated 78% of the industry's total revenues of approximately US$52 billion in 2006 (Nasscom, 2007). By comparison, China's IT services industry had revenues estimated at US$48 billion in 2005, with export accounting for less than 8% (CSIA, 2006). Thus, both China and India have substantial software sectors and both have experienced rapid growth in recent years (see Shie and Meer, 2010).

The rapid development of the IT services sectors in these two countries raises some interesting questions regarding the nature of future competition in this sector. One important question relates to whether China will emerge as a major competitor to India in the IT services sector and erode India's dominant position as a global provider of IT services. This study aims to demonstrate that China and India are unlikely to compete against each other in the IT services sector in the foreseeable future and that co-operation between the two countries is a more likely outcome.

This paper seeks to address this question by first comparing the structure of the IT services sector in India and China in order to assess their competitive positions and then offering insights into the nature of competition between these two countries in the future. The paper is organised as follows. The next section presents Porter's (1990a) competitive advantage framework, which serves as the theoretical basis for the paper, followed by the methods and data used for the analysis. We then analyse the competitive advantage of India and China in the global IT services market along the main dimensions of Porter's framework. The concluding comments are contained in the last section.

The Framework

Porter's (1990a) competitive advantage framework posits that the key elements in competition between firms are: factor conditions; demand conditions; related and supporting industries; firm strategy, structure and rivalry; the role of the government; and chance events (see Figure 1). Factor conditions constitute a country's endowment of factors of production, including natural resources, human resources and capital. Demand conditions refer to the existence and nature of consumer markets as factors which influence the development and growth of enterprises. Related and supporting industries refer to the existence of agglomeration and clusters which allow firms to share knowledge, complement skills and create a supportive environment. Firm strategy, structure and rivalry relate to the creation, organisation and management of competing firms, including the severity of

Table 1. China and India compared, selected indicators

	India					China				
Indicator	1990	1995	2000	2005	2008	1990	1995	2000	2005	2008
Total population (billion)	0.85	0.93	1.01	1.09	1.2	1.13	1.20	1.26	1.30	1.33
Population growth (%)	2	2	2	1	1	1	1	1	1	1
GDP growth (% annual)	6	8	4	9.2	9	4	11	8	10	9
GDP (US$ billion)	317	355	460	810	1236	355	728	1198	2236	4909
GDP per capita (PPP US$)	1026	1315	1745	2093	2941	1248	2225	3364	4064	6567
Services as % of GDP	41	44	50	54	54	31	33	39	40	40
Export Value Index (200 = 100)	na	72	100	235	417	25	60	100	306	573
Exports (annual % growth)	11	31	18	15	13	5	6	31	21	−10
FDI net inflow (US$ billion)	0.24	2.14	3.58	7.60	41	3.49	35.85	38.40	79.13	147.79
Stock market capitalisation (US$ billion)	22	22	510	443	645	na	50	722	781	2793
IT services total revenue (US$ billion)	na	0.83	8.2	28.4	60	na	0.81	7.16	47.60	139
IT services export revenue (US$ billion)	na	0.48	4.0	17.7	47	na	0	0.40	3.62	2.4

Source: CSIA (2006), People's Daily (2005), Nasscom (2006a, 2007, 2009) and World Bank (various years).

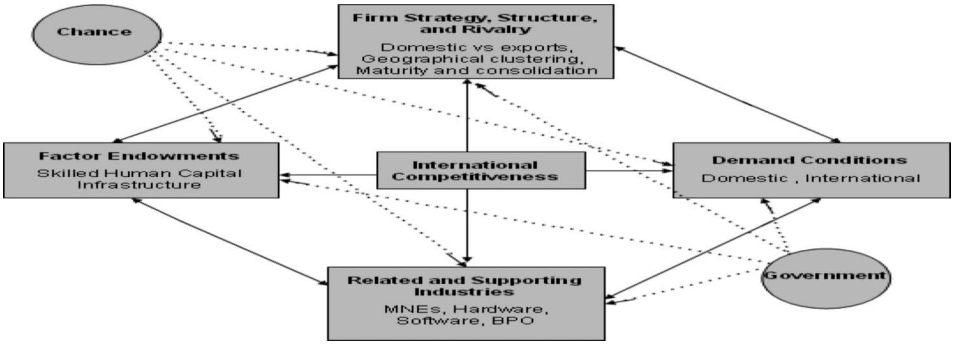

Figure 1. Main elements of competitiveness of IT service providers. *Source*: Adapted from Porter (1990b: 127).

competition. The role of the government has also been found to be a critical element of enterprise development and growth. Lastly, chance factors have also been linked to the success of enterprises and are an integral part of the present mode. Together, the factors shown in Figure 1 create the conditions in which IT service providers compete and grow. Porter's (1990a, b) framework has been applied extensively for assessing the nature of competition in numerous industries, including IT services (see Kapur and Ramamurti, 2001).

