



Investigating India's competitive edge in the IT-ITeS sector



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Abstract The paper investigates the factors instrumental in imparting a competitive edge to the Indian IT-ITeS sector using Porter's diamond model. The paper ascertains the relative superiority of the model in explaining India's prominence in the IT-ITeS sector. The study carries out a "complex" application of the model that is "instrumental" in its attitude by identifying certain distinct factors under the realms of the diamond, the interplay of which catapulted India into the most favoured outsourcing destination. The study posits that the sector is likely to retain its technological prominence in the foreseeable future.

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Introduction

The year 2012 was a landmark year for the Indian information technology – information technology enabled services (IT-ITeS)⁴ industry with aggregate revenues crossing US\$ 100 billion. Being the largest recipient of the global outsourcing pie with a market share of 55% in the Financial Year (FY) 2013, the industry has grown at a CAGR

of over 21% during FY1998–2014. The sector's contribution to GDP increased from 1.2% in FY1998 to an estimated 8.1% in FY2014 (NASSCOM, 2014).

Researchers have attempted to develop models to trace the factors contributing to this success. The models/frameworks so far have attempted to club the factors under broad categories to frame a generalised structure, capable of explaining the dynamics emerging from the interaction of the factors that ultimately resulted in competitive advantage for countries in software and allied sectors. Four of these models deserve special mention—Porter's diamond model (1990); Heeks-Nicholson model (2002); Carmel's oval model (2003); and Joshi-Mudigonda's offshore attractiveness framework (2008). The basic tenets of these four models are outlined below:

1. **The diamond model (1990):** Framed with a business policy perspective, Porter's model emphasized the need for enhancing productivity to retain the competitive edge in a particular industry through continuous

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⁴ The IT-ITeS industry includes IT software, IT services and ITeS-BPO (NASSCOM classification).

upgradation of technology. The incentive for upgradation stems from the interplay of four attributes, namely (i) favourable factor conditions; (ii) high domestic demand; (iii) firm strategy, structure, and rivalry; and (iv) existence of related and supporting industries. Apart from these four factors that constitute the diamond, Porter also emphasized the role of “chance” factors and government policies that often assume important roles in strengthening the diamond, notwithstanding their positioning outside the realms of the diamond.

2. **The Heeks-Nicholson model (2002):** Heeks-Nicholson examined the factors contributing to the success of the three first-tier software exporting nations, viz India, Ireland, and Israel. Based on a competitive analysis of the three countries, Heeks-Nicholson proposed a software export success model by taking into consideration five factors, namely (i) demand (both domestic and foreign); (ii) national vision and strategy; (iii) international linkages and trust; (iv) software industry characteristics; and (v) domestic input factors/infrastructure.
3. **The oval model (2003):** The oval model propounded by Carmel identified eight factors that contribute to software export success. In doing so, the model claims to enhance the Heeks and Nicholson (2002) model by explaining the success factors of even the third and fourth tier software exporting nations. The eight factors identified by Carmel include (i) government vision and policies; (ii) human capital; (iii) wages; (iv) quality of life; (v) linkages; (vi) technological infrastructure; (vii) capital; and (viii) industry characteristics.
4. **The offshore attractiveness framework (2008):** Joshi-Mudigonda propounded the offshore attractiveness framework for evaluating a country’s attractiveness for offshore work. The framework is based on three key factors (analogous to the motion of an automobile), namely (i) primary motivating factors (accelerator); (ii) inhibitors (brakes); and (iii) facilitating conditions (steering). While primary motivating factors are fundamental drivers for offshore work, inhibiting factors act as deterrents. The facilitating conditions on the other hand tend to support convenient initial entry, smooth transition, and efficient trouble free delivery. Joshi-Mudigonda argue that facilitating conditions act as the most important discriminator in the choice of a target country among countries of similar cost advantages and risk profiles.

A study of the models reveals that the basic factors considered in all the models are similar; it is the classification of the factors that differentiates them from one another. In that sense, the other models do not bring anything new to Porter’s diamond model.

An additional advantage of Porter’s model is that unlike the other models, it assigns “chance” factors an important role. This is significant, especially in the context of the Indian IT-ITeS sector whose success to a great extent, can be attributed to events that unfolded outside the geographical territory of the country.

The most comprehensive attempt at using Porter’s model to assess the competitive advantage of the Indian IT-ITeS sector was by Heeks (2006). Other notable attempts

include the ones by Krishna, Ojha, and Barrett (2000), Vedpuriswar and Chowdary (2001), and Kapur and Ramamurti (2001).

Heeks (2006) classifies the earlier attempts into three categories, namely naïve, basic and complex (Fig. 1). Naïve application refers to the usage of the four elements of the diamond as mere “dump bins” for allocating points with little engagement (either systemic or dynamic) with the content of those categories. Basic application is more analytical, wherein the elements of the diamond are used to characterize a software industry, without any engagement with the systemic or dynamic elements of the theory. Complex application is analytical and encompasses not only the components of the diamond but also two extra diamond categories (namely “chance” and government) in engagement with the systemic and dynamic aspects of Porter’s construct. In other words, as compared to the basic or naïve applications of the construct, complex analysis is more holistic in its approach in terms of engagement with the systemic and dynamic aspects of the construct through interplay among the various components that it encompasses. This classification is mapped by attitude, which again has been classified into three categories, viz. instrumental work (which does not question Porter’s theory and uses it towards a descriptive end); critical work (does not take the theory as accepted truth and uses it for instrumental purposes); hypercritical work (which seeks to refute the theory altogether).

Most of the studies are either naïve or basic in terms of the application and are either instrumental, critical or hypercritical in terms of attitude. In contrast, our attempt is instrumental and complex. Our study builds on the work of Heeks (2006), yet differs significantly from it as it captures the transformation that the industry has witnessed over the years. The rationale for capturing this transformation while investigating the competitive edge emanated from the fact that it takes time for an industry to attain a competitive

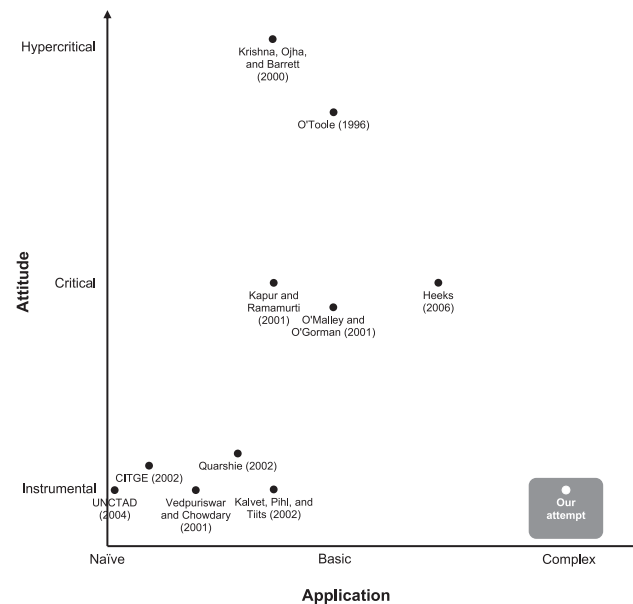


Figure 1 Researcher usage of Porter’s theory. Source: Adapted from Heeks (2006).

standing in the global market. In effect, our study goes on to contradict the findings of Heeks (2006) who argued that the industry “does not have a fully functioning diamond”.

The dynamism that we attempted to incorporate in our study necessitated a unique classification of the factors, instrumental in imparting the competitive edge under the realms of the diamond. This unique classification not only gave us a fully functioning diamond but also ascertained the supremacy of the construct itself.

