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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 (1990) competitive advantage model. The main findings indicate that the IT services sector 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 oriented 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 cooperation between IT service providers in the two countries is a more likely outcome.*

KEY WORDS: IT Service Providers, Competitiveness, India, China.

It is well documented that the world information technology (IT) services[i] sector has been one of the fastest growing industries over the last decade (Chadee & Raman, 2009; Kenney et al., 2009; Kotabe & Mudambi, 2009; Oshri et al., 2009). Within this sector, the international outsourcing of IT services has been estimated at around US$ 55 billion a year with annual growth of between 15-20% annually (Oshri et al., 2009). A number of countries have developed successful IT services sectors such as China, India, Malaysia, the Philippines, Russia, Israel and Ireland which are the major players. Among these countries, the four

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leading exporters of IT services, in terms of world market shares are Ireland (20%), India (16%), Israel (5%) and China (2%) (UNCTAD, 2006). However, in terms of country attractiveness[ii], India (6.91) and China (6.29) are generally regarded as being by far the two most attractive locations for IT service providers (Kearny, 2009). India has established herself as 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 (Willcocks & Lacity, 2009 *cited in* Oshri et al., 2009). Although China is still a relatively small exporter of IT services, it has the capacity to grow rapidly. The information presented in Table 1 suggest that while both India and China have experienced rapid economic growth over the last two decades China has an overall more developed economy with higher GDP, stock of foreign direct investment (FDI) and exports. However, China's economic growth has been driven mainly by its export oriented manufacturing sector while the service sector has been the main driver of economic growth in India. Within the 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 (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. It is widely believed that the IT export sectors in these two countries are on a collision course and that continued rapid growth and development of China's IT services sector will erode India's competitiveness in this sector. Thus, an interesting 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 contrary to popular beliefs, China and India are unlikely to compete against each other in the IT services sector in the foreseeable future and that cooperation between the two countries is a more likely outcome.

Take in Table 1 here

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 offer 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.

Theoretical Framework

The competitiveness of the IT services sector of both India and China is assessed by using Porter's (1990a) competitive advantage framework which posits that: (1) factor conditions, (2) demand conditions, (3) related and supporting industries, (4) firm strategy, structure and rivalry, (5) the role of the government and (6) chance events constitute the key elements for firms to compete (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 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 (1990) framework has been applied extensively for assessing the nature of competition in numerous industries including IT services (Kapur & Ramamurti, 2001) .

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Methods and Data

This paper uses two sources of data 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 et al., (Zaheer et al., 2009), industry level secondary data for India are drawn mainly from Nasscom website (www.nasscom.com), and the directory of Indian software and services industries (Nasscom, 2005). Nasscom is the main IT industry association with its members accounting 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 for China (www.mii.gov.cn).

Given 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 is supplemented with qualitative data drawn from semi-structured interviews of executives from 11 of the top 20 IT service providers in India (Nasscom, 2006b). 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 in the future between India and China in the provision of IT services globally. The information collected from the interviews were transcribed electronically and sorted by main questions/issues under consideration. The responses from IT executives on the nature of competition between India and China together with the secondary data formed the main data set 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 young and older firms, Indian owned and foreign owned firms, high and moderate revenue firms with head quarters in all the three IT hot spots in India; namely Bangalore (South), Mumbai (East) and National Capital Region (North).

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Analysis and Discussion

In order to assess the nature of competition between the IT services sector of India and China, we proceed by comparing and contrasting each dimension of Porter's (1990) model describes in Figure 1 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 into the future.

Factor Endowments

Factor endowments refer to the factors of production essential to compete in the industry (Porter, 1990a). In case of the IT services, human resources and infrastructure have been identified as being critical factors for competitiveness (Doh et al., 2009; Graf & Mudambi, 2005; Kearney, 2006; Lewin et al., 2009). The information in Table 3 compares China's and India's endowments for these two main factors.