Methods and Data

Two sources of data are used in order to assess the nature of competition between India's and China's IT services sector. The first source of data includes published industry and macro-level data on the IT services industry for the two countries. Following Zaheer and colleagues (2009), industry-level secondary data for India are drawn mainly from the website and directory of Nasscom, an Indian trade body and the chamber of commerce of the IT-BPO industries (Nasscom, 2005). As the main IT industry association, Nasscom's members account for more than 95% of the industry revenue (Nasscom, 2006a). Similarly, for China, the secondary industry-level data are drawn from the Annual Report of China Software Industry Association (CSIA, 2006) and the Ministry of Information Industry website.

Given that the focus of the paper is on potential threats that China poses for India's competitive position in the IT services sector, the secondary data are supplemented with qualitative data drawn from semi-structured interviews of executives from 11 of the top 20 IT service providers in India. The top 20 IT service providers account for more than 50% of the industry revenues (Dataquest, 2005). The semi-structured interviews with open-ended questions were held at the respective company headquarters in India by one of the authors and lasted for about one hour each. The interviews, which formed part of a larger study, covered a wide range of issues relating to the competitiveness of Indian IT service firms, in general, and issues specific to the nature of competition between India and China in the provision of IT services globally in the future. The information collected from the interviews was transcribed and sorted by main questions/issues under consideration. The responses

on the nature of competition between India and China, together with the secondary data, formed the main dataset for the purposes of providing insights into the nature of competition likely to emerge in the future. The information in Table 2 presents some of the sample characteristics. The participating firms are large IT services providers with a mix of newer and older firms, Indian-owned and foreign-owned firms, high and moderate revenue firms with headquarters in all the three IT centres in India: Bangalore (south), Mumbai (east) and National Capital Region (north).

The Elements of Competition

In assessing competition between India and China, we proceed by comparing and contrasting each dimension of Porter's (1990) model, using both quantitative data and qualitative observations of industry experts. Together, these provide insights into the current state of competition and foresight on the nature of competition in the future.

Factor Endowments

Factor endowments refer to the factors of production essential to compete in an industry (Porter, 1990a: 77). In case of the IT services, human resources and infrastructure have been identified as being critical factors for competitiveness (Graf and Mudambi, 2005; Lewin et al., 2009). The information in Table 3 compares China's and India's endowments for these two main factors.

Human resources. The availability of a skilled labour force has been found to be a critical element of competitiveness for the software and services industry (Kearney, 2006). Due to the labour-intensive nature of the IT services industry, an abundant and consistent supply of human resources with skills in (English) language, and science and technology have been found to be particularly relevant for the IT sector (Shee and Pathak, 2005: 74). The shortage of skilled labour in IT has also been found to be a major constraint in the growth and further development of the IT sector of many countries (Nasscom-McKinsey, 2005). The sheer size of a country's population by itself does not constitute a source of competitiveness. Rather, quality of the labour force is more important in knowledge-based industries.

India's pool of knowledge professionals comes from more than 340 institutes of higher education and 16,000 colleges, with a total enrolment of 9.3 million in 2007 (Nasscom, 2007). India's pool of IT skilled labour accounts for 28% of the global market for knowledge workers. According to a recent estimate, about 850,000 IT professionals and 1.4 million IT-enabled services – BPO professionals – will be needed in India by 2010 (Nasscom-McKinsey, 2005) in order for the country to sustain its planned growth. However, it is unlikely that India will be able to meet these targets for two reasons. First, although India graduates a large number of IT professionals annually, of these 75-80% are deemed to be unemployable due to lack of adequate English-language proficiency and technical skills required in the software and services industry (Farrell et al., 2005: 76). Second, India also loses a large proportion of its IT graduates to other countries where salaries are higher due to the global shortage of IT qualified professionals. Together, these two factors