Thus, our paper reconstructs Porter’s model in the context of the Indian IT-ITeS sector in a more systematic pattern, based on a longer time horizon encapsulating newer sets of information.

The remainder of the paper is as follows. In the second section we focus on the applicability of Porter’s construct in the context of Indian IT-ITeS sector (we do not

undertake a detailed analysis of the theoretical underpinnings of Porter’s construct as Heeks (2006) does). The third section discusses the findings and contributions of the study. The fourth section underlines the implications of the study.

Porter’s model: applicability to the Indian IT-ITeS sector

Porter’s framework identifies four primary factors, namely favourable factor conditions; high domestic demand; existence of related and supporting industries; and firm strategy, structure, and rivalry. These primary factors are supported by “chance” factors and government policies (Fig. 2).

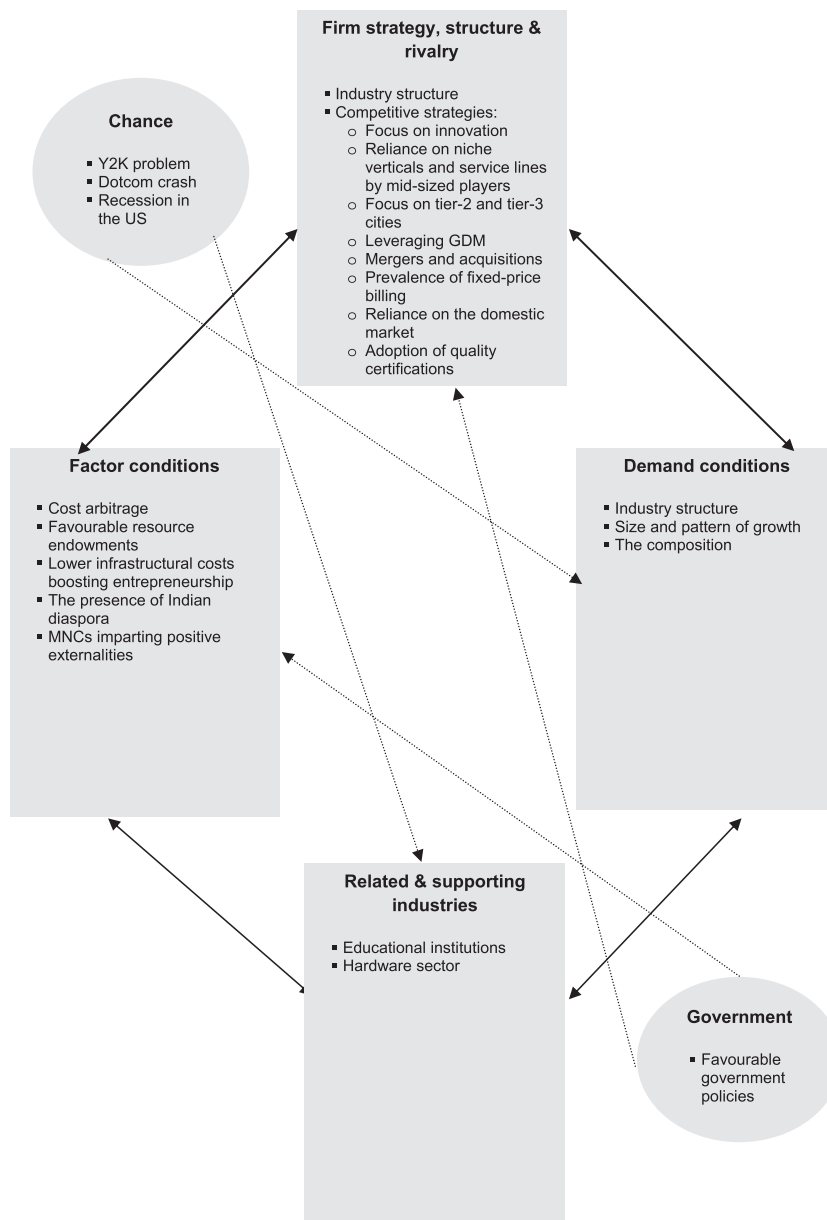


Figure 2 Porter’s diamond framework. Source: Authors’ classification under the realms of the diamond framework.

Factor conditions

In defining factor conditions, Porter avoided the traditional method of classification and divided the factors in four categories, namely basic, advanced, generalized and specialized factors. He opined that efficient and effective deployment of the advanced and specialized factors is the key to competitive advantage. In contrast to Heeks (2006), who divided the factors into two components, namely labour skills and other inputs (hardware, physical resources etc.), we have attempted a detailed enumeration of the factor conditions as follows:

Cost arbitrage

Cost arbitrage emanates from the availability of low-cost skilled labour which is the most important factor underlying the competitive advantage of the industry. Indian software professionals have tended to enjoy (absolute) wage advantages vis-à-vis their counterparts in the US and Europe. Estimated wage costs in India in 1997 were about 1/3 to 1/5 of the US levels for comparable work. The cost arbitrage remains unchanged even today notwithstanding the wage inflation due to decline in billing rates by around 5% in the last 4–5 years (NASSCOM, 2013). Moreover, India's large pool of technically trained manpower with proficiency in English complements this cost advantage (Arora & Athreye, 2002, 2005; Coward, 2002; Heeks, 2006; Kapur, 2002). With the availability of cheaper and quality manpower, a significant amount of software production began to be outsourced to India, which laid the foundation of the evolution of the IT-ITeS industry in India (Arora & Athreye, 2002).

Had cost advantage been the sole reason for the competitive advantage, India would have been expected to exhibit competitive advantage in the manufacturing and agricultural sectors as well. However, this was not the case. Lack of physical infrastructure forced Indian entrepreneurs to shift towards service-oriented sectors such as like IT-ITeS (Arora & Athreye, 2002, 2005).

Further, the wage rate in the software industry is much higher than the wage rates in the manufacturing sector or academia, when measured in purchasing power parity (PPP) terms (Balasubramanyam & Balasubramanyam, 1997; Coward, 2002) which has continued to ensure a steady supply of workers.⁵ In other words, India's specialization in IT-ITeS has been driven partly by absolute and partly by comparative wage advantages and these two types of wage advantages have tended to reinforce one another.

Porter (1990) argues that the existence of relatively cheap labour may not explain the existence of competitive advantage for such a long span of time. Manoj Chugh (Global Head, Business Development at Mahindra Satyam)⁶ reiterates this point and opines "Cost arbitrage is not compelling enough. Customers are looking for flexible offerings and managed services". Porter (1990) goes on to state that the competitive advantage depends on the nation's ability to increase its productivity over time through

continuous upgradation. The Indian IT-ITeS industry has been successful in achieving this with the first US\$ 100 billion attributable to wage arbitrage and the next US\$ 100 billion achieved through a combination of high-value services and increasingly non-linear play manifested in a shift from enterprise services to enterprise solutions (NASSCOM, 2013). Efforts at improving the competitiveness through various measures such as agile delivery models; standardization and automation of business processes; inclusion of delivery network in tier-2 and tier-3 cities; delivery excellence; process innovation; and domain expertise have been the key focus areas (NASSCOM, 2010, 2013). The dynamics of the industry manifested in Indian firms making noticeable inroads in rendering higher-end services such as IT consulting indicates that the industry has moved significantly higher up the value-chain to retain its competitive edge.

Favourable resource endowments

The IT-ITeS industry is particularly suited to the resource endowments in a developing country like India by making, increasingly, more use of the resources in which India has a comparative advantage, such as quality manpower and less use of the resources in which India has a comparative disadvantage, such as physical infrastructure and financial capital (Arora & Athreye, 2002; Coward, 2002; Kapur, 2002; Kapur & Ramamurti, 2001).