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Human resources: People skill and the availability of talent constitute one of the most critical elements of competitiveness for the software and services industry (Kearney, 2006). In particular an abundant and consistent supply of competitively remunerated skilled human resources particularly in areas of (English) language, science and technology have been found to be critical for the competitiveness of firms in the IT sector (Shee & Pathak, 2005). It is also well known that the shortage of skilled labour in IT is a major constraint in the growth and further development of the IT sectors 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 come from more than 340 institutes of higher education and 16000 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 850000 IT professionals and 1.4 million IT enabled services (ITES) – business process outsourcing (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 the labour force targets above for two reasons. First, although India is graduating a large number of IT professionals annually, only about 10-25% of these are deemed to be employable because of inadequate language (English) and technical training (Farrell & Grant, 2005). Second, a large proportion of Indian graduates are also lured into more attractively remunerated positions in other countries as a result of the ongoing acute shortage of IT qualified professionals in the world. Together, these two factors greatly reduce the pool of available qualified graduates to sustain India's planned growth.

In China**,** there are approximately 1400 institutions of higher education with total enrolment of 9 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'sDaily, 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).

There is a general consensus among Indian industry executives interviewed that despite China's recent efforts at improving the English language proficiency of its graduates, in general, 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 critical shortage in the supply of skilled workers because of '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 & Grant, 2005). 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.

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, the demographic structures of the two countries are predicted to shift in different direction over the next 15 years. India's active labour force (those aged 15-49) is predicted to remain stable while that of China will decline by 7%. 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 infrastructures which supports the development and growth of enterprises is well established in the literature (Dunning, 1988; Loree & Guisinger, 1995; Porter, 1990b; Root & Ahmed, 1978). The development of 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 IT services sector include the capacity for electricity generation, telecommunications, roads, ports and technology parks and overall public infrastructures. These are generally well developed in China compared to India. The

superior state of China's physical and technological infrastructure (Table 3) is the result of strategic Chinese government policies towards industrial and economic development. By comparison, India's physical infrastructure including electricity generation, roads and transportation and telecommunications is generally in a poor state. During the early 1980's 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 to China partly because the domestic physical and technological infrastructures are generally below world standards. 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 National Capital Region. Despite such efforts, the overall state of the country's infrastructure in key areas for industrial development remain a major concern for the IT services sector as noted in the following:

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 is 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 of the basic infrastructural support such as in electricity generation. To quote Company H when 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 sorry, the government is not giving us power so we can't work.

It is also well 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 & 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. 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 stick of inward FDI in China estimated at US$327 billion for China compared to US$76 billion for India. However, India's financial sector is generally perceived to be more efficient at allocating capital and controlling bad debts (Farrel & Lund, 2005). Although China is well endowed with capital it is weak in its efficient allocation whereas India has limited capital but is strong in its efficient allocation.

Demand Conditions

The importance of the nature and sophistication of domestic demand (Porter 1990) and international demand (Cartwright, 1993; Kapur & Ramamurti, 2001; Moon et al., 1998) in the development and growth of industries is well documented. 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 to the poor state of the telecommunication infrastructure and the lack of consumer spending for IT goods. Because of poor growth prospects at home, Indian IT service providers have ventured overseas in search of growth and as a result, India today has established herself as a world leader in the provision of IT services in international markets. By comparison China's IT services sector developed rapidly to service its large domestic market while its international activities have remained negligible until recently.

The Indian IT services 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 it's ITS 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 services 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 India's IT sector's growth will be its capacity to meet clients' needs rather than the lack 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 lot of internal demand in China's market for IT services. I think China could also have a play in some of the region's markets such as South Korea, Japan and Taiwan but I have my strong doubts whether China will be able to be a global delivery player…particularly in Western markets.