Table 2. Characteristics of IT service providers in the sample

Variables	Frequency	% of sample
Year of incorporation		
Prior to 1996	7	64
After 1996	4	36
Turnover (2006, US$ million)		
$\leq$500	6	55
$\geq$500	5	45
Number of employees		
$\leq$200	0	0
200–2499	0	0
$\geq$2500	11	100
Ownership		
Indian	6	55
Foreign	5	45
Headquarter's location		
Bangalore	4	36
Mumbai	4	36
National capital region	3	28

$n = 11$.

Table 3. Factor endowments: India and China

Indicator	India	China
Human resources		
Total population (million, 2008)	1140	1325
15–49 age group as % of total: 2005 (2025)	43 (44)	47 (40)
Total enrolment in higher education (million, 2002)	9.3	9.0
Tertiary enrolment as % of gross enrolment (2004)	12	19
Infrastructure		
Physical		
% of total roads paved (2005)	62.6	82
Electricity consumption (kWh per capita, 2007)	542	2322
Energy use (kg of oil per capita, 2007)	529	1484
Technological		
Telephone mainlines (per 100 inhabitants, 2007)	3	28
ICT expenditure per capita (US$, 2008)	46	195
ICT expenditure as % of GDP (2008)	4	6
Internet users (per 100 people, 2008)	5	22
Personal computers (per 100 people, 2006)	3	4
Fixed line and mobile phone subscribers (per 100 people, 2008)	34	74
Secure internet servers (2009)	1796	1579
Financial		
Bank non-performing loans to total gross loans (%, 2008)	2	2
Total value of stocks traded (US$ billion, 2009)	1089	8956
Inflow of FDI stock (US$ billion, 2008)	123	378
Outflow of FDI stock (US$ billion, 2008)	62	148

Source: Data from UNCTAD, UNDP, US Census Bureau and World Bank (various years), CERN (2007).

greatly reduce the pool of qualified graduates available in India to sustain the further development of its IT services sector.

In China, there are approximately 1400 institutes of higher education, with total enrolment of nine million students. The total number of graduates annually is approximately 1.33 million (CERN, 2007). The Chinese IT services sector suffers from several education-related challenges, including inadequately trained professionals for the industry (People's Daily, 2005). Compounding this is the severe lack of graduates with English language skills, which also hampers the ability of IT service providers from China to serve English-speaking markets (Wiggins, 2006).

Among the Indian industry executives interviewed for this study, there is a general consensus that despite China's recent efforts at improving the English language proficiency of its graduates, it is unlikely that China is going to overcome its language weaknesses and become a major threat to India. This view is best summarised by Company J as follows:

> China has very good technical skills but unless you communicate with your clients and understand what you are doing, it's very difficult. China is addressing its disadvantages in English language gradually, but we (India) have a 5-10 year advantage over China. In the long run India will still be ahead because of its education system.

Although India has a slight advantage over China in human resources, both face a critical shortage in the supply of skilled workers because of the "scarcity in abundance" paradox. The IT services sectors in both countries have an abundance of graduates and postgraduates but the employability ratios vary: 10-25% for India and about 10% for China (Farrell et al., 2005: 76). When considering this fact, the pool of graduates available to the IT services sector is greatly reduced. Thus, improving the employability of their graduates through language and technical training is a key priority for both countries in order to remain competitive.

An interviewee at Company F points out that the shortage of IT professionals is a global phenomenon and only India and China have the capacity to supply the large labour force generally required for the IT industry by virtue of having the world's largest population bases, a relatively young demographic and well-developed IT sectors. However, as the information in Table 3 shows, the demographic structures of the two countries are predicted to shift in different directions over the next 20 years. India's active labour force (those aged 15-49) is predicted to remain stable at around 43% of its total population, while in China the active labour force is predicted to decline from 47% to 40% during the same period (Table 3). This long-term trend can become a source of competitiveness for India, given the labour-intensive nature of the IT services sector.

Infrastructure. The importance of well-developed infrastructure, which supports the development and growth of enterprises, is well established in the literature (Dunning, 1988; Porter, 1990b). The development of the IT services sector has also been linked to locations with well-developed physical, technical and financial infrastructures (Kearney, 2006). Thus, the extent to which the infrastructure in India

and China is conducive to growth of their IT services sector can greatly influence their competitiveness.