The attributes of the Indian workforce seem to be tailor made for the industry which includes quality education, skill sets, exposure to frontier technologies, and fluency in English (Joshi & Mudigonda, 2008). India has the world's second largest English speaking population at 72 million and second highest number of engineering graduates, after China (NASSCOM, 2010). In addition, there are a number of socio-cultural factors that have influenced the attributes of the workforce that would include the submissive nature of the Indian workforce (due to the historical prevalence of hierarchical structure of society); their disciplined approach to work; structured method of analysis, and design and project management skills. Moreover, by outsourcing their jobs to India, most of the Western countries have successfully managed to increase the effective working hours of their workforce without any trade union opposition (Nicholson & Sahay, 2001).

As of FY2014, the IT-ITeS industry employed an estimated 3.1 million people directly and another 10 million people indirectly (NASSCOM, 2014). The demographic profile of the working population also seems to be favourable with 30% of the workforce within the age group of 18–25 years and 44% within the age group of 25–30 years. Career progression based on meritocracy, financial independence, opportunity for improving skill sets through ongoing training and professional development programs,⁷ monetary compensation, and other perks and privileges being the chief attractions for attracting a young workforce (NASSCOM, 2010).

In recent times, the government is working towards improving the physical infrastructure to ensure time-bound creation of world class infrastructure delivering services. To this end, the government intends to double the spending on

⁵ Entry of fresh graduates in the Indian IT-ITeS sector increased seven times during the period FY1999-2009 (NASSCOM, 2010).

⁶ <http://www.dqindia.com/dataquest/interview/191944/cost-arbitrage-win-deals>. Accessed on 8th December, 2013.

⁷ On an average, the industry spends around 2% of the revenues towards training new recruits (NASSCOM, 2010).

infrastructure from US\$ 500 billion in the 11th Plan (2008–12) to US\$ 1 trillion in the 12th Plan (2013–17). Further, the encouragement of private partnership through the public-private partnership (PPP) model is helping in provision of quality infrastructure. Notable examples would include the modernization of airport infrastructure in key cities such as Bangalore, Mumbai, Delhi, and Hyderabad, and public transport management system in Delhi through the Delhi Metro Network (NASSCOM, 2013). Such measures would fortify the prospects of the industry by imparting positive externalities.

Lower infrastructural costs boosting entrepreneurship

The infrastructural costs for setting up a software unit are low. Besides computers, office space and equipment, and internet connectivity, there are virtually no major costs for setting up a software unit (Coward, 2002). Hence, entry barriers are low. This, coupled with increased profitability from software production, worldwide decline in hardware prices, and a series of government initiatives such as lower tax and tariff obligations in the early 1990s ushered in a new wave of entrepreneurship (Arora, Arunachalam, Asundi, & Fernandes, 2001; Arora & Athreye, 2002; Balasubramanyam & Balasubramanyam, 1997; Kapur & Ramamurti, 2001). Majority of these entrepreneurs (comprising skilled engineers and technicians) were the return migrants of the "brain drain" of the 1960s and 1970s.⁸ Having accumulated substantial skills and savings overseas, many of them set up their own firms in India (Balasubramanyam & Balasubramanyam, 1997).⁹ Many of the leading software firms of today including Infosys, Wipro, Mahindra Satyam, Polaris etc. were started by first generation entrepreneurs (Kumar, 2001).

Presence of Indian diaspora

The presence of a large Indian diaspora, especially in the Silicon Valley in the US, has acted as "reputational and credibility intermediaries" that brought back substantial business opportunities in India (Coward, 2002; Kapur, 2002; Kapur & Ramamurti, 2001; Patibandla, Kapur, & Petersen, 2000). Half of the Indian diaspora in the Silicon Valley had business contacts in India and a quarter had actually invested in an Indian start-up (Saxenian, Motoyama, & Quan, 2002). The worth of the diaspora (in terms of knowledge, skills, social, and financial capital) intensified on account of reverse migration (Kapur & McHale, 2005), with their investments in India picking up since the mid-1990s (Heeks, 2006).

MNCs imparting positive externalities

Multinational corporations (MNCs) have had positive externalities on the host country in terms of knowledge spillovers and subcontracting, causing "demonstration effects" (Giarratana, Torrissi, & Pagano, 2003). Multinational corporations entered India during the 1980s, i.e. during the formative stages of the industry, influencing the business

models of the firms operating domestically. Texas Instruments (TI) for example, that entered India in the mid-1980s and whose business model rested on robust communication facilities on one hand and high-end offshore R&D activities on the other, influenced the way local majors such as TCS, Infosys and Wipro operated.

In recent times, there has been considerable R&D relocation by MNCs in India. In Bangalore alone, 230 MNCs invested towards R&D in telecom applications development and chip design, notable among them being TI, Intel, ST Microelectronics, Cisco Systems, SAP, and Oracle (Sridharan, 2004).

Demand conditions

While explaining the demand conditions, though Porter accepted the roles of both domestic and foreign demand, he attributed domestic demand to be the frontrunner in determining competitive advantage. The success story of the Indian IT-ITeS industry, in contrast, has been crafted by external demand and not home demand,¹⁰ and the dynamics of external demand or exports have received foremost attention in the literature. In effect, the domestic demand dynamics have been overlooked notwithstanding the fact that since early 2000, there has been significant reversal in the pattern of domestic demand which has helped the industry retain its competitive advantage amidst decline in foreign demand on account of the downturn of the US economy. We attempt to fill this gap by providing a detailed account of the domestic IT-ITeS scenario.

The emergence of the domestic market has aided firms in carving a niche for themselves in the global software market, by not only delivering global solutions but also focussing on solutions for the emerging markets (NASSCOM, 2010; Sarma & Krishna, 2010). We address the domestic demand dynamics on three fronts: industry structure; size and pattern of growth; and composition.

Industry structure

The structure of the domestic segment (Table 1) as outlined below is similar to that of the export segment:

- The domestic IT-ITeS sector exhibits a pyramidal structure with few big players and a large number of small and medium vendors.
- The service offerings of the tier I players (including MNCs) encompass the entire value-chain of IT.

⁸ The rate of return of migrants increased from 2% in 1991 to 8–10% in the late 1990s (Kumar, 2001).

⁹ The urge for self-employment, especially among the return migrants was also influenced by the labour market imperfections arising out of government policies towards employment in civil services and academia (Balasubramanyam & Balasubramanyam, 1997).

¹⁰ In this context, it needs to be reiterated that Porter's construct was formulated keeping in mind the experience of the manufacturing sector, while here we focus on the services sector, specifically IT-ITeS. One of the distinct characteristics of the IT-ITeS sector is delivery of services via internet on a virtual real-time basis unlike the manufacturing sector. Therefore, it is possible for the IT-ITeS sector to flourish on the basis of external demand alone as has been the case for India. Thus for the IT-ITeS sector to develop, what actually is needed is high demand, irrespective of the source. Moreover, even if it is argued that constraints of the domestic market seems to be a factor disadvantage, this factor disadvantage motivated firms to venture into the more lucrative export markets (Heeks, 2006).

Table 1 Industry structure: Domestic segment.