Related and Supporting 1ndustries

Internationally competitive related and supporting industries or institutions provide a strong base for innovation, knowledge sharing and technology development (Porter, 1990a). The IT services sector broadly consists of three segments; hardware, software and services and information technology enabled services which rely and draw from each other for growth and development. Being knowledge based industries, their links with the education sector is 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, 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 (Table 1) is a major market for its hardware industry which in turn increases demand for the software industry. 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 account for about two thirds of the software market. Other related and supporting networks include the Chinese Academy of Sciences (CAS), 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 enables services. India's software services enterprises are mostly involved 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 (BFSI) account for approximately 40% of share of revenue in 2005. India's IT services sector is also strongly supported by world class educational institutions such as IITs, IIMs, IITMs and a large network of private education and training providers such as Aptech, NIIT[iii]. 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 & 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 cultural factors. For example, China is the largest offshore software outsourcing manufacturing base for Japan. In 2005 Japan contributed 59% to China's IT services export revenue followed by Europe and America (20%) and Asia - other than Japan (14%). By comparison North America accounts for 68% of India's IT services export revenue followed by Europe (23%) and Australasia (8%). India's English language skills, colonial background, mixed economy with emphasis on western style private sector, and time zone gap played a crucial role to serve USA and UK markets. However, there are indications that the future growth strategies of both countries include addressing some of their current weaknesses such as China's emphasis on improving its English language competencies in order to be able to enter English speaking markets.

The structure of the IT services sector in India is considered to be more mature and consolidated compared to China. Following a period of active mergers and acquisition over the last three years, India's IT services sector comprises about 1000 ITS providers with the top 5 companies accounting for about 32% of total software exports of which the top three companies (TCS, Infosys, and Wipro) are valued at more than US$ 3 billion each. Thus, the Indian IT services sector is characterised as one with a concentration of large companies leading the sector globally. Global delivery models developed by leading Indian IT service providers have enhanced the country's location attractiveness and reputation (Kotlarsky &

Oshri, 2008). Competition and rivalry in the sector are also intense as evidenced by firm's behaviour in mimicking their competitors particularly in their offshore growth strategies and business models. This view is also reinforced frequently by company executives where the general consensus seems to be that competition is generally high among IT companies; particularly 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 with approximately 75% of firms having fewer than 50 employees. In 2003, India had 60 CMM[iv] level 5 companies and 26 level 4 companies compared to 7 and 4 respectively for China (Kearney, 2007). 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 Company B:

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

The government can play a critical role in enhancing the competitiveness of firms (Dunning, 1991; Porter, 1990b), particularly where there is a market failure or markets are weak or do not exist (Kumar & Chadee, 2001). According to Porter (1990) **t**he government acts as a catalyst and challenger and it is the firms that create competitive industries not the Governments. In particular, governments may play a critical role in assisting firms to gain international competitiveness through policies that stimulate the market where it does not exist and that complement markets where there is market failure (Kumar & Chadee, 2001). Since most IT offshore service providers are from developing countries usually characterised as having weak markets, the role of the government has become one of the most critical success factors for offshore IT service providers. Furthermore, governments also use trade, environmental, industrial, and science and technology policies as weapons of international competition. In China, for example, the Government have used FDI policies quiet successfully to foster the transfer of technology to assist Chinese enterprises in improving their competitiveness. Commenting on the role of the government, two Indian IT executives highlighted the important role of government policies for industry growth:

Company G: 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

govt policies and the government also encouraged these companies to set up offices here by having proactive policies.

Company C: 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. Tshang and Xue (2003) trace the origin of China's IT sector to Universities, China's Academy of Sciences and government owned companies at the end of the 1970s. With the beginning of China's Open Door Policy, in mid 1980s several professors and research fellows from Beijing Zhongguancum left their jobs and started their software companies to produce Chinese word processing systems. Sensing the emergence of 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, in India's free market economy characterised by competition and free enterprise, the government has played a supportive role by creating and providing the necessary economic, political and regulatory environment supported by 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 more flexible, innovative and adaptable to change in the global business environment and 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 sizes of the two country's populations and their relatively young populations have worked in favour of both countries in becoming leading IT service providers. The IT services sector is labour intensive and only two countries, India and China, have the capacity to supply the scale of IT graduates required for achieving economies of scale in this industry.