The physical infrastructure relevant for the IT services sector include electricity generation, telecommunications, roads, ports and technology parks and overall public infrastructures. These are generally better developed in China than in India. The superior state of China's physical and technological infrastructure is the result of strategic Chinese government policies towards industrial and economic development (Table 3). By comparison, India's physical infrastructure, including electricity generation, roads and transportation, and telecommunications, is generally in a poor state. During the early 1980s India had more power-generating capacity, roads and telecommunication lines than China, but developments in these areas have lagged behind China over the last two decades. India has also performed poorly in attracting FDI compared with China (Table 3). This is due to the fact that India embraced globalisation later than China, and also because of the undeveloped state of its physical and technological infrastructures in most parts of the country. The information in Table 3 shows that China has superior physical, technological and financial infrastructures compared to India – all of which are deemed to be critical for the development of the IT services sector. However, over the last decade, the Indian government has made efforts to improve the domestic IT sector's infrastructure by developing world-class technology parks, such as in Bangalore, Mumbai and the national capital region. Despite such efforts, the overall state of the country's infrastructure in key areas for industrial development remains a major concern for the IT services sector, as noted in the following from the interviewees:

> Company A: Infrastructure is still a problem and that is where I think each of the state Government and the central Government are making a lot of efforts.

> Company K: Infrastructure in India can be better and it has improved things like telecommunications that are extremely important for the industry

The scale of the poor state of India's infrastructure and the inherent complexity of effecting change has also led to a rapid growth in the private provision of some basic infrastructural support, such as in electricity generation. To quote an interviewee from Company H, commenting on the poor state of infrastructure and how it affects the competitiveness of IT service firms in India:

> Any IT company has to have a self-sustained campus by having their own captive power backup. You have to have electricity generators for backup. Although state power is there you always need to ensure that you are up and running on a 24/7 basis. You can't tell a client in the US or Europe, the government is not giving us power so we can't work.

It is also established in the literature that the availability and accessibility to capital at competitive rates play a critical role in the development and growth of businesses (Amable and Chatelain, 2001; Hennessy, 1987; Hoskisson et al., 2004). India and China have vastly different financial infrastructures, with China having a centrally controlled financial sector compared to India's market-based sector.

Overall, China appears to be more successful than India in providing the necessary financial infrastructure to attract foreign capital to support the development and growth of its enterprises (Table 3). This is partly because China started economic and financial reforms earlier than India. As a result, China has been more successful in attracting FDI than India, with the stock of inward FDI in China estimated at US$327 billion compared with US$76 billion for India. However, India's financial sector is generally perceived to be more efficient at allocating capital and controlling bad debts (Farrell and Lund, 2005: 103). Although China is well endowed with capital, it is weak in its efficient allocation compared with India, which has limited capital but is strong in its efficient allocation.

Demand Conditions

The importance of the nature and sophistication of demand, both domestic and international, in the development and growth of industries is well documented (Porter, 1990a; Kapur and Ramamurti, 2001). The IT services sectors of India and China have developed along two distinct growth models. In India, domestic demand for IT services remains relatively underdeveloped due largely to the poor state of the telecommunication infrastructure. Because of poor growth prospects domestically, Indian IT service providers have ventured overseas in search of growth and, as a result, are now world leaders in the provision of IT services in international markets. By comparison, China's IT services sector has developed rapidly to service its large and rapidly growing domestic market. As a result, China's IT service providers have been slow in venturing into international markets.

The Indian IT service sector's approximate share of export revenue to total revenue rose from 50% in 1995 to 80% in 2008. By comparison, China had no export revenue in 1995, less than 1% in 2000 and about 10% in 2008 for its IT service sector. The strength of China IT services sector is based on the production of software for its large and growing domestic hardware industry. China's strong manufacturing sector, buoyant consumer electronics market, large number of domestic and foreign SMEs, a larger population and rapid economic growth have all contributed to keeping IT service enterprises focused on the domestic market.