Category	Number of players	Share of total domestic IT-BPO (FY2011)	Remarks
Large companies	20	~60% Annual revenues: >INR 10 billion	Comprises Indian and MNC third-party players offering services encompassing the entire value-chain of IT.
Mid-sized	55–60	~25% Annual revenues: INR 1–10 billion	Primarily IT service providers and software product companies specialising in business application solutions.
Domestic BPO	~200	~5–6% Annual revenues: INR 1–7 billion	Includes pure-play BPO players, with gradual progression to non-voice based services.
Software products	~1100	~5% Annual revenues: ≤INR 2.5 billion	Around 150 MNCs, 400 Indian product companies and around 500–550 start-ups operating primarily in the business applications space.
Smaller firms providing IT services or support	~11, 000	~5–10% Annual revenues: <INR 1 billion	Comprising players providing IT services that includes small web-development organizations, freelancers and resellers restricted to a particular geography.

Source: Adapted and compiled from [NASSCOM India's Domestic IT-BPO Market Report \(2011\)](#) and [NASSCOM Strategic Review \(2010\)](#).

- The sector is highly competitive with user industries embracing IT to match best-in-class practices for enhancing competitiveness.
- The sector embraces emerging technologies such as service oriented architecture (SOA), software as a service (SaaS), and cloud computing.

Thus, the domestic segment matches the characteristics of the export segment (that has historically been the frontrunner) in more ways than one which implies sophistication of domestic demand in terms of product complexity, delivery flexibility, and service offerings ([NASSCOM, 2010](#)). This transformation of the domestic segment and its increasing importance has been aptly summarised by Anand Sri Ganesh (Senior Vice-President and Business Head, Customer Analytics, Manthan Systems)¹¹ and we quote "With the development of a sophisticated analytics attitude and perspective, the time to target the Indian market is now. Going forward, we are looking at the Indian domestic market in a concerted manner and believe the opportunities here are large and interesting for us to pursue".

Size and pattern of growth

The size of the domestic IT-ITeS market rose from US\$ 1.9 billion in FY2000 to an estimated US\$ 19.0 billion in FY2014, thereby registering a CAGR of 17.8% during the said period ([NASSCOM, 2014](#)). This achievement has to be considered in the context of the fact that domestic operations do not get any tax incentives from the government unlike the export oriented unit (EQU) schemes, and pressures such as rampant piracy, downward pressure on software prices, lower levels of IT penetration and technological sophistication in user industries. [NASSCOM \(2010\)](#) rightly points out that the domestic market is at an inflexion point. The major drivers for this development are outlined below:

- Hitherto untapped market, giving ample scope for IT penetration
- Pervasiveness of IT in the domestic market with the advent of globalization
- Domestic IT businesses do not get any tax sops; yet, optimism for domestic business stems from lower cost pressures vis-à-vis international businesses
- Industry players resorting to the domestic market to circumvent export market vulnerabilities amidst the downturn of the US economy
- E-governance initiatives
- Exponential growth of internet subscribers, penetration of computers and mobile telephony

Notwithstanding the healthy performance of the domestic market in recent years, till the dawn of the 21st century, the domestic software activity was dominated by re-sale of packaged software developed in the West, notably the US ([Arora et al., 2001](#); [Desai, 2000](#); [Nath & Hazra, 2002](#)). This trend seems to be witnessing a reversal in recent times. As Anup Tapadia (CEO of TouchMagix)¹² comments "India's product ecosystem is evolving". Indian firms have developed packaged software that include word processing packages in Indian languages—Sonata and Arabic scripts—In-Page; accounting packages—Finnacle and EX; a few industry-specific products—MakeSS; an ERP package; and Spectrum—a stock broking product. Finnacle is regarded as one of top three banking products globally; EX is positioned as the world's friendliest accounting software with an estimated user base of 80,000; In-Page is the undisputed leader in Arabic script software globally; MakeSS, with over 100 installations in India has carved a niche for itself as a low-cost, value for money ERP package in India. Spectrum, designed to manage the essential operations of a stockbroker incorporates the state-of-the-art best practices in the broking sector ([Krishnan &](#)

¹¹ <http://www.nasscom.in/anand-sri-ganesh-senior-vicepresident-and-business-head-customer-analytics-manthan-systems>. Accessed on 7th December, 2013.

¹² <http://www.dqindia.com/dataquest/interview/196712/indias-product-ecosystem-evolving/page/1>. Accessed on 19th December, 2013.

Table 2 Domestic IT-ITeS scenario.

Offerings	FY2005	FY2006	FY2007	FY2008	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014E
Project based	1,166	2,483	3,076	4,413	4,695	6,320	7,466	8,008	7,906	7,774
IT consulting	106	874	688	987	1,036	1,099	1,385	1,585	1,602	1,552
Systems integration	751	1,235	2,031	2,917	3,122	3,805	4,426	4,672	4,574	4,509
Custom application development	309	374	357	509	537	1,416	1,655	1,751	1,730	1,713
Outsourcing	5,09	865	1,033	1,426	1,501	2,052	2,725	3,303	3,496	3,565
Application management	369	627	749	1,034	1,075	1,586	2,154	2,663	2,863	2,953
IS outsourcing	140	238	284	392	426	466	571	640	633	612
Support & training	333	230	222	279	475	698	813	859	780	700
In-house/captive IT	920	898	1,200	1,764	1,555	1,657	—	—	—	—
Total IT services	2,928	4,476	5,531	7,882	8,226	9,070	11,004	12,170	12,182	12,039
Domestic BPO	914	914	1,097	1,576	1,932	2,304	2,791	3,068	3,220	3,244
Software products	1,329	1,329	1,600	2,234	2,690	2,960	3,495	3,721	3,774	3,721
Total	5,171	6,719	8,228	11,692	12,848	14,334	17,290	18,959	19,176	19,004

Note: All figures in US\$ million.

Source: Compiled from *NASSCOM Strategic Review (2004; 2009–2014)*

Prabhu, 2004). In addition, there has been a progressive shift towards turnkey projects and captive software development, which have comparatively lower entry barriers. Since FY2008, the domestic activities have tended to move up the value-chain, manifested in terms of a significant rise in the volume of IT consulting projects carried out in the domestic market (Table 2). A range of complex and state-of-the-art software packages has been developed and used in the domestic market by public sector units such as CMC, RITES, and TCI. Many of these products have found favour in foreign markets as well (Parthasarathi & Joseph, 2004).

Composition

The demand for IT in the domestic market can be analyzed by looking at the dynamics of demand in various user industries or industry verticals. The need for outsourcing of IT within the domestic sphere is driven by the need for companies to focus on their core businesses and improve operational efficiency and not cost considerations, which is the prime driver for global sourcing. The early adopters of IT such as banking, financial services and insurance (BFSI), telecom and IT-BPO are high on the maturity curve as regards IT adoption while retail, healthcare, and government are the emerging verticals (NASSCOM, 2010).

Firm strategy, structure and rivalry

Porter (1990, p. 71) opines that firm strategy, structure and rivalry refer to "the conditions in the nation governing how companies are created, organized, and managed, and the nature of domestic rivalry". In this context, Anand Rangachary (Managing Director - South Asia & Middle East, Frost & Sullivan, Chennai)¹³ points out that "geographic concentration of interconnected companies, specialised suppliers, and service providers, firms in related industries and associated institutions in a particular field that compete but also cooperate. ... The interplay between the various

stakeholders ... played a critical role in the success of the IT industry globally." While the pyramidal industry structure is well known, its influence on the competitive environment and the strategies adopted by the players to withstand competition seems to have been overlooked. We attempt to fill this gap here.