Besides being naturally endowed with the world's largest populations, India has benefited from 3 specific 'luck' factors which have set her 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 from the British constitutional system and (3) the advent of Y2K in 2000. 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 1980's. 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 enough competencies and capability in offshoring of IT services and had the right economic environment to favourably position herself to take advantage of the Y2K phenomenon in 2000. Since the Y2K phenomenon, the offshoring of IT services from India has grown by more than four folds and represents 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 widely recognised in the industry as summarised below:

Company H: 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.

Comparative Assessment: Summary and discussion

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 to date India draws its competitiveness from three main sources; namely 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 Y2K phenomenon. India's IT services sector is also strongly supported by well developed higher education sector, research laboratories and the government which provides the necessary catalytic impetus for business growth.

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 oriented with IT service providers servicing the local hardware sector. Although China has a relatively well developed and superior industrial infrastructures and strong government support, IT service providers from China are unlikely to become global players in the near future due to a number of weaknesses. One of the major weaknesses relate 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 with low psychic distance (e.g. Japan and South Korea), leading IT executives do not perceive China as a serious threat to India as summarised in the comments below:

Company E: 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: 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: 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 cooperation with Chinese IT services companies is a viable option to overcome some of their constraints. Industry executives believe that cooperation 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: 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: I think India and China can cooperate. India is strong in IT whereas China is strong in manufacturing, so some cooperation 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 greater alliance which would allow them to exploit the synergies between the two countries.

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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. The IT services sectors in the two countries have contrasting and complimentary features. 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 their 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 oriented. 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 worldwide. This is particularly important when servicing global firms with multiple locations dispersed around the globe.

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 at infant stage 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 third 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 relates 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 inevitable introduce inconsistencies in the data. To this extent, the findings should be interpreted with due caution.

Table 1: Selected stylized facts for China and India

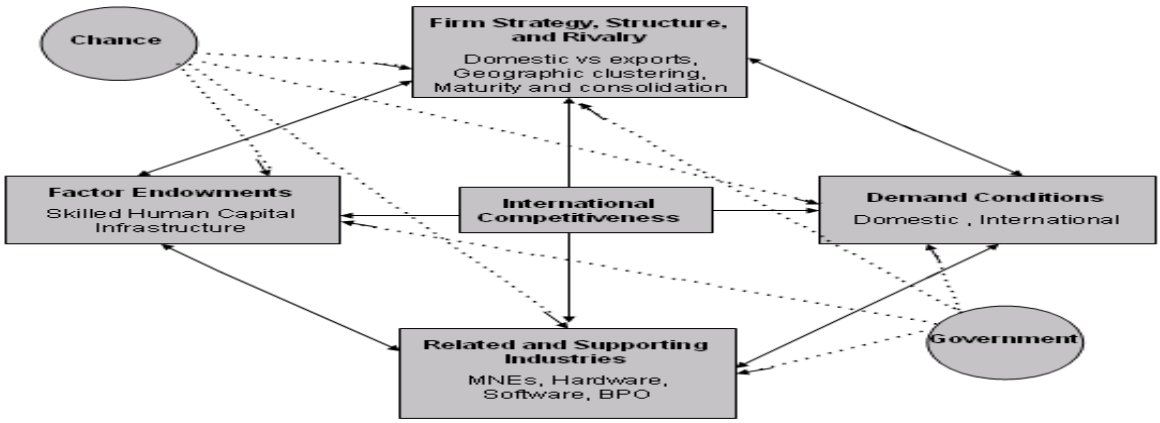
Indicator	India					China				
	1990	1995	2000	2005	2008	1990	1995	2000	2005	2008
Total population (bil.)	0.85	0.93	1.01	1.09	1.2 [c]	1.13	1.20	1.26	1.30	1.33 [c]
Population growth (%)	2	2	2	1	1	1	1	1	1	1
GDP growth (% annual)	6	8	4	9.2	9	4	11	8	10	9
GDP (US$ billion.)	317	355	460	810	1236 [c]	355	728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

Sources: http://databank.worldbank.org/ddp/home.do?Step=12&id=4&CNO=2 .