The export market orientation of India's IT services sector and the domestic market orientation of China's IT services sector raise an important question regarding each country's future growth strategies. Company C noted that the main constraint to the growth of India's IT sector will be its capacity to meet clients' needs rather than the lack of opportunities in the international marketplace. Hence, weak and underdeveloped domestic demand for software and IT services in India do not appear to be relevant to the sector's plan to continue to grow in the global marketplace. Despite the strong domestic market orientation of China's IT service providers, opportunities exist to expand overseas, particularly in regional markets with low psychic distance and similar linguistic and cultural backgrounds. Despite this possibility, Indian IT executives in general do not perceive China as a major threat to their business. To quote Company D executive:

> There will be a lot of internal demand in China's market for IT services. I think China could also have a play [venture into] in some of the region's markets such

> as South Korea, Japan and Taiwan but I have strong doubt whether China will be able to be a global delivery player ... particularly in Western markets.

Related and Supporting Industries

Related and supporting industries and institutions provide a strong base for innovation, knowledge-sharing and technology development (Porter, 1990a: 80). The IT services sector consists of three broad segments: hardware, software services and information technology-enabled services which rely on and draw from each other for growth and development. Being knowledge-based industries, links with the education sector are also critical. Commenting on the importance of related and supporting industries, such as educational and training institutes, for the success of India's IT services sector, an interviewee at Company H remarked that:

> The South, Bangalore in particular, has had a history of having good educational institution and excellent government-run laboratories and research institutions. So there was this engineering talent with middle and senior management experience readily available to join the [IT] industry and that was very advantageous. There are also a lot of technical training institutes and engineering colleges around which benefit the ITS sector.

In the case of China, a well-established and growing hardware industry provides the main platform for the development and growth of its software services industry and IT-enabled services. The larger penetration of personal computers and internet lines in China is a major market for its hardware industry, which in turn increases demand for the software industry (Table 1). Kharbanda and Suman (2002) point out that application software, consisting of accounting software, word processing packages, translation tools, antivirus developments and publishing software, is a dominant segment of China's IT services enterprises and accounts for about two-thirds of the software market. Other related and supporting networks include the Chinese Academy of Sciences, a leading academic research institution in natural science, technological science and high-tech innovation, which is frequently credited for the development of the country's IT industry. Founded in 1949, it has a total staff of over 58,000, 108 scientific research institutes, over 200 science and technology enterprises and more than 20 supporting units. China's IT services sector has also benefited greatly from the rapid agglomeration of its manufacturing sector in general and manufacturing related to computer and information and communication technology in particular. Also, the role of FDI as a vehicle for technology and knowledge transfer is well established. And, because much of the growth in manufacturing was supported by FDI, IT service providers in China have also benefited from technology and knowledge transfer embedded in manufacturing-related FDI.

By comparison, in India, IT service providers focus primarily on software services and IT-enabled services. India's software services enterprises are involved mostly in custom application development and maintenance, and application outsourcing, which account for approximately 88% of total software export revenues. Among IT-enabled services, the financial sector comprising banking, financial services and insurance account for approximately 40% of the share of revenue in 2005 (Nasscom,

2006a). India's IT services sector is also strongly supported by world class educational institutions, such as the Indian Institute of Technology, Indian Institute of Management and Indian Institute of Technology and Management, and a large network of private education and training providers, such as Aptech and the National Institute of Information Technology. The successful development and growth of the IT services sector in both India and China have often been traced to their connections with higher education and research institutions (Tschang and Xue, 2003).

Firm Strategy, Structure and Rivalry

The context in which firms are created, organised and managed, and the extent of domestic rivalry differentiate between firms across nations (Porter, 1990a). The growth strategies of both China and India have been influenced to a large extent by linguistic and geographical factors. For example, China is the largest offshore software outsourcing base for Japan. In 2005, Japan contributed 59% to China's IT services export revenue, followed by other Asian countries (14%), Europe and America (20%). By comparison, India's English language skills, colonial background, mixed economy with an emphasis on the Western-style private sector, and time zone gap may explain the internationalisation of its IT services sector. The dominant international markets in terms of total revenue for India's IT service providers include North America (68%), Europe (23%) and Australasia (8%).