Industry structure

The Indian IT-ITeS industry comprises over 15,000 firms. The industry exhibits a pyramidal structure with a handful of firms at the top. Number of firms with an annual turnover greater than US\$ 1 billion was only 11 in FY2013 (amounting to less than 0.1% of the firms), but they accounted for over 40% of total export earnings, providing employment opportunities to roughly 35–38% of the workforce (Table 3). This pyramidal structure, contrary to the popular notion that presence of monopolistic elements hinders competition, has instilled fierce competition. The competition is unique in the sense that while large integrated players offer bundled solutions that encompass the entire value-chain of IT; small and emerging players excel in niche services/verticals so as to circumvent the competition from the industry majors. The presence of a large number of players of varying sizes, offering a plethora of services that encompass the entire value-chain have made the industry internationally competitive and it remains the most favoured destination for projects and contracts.

Competitive strategies

The competition in the Indian IT-ITeS industry has intensified over the years with the entry of an increasing number of players and services. In recent times, the slowdown of the US economy and with it the decline in the volume of outsourcing activity, emerging competition from various low-cost destinations, and influx of MNCs have intensified competition further. In a bid to sustain themselves in this competitive landscape, players have resorted to various strategies as enumerated below:

Focus on innovation: For knowledge-intensive industry like IT-ITeS, innovations in technology assume prominence

¹³ <http://www.thehindu.com/business/clusters-can-help-it-cut-through-the-glass-ceiling/article1690685.ece>. Accessed on 18th December, 2013.

Table 3 Structure of the Indian IT-ITeS industry.

Category	Number of players	Share of exports revenue (FY2013) Annual revenues: >US\$ 1 billion	Share of employment	Remarks
Large sized	11	>40%	~ 35–38%	Fully integrated Indian and MNC third party players with presence in over 60 countries.
Mid-sized	~ 120–150	~ 35–40% Annual revenues: US\$ 100 million – 1 billion	~ 28–30%	Mid-tier Indian IT and MNC firms offering multiple services across multiple verticals with presence in over 30 countries.
Emerging	~ 1000–1200	~ 9–10% Annual revenues: US\$ 10–100 million	~ 15–20%	Primarily Indian third party vendors (TPVs) offering full spectrum of services with specialisation in ER&D and niche IT services. In addition, they have dedicated GICs offering IT/BPO/ER&D services.
Small/Start-ups	~ 15,000	~ 9–10% Annual revenues ≤ US\$ 10 million	~ 15–18%	Smaller firms focussing on niche in services and verticals.

Note.

ER&D: Engineering Services and Research and Development.

Source: Adapted and compiled from [NASSCOM Strategic Review \(2013, 2014\)](#).

in sustaining competitive advantage. Manoj Chugh (Global Head, Business Development at Mahindra Satyam)¹⁴ opines “Innovation has been and shall always be the key differentiating factor”. The Indian IT-ITeS sector is ahead of the learning curve with firms delivering excellence through innovation. This includes experimentation with new forms of organizational structure, value-based pricing models, process innovation, investing in intellectual property (IP) creation, building domain expertise, and new technologies. The number of patents filed with the Indian IP office increased from 71 in FY2005 to 2052 in FY2008 ([NASSCOM, 2010](#)).

Reliance on niche verticals and service lines by mid-sized players: In a bid to sustain themselves in the industry dominated by industry majors, mid-sized players are venturing into various niche service lines instead of being end-to-end service providers. These players have developed their areas of excellence so as to strategically differentiate themselves from the rest. Dataquest¹⁵ reports “While the media spotlight and investor interest is focused on big software services companies, a lot of action goes unnoticed among small and medium sized companies that focus on a particular niche area. Small and medium sized companies are enroute to becoming veritable leaders in their respective spaces”.

Focus on tier-2 and tier-3 cities: Cost considerations have lured firms to venture into tier-2 and tier-3 cities. In doing so, firms are estimated to save around 15–20% as compared to tier-1 cities on account of lower talent cost

and attrition rates, affordable real estate, better quality of life, and local government support ([NASSCOM, 2013](#)). In effect, employment in these cities increased by 50% in FY2007–2009 ([NASSCOM, 2010](#)) accounting for 58% of the total employment ([NASSCOM, 2011](#)).

Leveraging GDM: The widespread incorporation of the global delivery model (GDM), has changed the fortunes of the Indian IT-ITeS industry for the better by imparting “demonstration effects” to start-ups and emerging players. The GDM has assumed paramount importance due to seamless execution of services with a combination of quality, cost arbitrage, and localization of services through distribution of services across various locations worldwide. As of FY2014, the number of global delivery centres (GDCs) reached around 600 in over 78 countries ([NASSCOM, 2014](#)). Since 2008, the industry witnessed 32% increase in the number of delivery centres penetrating 12 new countries ([NASSCOM, 2010](#)).

Mergers and acquisitions (M&As): M&As have been playing a significant role in influencing the dynamics of the industry. Dataquest¹⁶ reports “This sector has seriously adopted the strategy of establishing a global footprint through inorganic growth”. Traditionally, Indian firms have been adopting this inorganic route for penetrating newer geographies, gaining domain expertise, hedging risks, strengthening the global delivery model, and augmenting scale and size of operations. In recent times, players are increasingly adopting this inorganic route for augmenting IP-led technological capabilities, increasing product/service offerings, and enhancing cloud offerings ([Fig. 3](#)). During the period 2009–12, M&A activity grew in excess of 5% in volume terms, while in value terms, the growth was around 32%. The shares of outbound and domestic deals

¹⁴ http://www.dqindia.com/dataquest/interview/191944/cost-arbitrage-win-deals/page/2?WT.rss_a=cost+arbitrage+is+no+longer+enough+to+win+deals+&WT.rss_f=interviews++people. Accessed on 8th December, 2013.

¹⁵ <http://www.dqindia.com/dataquest/news/147938/small-companies-rapid-growth>. Accessed 8th December, 2013.

¹⁶ <http://www.dqindia.com/dataquest/news/145789/movers-shakers-m-a-the-m-a-deluge>. Accessed on 27th December, 2013.

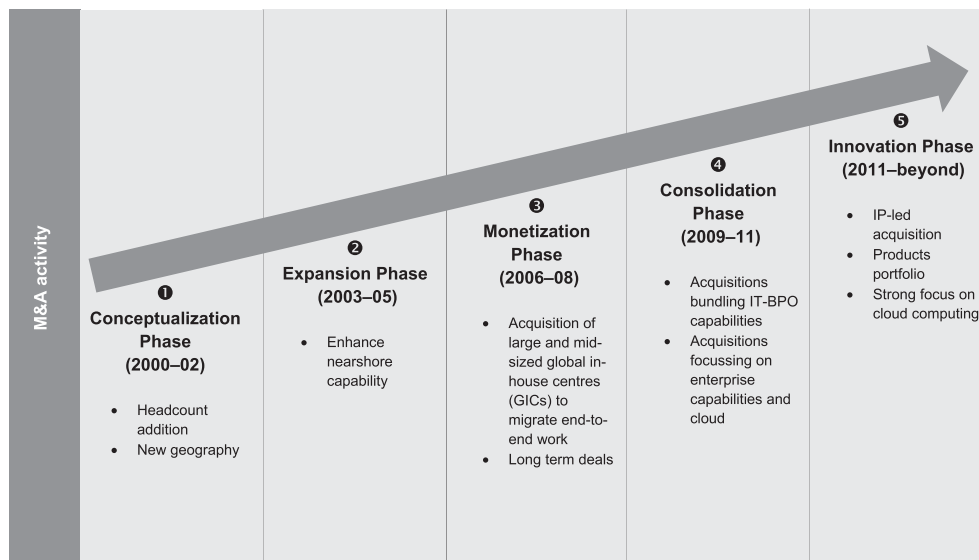


Figure 3 Evolution roadmap of M&A activity in India. Source: Adapted from NASSCOM (2013).

stood at 48% and 32% respectively during the same period (NASSCOM, 2013).