[a] data computed from MII and CSIA (2006) for China and from Nasscom Fact Sheets (various years) for India.

[b] Estimated for 2009 downloaded on May 3 from http://www.nasscom.in/upload/5216/IT_Industry_Factsheet-Mar_2009.pdf [c] This information is for 2009 downloaded on May 3 from http://english.peopledaily.com.cn/90001/90778/90860/6888062.html and http://www.x-rates.com/d/CNY/table.html

Figure 1: Main elements of competitiveness of IT service providers



Source: (Porter, 1990b, p. 127), Adapted

Table 2: Characteristics of IT service providers in the sample (n = 11)

Variables	Frequency	% of Sample
Age (Year of incorporation)		
Prior to 1996	07	64
After 1996	04	36
Turnover (2006, $ million)		
≤500	06	55
≥ 500	05	45
Number of Employees		
≤200	0	0
200 – 2499	0	0
≥ 2500	11	100
Ownership		
Indian owned	06	55
Foreign owned	05	45
Head Quarter Location		
Bangalore	4	36
Mumbai	4	36
National Capital Region	3	28

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$, 2008)	46	195
ICT expenditure as % of GDP 92008)	4	6
Internet users (per 100 people, 2008)	5	22
Personal computers (per 100 people, 2006)	3	4
Fixed line & mobile phone subscribers (per 100 people, 2008)	34	74
Secure internet servers (2009)	1796	1579
Financial		
Bank non performing loans to total gross loans (%, 2008)	2	2
Total value of stocks traded (US$ billion, 2009)	1089	8956
FDI stock (US$ billion, 2008).....Inflow	123	378
Outflow	62	148

Sources:
http://databank.worldbank.org/ddp/home.do?Step=3&id=4; http://www.unctad.org/Templates/Page.asp?intItemID=3198&lang=1
http://www.edu.cn/education_1384/index.shtml; http://www.education.nic.in/statscontents.asp;
http://www.census.gov/ipc/www/idbsum.html; http://hdr.undp.org/hdr2006/statistics/;

Table 4: Competitive strength of the IT services sectors of India and China

Competitive Dimension	India	China	Comments
1. Factor Endowment			
(a) Human Resources	S	W	India has highly skilled human capital, English language proficiency and reputable educational facilities. However the employability of human capital needs to be improved in both countries.
(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 market due to its strong manufacturing sector. There is strong domestic demand for software in Mandarin. India has an underdeveloped domestic market and focuses on offshore markets mostly in US and Europe.
(a) Offshore Demand	S	W	
(b)Domestic Demand	W	S	
3.Related & Supporting Industries	S	S	Strong industrial agglomeration in both countries to support the development of IT service providers.
4.Strategy, Structure and Rivalry			
(a) Growth strategy	S	S	Chinese growth derived from domestic demand while India focuses on export markets..
(b) Industry structure	S	W	India has a consolidated industry with large global companies leading in the field. China's has many small firms and lacks the necessary scale and structure to become serious global players.
(c) rivalry	S	W	With two decades of experience Indian industry is more mature with fierce competition and rivalry among firms. China has a large number of very small firms with low process capabilities and rivalry.
5) Government	M	S	In China the government is pro active in developing industry through direct intervention. 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.

Note: S = Strong; M = Moderate; W = Weak

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Notes

[i] For the purpose of this paper, information technology services include software development services, system services and broader range of IT supported business services commonly referred to as IT enabled services or BPO services.

[ii] The country attractiveness (Kearney, 2009) measures the overall location attractiveness of IT service providers on a 10 point scale where 1= not attractive… 10= most attractive.

[iii] IIT (Indian Institute of Technology), IIM (Indian Institute of Management), IITM (Indian Institute of Technology and management) NIIT (National Institute of Information Technology).

[iv] CMM stands for the Capability Maturity Model and is also known as SW-CMM as it relates to software companies.

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