The structure of the IT services sector in India is considered to be more mature and consolidated compared with China. Following a period of active mergers and acquisition between 2002 and 2005, India's IT services sector currently has just over 1000 ITS providers and the top five companies account for about 32% of total software export revenues (Nasscom, 2006a). Thus, the Indian IT services sector is characterised as one with a concentration of large companies operating globally. Global delivery models developed by leading Indian IT service providers have also enhanced the country's location attractiveness and reputation (Kotlarsky and Oshri, 2008: 230). Competition and rivalry among Indian IT service providers also appears to be intense, as evidenced by firms' behaviour in mimicking their competitors' international strategies and business models. The view that competition is generally high among IT companies is reinforced frequently by company executives who particularly note competition in the recruitment of human resource talent and in areas of new business development.

By comparison, in China the IT services sector consists of over 8000 companies, with the majority being small workshop-type operations and approximately 75% of firms having fewer than 50 employees (CSIA, 2006). In 2003, India had 60 CMM level-5 companies and 26 level-4 companies, compared with 7 and 4, respectively, for China (Kearney, 2007).[2] Thus, the Chinese IT services sector is still in its infancy and consolidation of the sector through mergers and acquisitions is inevitable in order for the sector to gain economies of scale necessary to compete globally. This view is summarised in the comments by a Company B interviewee:

> China is obviously gearing up but the industry is still very fragmented. There is no process orientation, as in India ... but they [China] are not a threat to India although they are the cheapest. They do not have many certified verified companies and large companies with 500 plus employees.

Role of Government

It is widely acknowledged that government can play a critical role in enhancing the competitiveness of firms, particularly where there is "market failure" or where markets are weak or do not exist (Dunning, 1991; Kumar and Chadee, 2001; Porter, 1990b). According to Porter (1990a), governments can act as a catalyst and challenger and, in particular, governments may play a critical role in assisting firms to gain international competitiveness. In the case of developing country IT offshore service providers, the role of the government has been one of the most critical factors in developing the industry and markets for their services. Furthermore, governments also use trade, environmental, industrial and science and technology policies to enhance the competitiveness of domestic producers. In China, for example, the government has used FDI policies quite successfully to foster the transfer of technology and assist domestic enterprises in improving their competitiveness.

Commenting on the role of the government, an Indian IT executive from Company G interviewed for this study highlighted the important role of government policies for industry growth:

> Out of Bangalore, out of India, we started delivering IT services because the cost of telecommunications or the cost of phone calls and internet came down drastically because of friendly government policies and the government also encouraged these companies to set up offices here by having proactive policies.

An executive from Company C added:

> Forward looking government policies have definitely facilitated the growth of the industry. The government has been very progressive. I would say there were visionaries in the government and I believe that the government has played a catalytic role in making sure that IT grows with the necessary fiscal and economic policies.

The governments of both China and India have been instrumental in the development and growth of their respective IT services sectors by creating the necessary policy environment and by supporting educational institutions and professional associations. Tschang and Xue (2003) trace the origin of China's IT sector at the end of the 1970s to universities, the Academy of Sciences and government-owned companies. With the beginning of China's Open Door Policy, in the mid-1980s several professors and research fellows from Beijing left their academic jobs and started software companies to produce Chinese word processing systems. Sensing the emergence of the information technology era, the government of China also implemented a number of policies targeted specifically at the software and IT industry.

In India, the government started promoting software exports as early as 1970 through various industry initiatives. However, it was not until 1991, when the government undertook massive economic restructuring and deregulation, that the IT services sector experienced unprecedented growth. In general, the government has played a supportive role by creating and providing the necessary economic, political

and regulatory environment, with attractive fiscal and tax incentives to support the IT sector. As a result, India's IT firms have developed rapidly into leading global companies by being flexible, innovative and adaptable to change in the global business environment and to consumer taste.

Chance Factors

The success of the IT services sectors in both China and India can also be attributed to several chance factors. The sheer size of the two country's populations – and their relative youth – has worked in favour of both countries in becoming leading IT service providers. The IT services sector is labour intensive and both India and China have the capacity to supply the scale of IT graduates required for achieving economies of scale in this industry (Kearney, 2009).