Here it is worthwhile to mention the aspect of internationalization of the industry driven by the twin effects of gradual pervasiveness of the GDM and inorganic growth via the M&A route. This is of prime importance in the highly competitive globalized world, especially for an export-oriented sector like IT-ITeS. Research has shown that increased internationalization, by fostering informal and formal networking, augments research and technology collaborations, innovation, firms' performance and growth, especially among small and medium enterprises (Hajela & Akbar, 2013; Keeble, Lawson, Smith, Moore, & Wilkinson, 1998).

Prevalence of fixed-price billing: The industry has witnessed a progressive shift towards fixed-price contracts as compared to time-and-materials contracts (Banerjee & Duflo, 2000) due to clients' preference. The preference of fixed-price contracts among clients emanates from cost predictability; however for the Indian players (who are the vendors), it entails greater risk (Arora et al., 2001). Nevertheless, it has encouraged Indian players to re-engineer and develop innovative operating models and now accounts for over 47% of the industry revenues (NASSCOM, 2013).

Reliance on the domestic market: Indian IT players are increasingly focussing on the domestic market to hedge against export market vulnerabilities. In this context, Atul Nishar (Founder & Chairman, Hexaware Technologies)¹⁷ points out "The growth in the Indian market will complement the growth in software and services exports. Indian IT companies will have to look at the home market to deliver services and solutions". The adoption of IT in the domestic market witnessed a spurt in recent times, with

the domestic segment outshining the export segment registering a year-on-year (YOY) growth of 14.1% as compared to 10.2% in the export segment in FY2013 (NASSCOM, 2013).

Adoption of quality certifications: Indian IT-ITeS players have been frontrunners as regards the adoption of various quality certifications. There are primarily two reasons for widespread adoption of international quality certifications by Indian firms. First, such certification is used as a signalling device (Arora & Asundi, 1999) to tell potential customers that the firm adheres to a well-defined and documented process of software development. Second, quality certifications enable firms to estimate the time and resources required to complete a project. This empowers them to bid for bigger and more challenging projects and expand their business opportunities (Parthasarathy, 2004, 2006).

Two of the most widely adopted international certification standards are the capability maturity model (CMM) for software developed by the Software Engineering Institute (SEI) and the international standards organization (ISO 9000) series (Coward, 2002). The CMM devised in the late 1980s is widely regarded as the industry benchmark for measuring performance and comprises five maturity levels ranging from 1 to 5. Level 1 indicates that software processes are ad-hoc and chaotic, whereas Level 5 indicates that software processes incorporate the highest levels of quality and are capable of self-improvement. Receiving a CMM Certification of Level 3 or higher implies that the firm has devoted enough time and resources in obtaining the said certification (Coward, 2002; Dutta, 2001; Kapur, 2002; Paulk, Curtis, Chrissis, & Weber, 1993). Almost 65% of all corporations in the world are estimated to be in Level 1 and more than half the software development units in the world with CMM Level 5 are located in India. Consequently, more than 75% of Fortune 500 companies are engaged with an Indian firm for their IT requirements (NASSCOM, 2010). In

¹⁷ <http://www.dqindia.com/dataquest/news/147877/the-year-that-will-be-crystal-ball-08>. Accessed 19th December, 2013.

this context, Arun Jain (CMD-Polaris Software Lab)¹⁸ points out “Today, clients conduct elaborate studies before entrusting their IT activity to a particular company. They check on the service providers’ credentials based on the quality standards they have in terms of HR, business processes, delivery etc. The CMM certification thus becomes an ideal platform in positioning ourselves as a software company of repute in the global arena.”

Related and supporting industries

The presence of related and supporting industries, if internationally competitive, helps the growth of the industry by providing high quality low-cost inputs. It also helps industries in a less formal way through joint problem solving on one hand and stimulating innovation on the other. For the IT-ITeS sector, the most important supplier or related industry would be education institutions, and hardware (Heeks, 2006).

Educational institutions

The growing reservoir of technically skilled manpower produced by the many educational institutions has been one of the critical curators of success of the Indian IT-ITeS industry. Talking about the availability of quality manpower, it must be pointed out that India has a comparative advantage in this area, even when compared to developed countries,¹⁹ thanks to India’s long-standing investment in technical education. As early as 1959, when the first of the Indian Institutes of Technology (IITs) were formed, India started investing heavily in technical education. Apart from the IITs, the Indian Institute of Science, the network of regional engineering colleges (renamed as National Institutes of Technology), the Indian Institutes of Management (IIMs) and a host of private training institutes such as NIIT and Aptech produce quality professionals of varying technical skills with English proficiency every year. India’s graduate outturn more than doubled in the past decade reaching an estimated 4.4 million in FY2012. This enviable outturn was possible on account of rapid increase in educational institutes offering higher education from 6000 in FY1991 to 21,000 in FY2008. This has been augmented by strengthening technical education with the establishment of six new IITs (six in 2009 and two more in the pipeline), Indian Institutes of Science Education and Research, Schools of Planning and Architecture, 1000 new polytechnics and 15 new Central Universities (NASSCOM, 2010). With an abundant supply of technically skilled professionals (second only to the US), India could capitalize on the severe manpower shortage of the IT boom in late 1990s which was estimated to be over 1 million in the US alone (Kapur & Ramamurti, 2001; Kaushik & Singh, 2004). This, coupled with the Y2K problem and the associated spending to solve the problem was a boon for Indian IT professionals.

¹⁸ <http://www.dqindia.com/dataquest/news/151038/stamped-quality>. Accessed on 27th December, 2013.

¹⁹ Quality of educational output in India outshines the BRIC average and quality of mathematics and science education is considered better than the US (NASSCOM, 2010).

Hardware sector

The hardware sector has not played a pivotal role towards fostering the growth of the IT-ITeS industry, at least, in terms of providing high quality innovative computers. On the contrary, links with the hardware sector (if any) emanate from software development for hardware companies (Heeks, 2006). The Indian hardware sector caters mostly to the domestic market (with a market share of around 40% since FY2010, and sales amounting to an estimated US\$ 12.6 million, as compared to US\$ 440 million from exports in FY2014 (NASSCOM, 2014) due to quality and cost considerations. The existing quality ensures predominance of domestic sales (and not exports) and lower costs (vis-à-vis MNC brands) ensure higher domestic demand. In recent times, increasing IT adoption among small and medium businesses (SMBs) to withstand competition, rising automation across various industry verticals, widespread usage of computers across households and government institutions, mushrooming of educational institutions, and decline in hardware prices have been the prime drivers for the hardware sector on the domestic front.

It is important to reiterate that though conventionally, the hardware sector has been regarded as the major supporting factor, the Indian experience suggests that it is the educational institutions which have played a pivotal role in the development of the IT-ITeS sector by ensuring a steady stream of qualified manpower. The notion of considering a developed hardware sector as one of the major prerequisites for the development of the IT-ITeS sector reflects traces of “manufacturing-centricity” owing to Porter’s original construct and it needs to be modified substantially while analysing the development of the service sectors.

In addition to these four factors, two exogenous factors, namely “chance” and government policies, which act as catalysts, often assume important roles in strengthening the diamond, notwithstanding their positioning outside the realms of the diamond.