Besides being endowed with the world's largest populations, India has benefited from three specific "luck" factors, which have set it apart from China. These include: (1) the emergence of English as the preferred language for international business; (2) India's business and legal frameworks have their foundations in the British constitutional system; and (3) the advent of Y2K in 2000.[3]

English language proficiency and familiarity with the English legal system have been a major consideration for foreign companies, US multinationals in particular, to employ Indian programmers as far back as the mid-1980s. This started as a cost-saving strategy and to extend the US working day to 24 hours by taking advantage of the 12-hour time zone difference between the two countries. By the end of 1990, India had developed sufficient competencies and capabilities in offshoring of IT services and had the right economic environment to be favourably positioned to take advantage of the Y2K phenomenon in 2000. Since the Y2K scare, the offshoring of IT services from India has grown more than four-fold, representing a major turning point in India's reputation as a leading global provider of IT services. The importance of chance on the Indian IT services sector is recognised widely in the industry, as summarised below in an interview with a Company H executive:

> Our big chance was in 2000 with Y2K. We concentrated on Y2K. Also, Telecom companies had projected the dot com move would go up and had invested a lot in laying cables across continents and when the dot com boom crashed, telecommunications became cheaper which put IT service companies in an advantageous position.

An Assessment of Competition Between China and India

Based on the foregoing analysis, a comparative assessment of India's and China's IT services sectors is summarised in Table 4. Our analysis indicates that India draws its competitiveness from three main sources: its human resources, the consolidated structure of the IT services sector and a host of chance factors, such as English language capability and the advent of the Y2K phenomenon. India's IT services sector is also strongly supported by a well-developed higher education sector, research laboratories and the government, which provides the necessary catalytic impetus for business growth.

Table 4. Competitive strength of IT services sectors, India and China

Competitive dimension	India	China	Comments
1. Factor endowment			
(a) Human resources	S	W	India has a highly skilled human capital pool, English language proficiency and reputable educational facilities. China lags behind in English language competency.
(b) Infrastructure			China dwarfs India on FDI parameters and her superior industrial infrastructure. India has adequate technology parks for software companies and also has a more efficient financial infrastructure. Overall, China has a more developed economy supported by higher quality infrastructure.
• Physical	W	S	
• Technological	W	S	
• Financial	S	W	
2. Demand conditions			China has a large and buoyant domestic IT services market. There is strong domestic demand for software in Mandarin. India has an underdeveloped domestic market and focuses on offshore markets mostly in the USA and Europe.
(a) Offshore demand	S	W	
(b) Domestic demand	W	S	
3. Related and supporting industries	S	S	Strong industrial agglomeration in both countries to support the development of IT service providers.
4. Strategy, structure and rivalry			Chinese growth derived from domestic demand while India focuses on export markets.
(a) Growth strategy	S	S	India has a consolidated industry with large global companies leading in the field. China's has many small firms that lack the scale and structure to become global players. With two decades of experience, Indian industry is more mature with fierce competition and rivalry among firms. China has a large number of small firms with low process capabilities and rivalry.
(b) Industry structure	S	W	
(c) Rivalry	S	W	
5. Government	M	S	In China the government is proactive in developing industry through direct intervention. The Indian government acts as catalyst in supporting industry by providing the necessary environment for firms to grow.
6. Chance factors	S	M	Y2K, English language proficiency and the Western-style business practices based on English law played a major role in the growth of the Indian IT services sector. The abundance of human resources is a chance factor for both countries.

S, Strong; M, Moderate; W, Weak.

By comparison, the rapid growth of China's IT services sector has been as a result of the rapid growth of its manufacturing sector, particularly for IT hardware, and a buoyant large domestic consumer market for computers and electronic goods. Because of this, China's IT services sector has remained largely domestically orientated, with IT service providers servicing the local hardware sector. Although

China has a relatively well-developed and superior industrial infrastructure and strong government support, IT service providers are unlikely to become global players in the near future due to a number of weaknesses. One of the major weaknesses relates to the highly fragmented state of the industry, which consists of a large number of small and globally uncompetitive firms. The lack of IT skilled human resources, access to funding for entrepreneurs and English language proficiency are major constraints for China to become globally competitive. Although in recent years China's IT service providers have ventured into neighbouring countries (e.g. Japan and South Korea), leading India-based IT executives do not perceive China as a serious threat to India, as summarised in the comments below:

> Company E executive: China will take time to come up to the level of India, but maybe in the next 5-6 years they will come to our level, but by that time we will probably have strengthened our position and they will be lagging behind India by another five years.

> Company A executive: We are competitive now and will likely remain competitive for another 5-10 years. I think we have this window open for 5-10 years as the industry moves to more complex, more value added type of work. The lower commodity type of work could get farmed out, possibly to China.

> Company D executive: I think India will remain competitive for many years ahead of all other competitors put together, but India will not sustain on labour arbitrage. India has to focus on business efficiencies, process efficiencies and providing significant transformational value to global.

It is also interesting to note that because China is not perceived as a major competitive threat to India, it is widely accepted among Indian industry leaders that potential co-operation with Chinese IT services companies is a viable option to overcome some of their constraints. Industry executives believe that co-operation rather than competition with China will strengthen the competitive positions of the country's IT services sector of both countries. These views are summarised below:

> Company C executive: Our Company has a presence in China (Shanghai), where we have a development centre. China is a manufacturing hub; it has hardware strength whereas India has software strength. You should not actually compete and I think most of the Indian companies are setting up shop in China to see how we could integrate the whole so it's not a question of competition.

> Company I executive: I think India and China can co-operate. India is strong in IT whereas China is strong in manufacturing, so some co-operation can be done where India can provide IT support to the manufacturing industry in China, and China can produce cost effective goods for India. Hardware comes from China and India can provide software to hardware.

While the majority of executives clearly see India as the leading provider of IT services on a global scale, they are also aware of the opportunities that China's

strong IT services and hardware industry and its relationship with Japan may represent. The complementarities between the two countries would suggest that India and China could benefit from a stronger alliance which would allow them to exploit the synergies between the two countries.

Conclusions

The trends in IT spending and outsourcing clearly signal that the international outsourcing of services is here to stay and will continue to grow in the foreseeable future (Gartner, 2006; Oshri et al., 2009). Although a number of countries have been active in the international outsourcing of IT services, India and China are emerging as two leading players in this rapidly growing market (Kearney, 2006, 2009). So far, the two countries have developed complementary strengths and specialise in distinctively different segments and regions of the IT services markets. Given their complementary strengths and weaknesses, both countries can benefit from partnering with each other and it is unlikely that China will become a major threat to India in the short to medium term. India specialises in IT services and focuses on providing integrated business solutions to clients globally. China, by comparison, focuses on the development of software to service its strong local IT hardware sector. Thus, India has a global market orientation while China is still largely domestically orientated. The IT sector in China is also fragmented, consisting of a large number of small enterprises which lack the necessary economies of scale to operate globally. Thus, industry consolidation and restructuring through mergers and acquisition is inevitable in the near future in China's IT services sector. By comparison, the Indian IT services sector comprises large transnational companies which can provide end-to-end IT service solutions to their clients world-wide. This is particularly important when servicing global firms with multiple locations dispersed around the world.

While the findings of this study provide answers to the initial question raised in the paper, a number of other questions remain unanswered. Further research is needed in exploring possible ways and hurdles for Indian and Chinese IT services firms to collaborate. Currently "co-operation" is in a stage of infancy and more research is needed to explore the political, economic and cultural considerations between the two countries. Another research avenue relates to the development of skilled IT professionals so as to ensure that a consistent and abundant supply of well-trained technicians is available to the industry. A further area worthy of investigation relates to the internationalisation of China's IT services sector and the mode of entry into foreign markets.

The main limitations of this paper relate to the data used for the purposes of analysis. Due to the unavailability of consistent and comparable data for the IT services sectors of China and India, it was necessary to compile the necessary data from various sources. Despite efforts to minimise errors, this process can introduce inconsistencies in the data. As a result, the findings should be interpreted with due caution.

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Notes

[1] The country attractiveness index measures the overall location attractiveness of IT service providers on a 10-point scale, where 1 = not attractive and 10 = most attractive. China's index was 6.29 and India's was 6.91 (Kearney, 2009).

[2] CMM is Capability Maturity Model and also often referred to as SW-CMM by practitioners in the industry. CMM provides a number of guidelines for quality assurance for the software industry, where level 5 is the highest achievable accreditation and level 1 is the lowest.

[3] Y2K refers to the realisation in the mid-1990s that computers would not be able to recognise the year 2000 due to a programming oversight. Given the seriousness of this issue, there was a race against time to adjust large numbers of computers and computer systems around the world in order to avoid large-scale disruption. India was one of the few countries that quickly deployed large numbers of skilled IT professionals world-wide to deal with this issue.

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