Chance

The “chance” factors relate to those events that are determined exogenously. For the Indian IT-ITeS industry, the new millennium ushered in mixed fortunes with the fallout of the Y2K problem, dotcom crash and recession in the US economy. The Y2K problem enhanced the demand for the existing software to be made Y2K compatible. Many mid-sized firms that would not have otherwise considered Indian firms for their IT requirements were left with no other option but to do so, on account of the shortage of US-based programmers. Indian firms capitalized on this opportunity by delivering quality services at affordable rates ensuring repeat clients that augmented the growth of the industry. On the other hand, the dotcom crash and US recession inhibited the growth of the global IT industry. This forced the Indian players to venture into other destinations such as the UK, Japan, and the Asia–Pacific, though with limited success.

In 2008, the industry was hit by the subprime crisis that affected the major industrialized nations, notably the US, resulting in significant reduction in IT spending. The industry responded by taking it as an opportunity to enhance operational efficiencies through initiatives such as cost controls,

enhanced utilisation and productivity of the workforce, maintaining price levels, and geographical diversification (NASSCOM, 2012).

Given the export-orientation of the industry, these "chance" factors have been instrumental in the gradual progression of the industry from being a service provider to a solution provider, manifested in terms of significant growth in the number of clients (including repeat clients), large-sized contracts, inorganic growth, and strong global delivery models (NASSCOM, 2010, 2013).

Government

The government has played a key role in the evolution of the IT-ITeS sector in India (Parthasarathi & Joseph, 2004; Sarma & Krishna, 2010).

Software development was practically non-existent until the mid-1960s, as it was embedded in computers and sold by multinationals such as IBM and ICL (Athreya, 2005; Heeks, 1996; Khanna & Palepu, 2004). By the 1970s, with the spread of computers primarily in government and academic institutions, software development began to be contracted outside the user organizations which gave birth to the domestic market for software development. Government policies at that time attempted to protect the nascent domestic hardware industry through high tariff barriers due to which procuring imported hardware became increasingly expensive. To ease the import process, the government allowed hardware imports in exchange for software exports. In this context, TCS was the first firm that secured permission to import hardware in exchange for software exports. The software export industry was thus born and the year was 1974. The gradually evolving software industry received added momentum with the departure of IBM in June 1978. Several of IBM's 1200 former employees set up small software companies to service former IBM clients.²⁰ This gave a major fillip to software development. On the other hand, it paved the way for other hardware manufacturers (notably Borroughs and ICL) to penetrate the Indian market and that in turn exposed Indian software professionals to a variety of platforms, notably UNIX (Athreya, 2005; Khanna & Palepu, 2004; Parthasarathy, 2004, 2006).

By the early 1980s, India started exporting software (Heeks, 1996). However, the growth rates of exports were sluggish as the outward-orientation of the industry was curtailed due to several reasons (Athreya, 2005; Khanna & Palepu, 2004; Parthasarathy, 2006):

- Policy regulations were restrictive in the form of high tariff barriers on imports of hardware; MRTP regulations preventing large business houses from entering the profitable hardware sector.
- Indian software firms carried out lower-end jobs like coding, maintenance etc. which were not very lucrative.

- The nascent industry faced reputational constraints in terms of both quality and delivery.²¹
- There were infrastructural bottlenecks in electricity and telecommunication facilities barring a few clusters in and around Bangalore, Delhi, Mumbai, and Pune.

All these factors resulted not only in lower exports (which was roughly one-third of the industry earnings), but also in a particular type of business model known as "body-shopping" wherein Indian software professionals were taken abroad to the clients' sites to execute projects. The advantage of the body-shopping or onsite business model was that Indian software professionals got to work alongside their more advanced counterparts in the West, which not only gave them learning experience but international exposure as well; however it also resulted in "brain drain".

The mid-1980s witnessed the advent of personal computers. This, coupled with networking facilities which enabled different users/computers to communicate with one another, created huge demand for software development and services (Athreya, 2005), most of which was outsourced away from the user organizations, primarily due to cost considerations. India was a favourable destination as India out-competed others not only in terms of cost but also in terms of credibility and quality that Indian software professionals had acquired by then.

Apart from quality and cost considerations, the progressive outsourcing and with it the gradual switchover to the offshore model of software development, was also a consequence of the government's favourable policies. The government formulated the New Computer Policy in 1984 that envisaged promotion of exports of software and services. The government liberalized the sector by allowing 100% customs and excise duty relief on imports and indigenous purchases of hardware and related accessories (Bajpai & Shastri, 1998). The lower price of importable items coincided with the worldwide crash in hardware prices, which led to the decline of start-up costs (and hence lowered entry barriers) and gave a fillip to entrepreneurship in the industry (Athreya, 2005). The industrial body NASSCOM was also formed during this period (1988), for promotion of software and related activities.

However, infrastructural bottlenecks continued to plague the industry. To counter this issue, software technology parks (STPs) were setup in 1990.²² The STP scheme being a 100% EOU scheme for undertaking software development provided, among other things, infrastructural facilities and high-speed data communication links that enabled offshore provisioning of services (Parthasarathy, 2006). The dedicated satellite connectivity coupled with 12-h time difference with the US meant extension of the effective working day to virtually 24 h. This not only increased productivity, but also profitability due to lower costs (the overall

²¹ That reputation plays a pivotal role in contractual agreements has been outlined by Banerjee and Duflo (2000).

²² It is interesting to note that India was the first country to setup STPs as an infrastructure development model that was later emulated by China and Russia for promoting IT-ITeS sector in their respective countries (Mann, 2009).

²⁰ In this context, it needs to be mentioned that Computer Maintenance Company (CMC), a public sector unit was established in 1975 mainly with ex-IBM employees for servicing the IBM computers (Athreya, 2005; Desai, 2003; Parthasarathy, 2006).

resource costs in India being one-third of that in the US). In mid-1991, the Indian economy was hit by a severe balance of payments (BOP) crisis and to mitigate the crisis, radical reforms were initiated that included abolition of industrial licensing, removal of entry barriers, exemption of corporate tax, opening up communication facilities, trade liberalization, devaluation of the rupee, and reduction in import duty on computers. These initiatives attracted multinationals²³ who set up their offshore development centres (ODCs) in India (Parthasarathy, 2010; Sarma & Krishna, 2010). The conducive environment coupled with large scale outsourcing to resolve the Y2K problem or the "Millennium Bug" ensured peaking of demand for software and services (Athreye, 2005).

Thus by the dawn of the 21st century, the Indian IT-ITeS industry had firmly established its credibility in the world market. The leading Indian firms were quick to realize that demand for low-end value-added services that they executed was not only temporary but had limited learning opportunities. As a result, they diversified into various domains such as insurance, finance, transportation etc. (Athreye, 2005). They also discontinued working as sub-contractors for other firms. Instead, they started bidding for larger projects directly with the clients which paved the way for turnkey projects (Parthasarathy, 2006).

Findings and contribution

The study attempted to investigate the factors that were instrumental in imparting a competitive edge to the Indian IT-ITeS sector using Porter's diamond model. Our starting point was Heeks (2006). Building on his work, we differed with him on at least three fronts.

First, Heeks's attempt lies between "basic" and "complex" as regards application and "critical" in its attitude (Heeks, 2006). Our study carried out a "complex" application of the model, which was "instrumental" in its attitude. More specifically, our study used the diamond model as an "instrument" and carried out a "complex" application of the construct with a view to ascertaining the sources of competitive advantage of the Indian IT-ITeS sector emanating from each of the components of the diamond. This is in consonance with Porter (1990, p. 73), who opines "Advantages throughout the 'diamond' are necessary for achieving and sustaining competitive success in the knowledge-intensive industries". In effect, our attempt has taken a unique position in Heeks's attitude-application framework (Heeks, 2006) as depicted in Fig. 1.

Second, in contrast to Heeks (2006), our study captures a longer time horizon encapsulating newer set of information which is critical for an evolving industry. The longer time horizon enabled us to extract certain findings that are either strikingly different from the prior studies or have been overlooked.

Third, the "complex" application of the construct encompassing longer time horizon necessitated a newer scheme of classification of the factors under the realms of

the diamond so as to ascertain the existence of a fully functioning diamond (even in the dynamic sense). This is in contrast to Heeks (2006) who opined that the Indian IT-ITeS industry "does not have a fully functioning diamond". Unlike earlier studies, our conjectures have been supported by anecdotal evidence.

In a nutshell, our study illustrates the transformation of the industry from its humble beginnings in the 1970s to emerge as the top outsourcing destination in present times.

This transformation has been aptly summarised by Keshav R. Muruges (Group CEO, WNS Global Services)²⁴ and we quote "Over the years, the service providers have developed a strong understanding of their clients' businesses and have steadily moved up the value-chain in terms of the services offered. From being providers of low-cost back-end services, these companies have now become strategic partners for their clients ... In a sense, the transformation reflects the journey of the industry from the back-office to the client's boardroom"

The study attempts to make three important contributions to the literature.

1. Relative superiority of Porter's diamond model

We are in agreement with Heeks (2006) as regards the applicability and usage of Porter's construct in assessing the competitive advantage of a country in any particular sector, not necessarily IT-ITeS. Yet, unlike Heeks (2006), we traced the progress in the literature beyond Porter (1990) with a view to ascertaining the applicability of Porter's diamond in the Indian context. Our analysis points to the relative superiority of the diamond model on account of two reasons. First, our scheme of classification makes it clear that other models in this area (Carmel, 2003; Heeks & Nicholson, 2002; Joshi & Mudigonda, 2008) do not point to any factor that has remained outside the realms of the diamond model. Second, the relative superiority of the diamond model in ascertaining India's competitive edge in the IT-ITeS sector also stems from the inclusion of the "chance" factors which has not been explicitly considered in other models. In the Indian context, the "chance" factors have acted as one of the most important determinants of the growth of the industry considering that the expansion of the Indian IT-ITeS sector has been mostly export-centric. While Heeks (2006) failed to appreciate the importance of "chance" events in imparting a competitive edge to the Indian IT-ITeS sector, we have elaborated how exogenous events such as the Y2K problem, the dotcom crash, US recession, and subprime crisis proved to be advantageous for the Indian IT-ITeS sector, which by creating discontinuities, enhanced the competitive standing of the industry, in consonance with Porter's construct. The models of Heeks and Nicholson (2002), Carmel (2003), and Joshi and Mudigonda (2008), by not considering "chance" factors explicitly, have limited their applicability in accounting for the success of the Indian IT-ITeS sector. Porter's diamond model, on the other hand, by considering "chance" as one

²³ Over 70% of the known multinationals entered India during 1992-99 (Athreye, 2005) including even IBM, which had left India in 1978 in protest against the FERA norms (Parthasarathy, 2010).

²⁴ <http://www.nasscom.in/keshav-r-muruges-group-ceo-wns-global-services>. Accessed on 7th December, 2013.

of the exogenous factors that augment the diamond appears to be more suitable in the Indian context.

2. Fully functioning diamond

The study adopted a longitudinal perspective so as to chart the progression of the industry from its beginnings in the 1970s to emerge as the top outsourcing destination in present times with a view to ascertaining the existence of a fully functioning diamond. This is in accordance with the dynamic element of the construct and we quote "the system is constantly in motion. The national industry continually evolves" (Porter, 1990, p. 144). Riding on this dynamic element of the construct, Porter's theory identifies four distinct stages of competitive development, namely factor-driven, investment-driven, innovation-driven, and wealth-driven. It is in the innovation-driven stage that the diamond becomes fully functional (Porter, 1990, p. 552).

While we are in agreement with Heeks (2006) as regards the progression of the industry from the factor-driven stage to the investment-driven stage, we proceed further to unravel the attributes of the innovation-driven stage and thereby assert the existence of a fully functioning diamond. In effect, we counter the findings of Heeks (2006) who opines "There are no real signs of an innovation-driven stage emerging in India given that the diamond is not (yet) in place".

Contrary to the findings of Heeks (2006), our study finds clear evidence of the emergence of the innovation-driven stage as outlined by Porter (1990, pp. 552–556). These include the following: (a) creation and upgradation of advanced and specialized factors that has enabled the industry to graduate from a service provider to a solution provider; (b) sophistication of (home) demand on account of pervasiveness of IT on the domestic front; (c) innovations in new product/process technologies including certain industry-specific products; (d) emergence of educational institutions as a strong supporting industry; (e) vigorous domestic competition amidst the pyramidal structure; (f) a growing international position with firms competing internationally in more differentiated industry segments; and (g) supportive role of the government. Our unique classification of factors under the realms of the diamond enabled us to identify these attributes (that we elaborate in the following sub-section) that provides evidence of the industry having reached the innovation-driven stage signifying the presence of a fully functioning diamond.

3. Unique classification of factors under the realms of the diamond

Investigating India's competitive edge in the IT-ITeS sector using Porter's construct necessitated unique classification of the factors under the realms of the diamond. This unique classification enabled us to depart from Heeks (2006) and justify the attainment of the innovation-driven stage and thereby assert the existence of a fully functioning diamond.

- Creation and upgradation of advanced and specialized factors: While classifying factor conditions, apart from

the traditional components such as skills and knowledge, we have also included socio-cultural factors influencing the workforce and the resultant productivity that assume prominence in sustaining the competitive edge. In addition, we have also identified some advanced and specialized factors that have been created and are being continually upgraded. These include (a) existence of lower infrastructural costs that have given a boost to entrepreneurship; (b) the presence of Indian diaspora in the US that acted as reputational and credibility intermediaries of the industry; and (c) the presence of MNCs which imparted positive "demonstration effects" to the Indian players. So the abundance of qualified manpower alone (basic factor) would not have imparted the competitive edge to the industry, but these factors remained unidentified in Heeks (2006).

- Sophistication of (home) demand: The home demand conditions have been virtually overlooked in the literature; Heeks (2006) contends that "domestic demand hardly seems to be a source of competitive advantage". In contrast, our study carried out a systemic analysis of the home demand dynamics on three fronts, namely (a) industry structure; (b) size and pattern of growth; and (c) composition, in keeping with Porter's construct (Porter, 1990; pp. 86–100). It has been highlighted that though in the formative years the industry focussed mainly on exports; in recent years, there has been substantial sophistication of home demand to match the characteristics of the export segment in terms of product complexity, delivery flexibility, and service offerings with some Indian firms developing software products even for the domestic market. Moreover, the hitherto untapped domestic market with its immense potential has given the industry an opportunity to overcome the demand deficiency caused by the global recession.
- Innovations in new product/process technologies: The study highlighted the nature and extent of innovative activities being carried out in the IT-ITeS sector that indicate that the sector is ahead of the learning curve with firms delivering excellence through innovations. This is critical for attaining and sustaining the innovation-driven stage. The increasing number of patents filed with the Indian IP office is testimony to this fact.
- Strong supporting industries: Our study opposes the accepted notion which considers the hardware sector as the major supporting industry, and brings to the forefront the role of educational institutions that ensured a steady stream of qualified manpower. Extending the analysis further, one can question the validity of considering a developed hardware sector as one of the major prerequisites for a developed software sector. Had that been the case, one would have witnessed flourishing software industries in China and some of the South-East Asian countries that have evolved as the hardware hubs of the world. Classifying hardware as a driver of software appears to reflect signs of manufacturing-centricity reflecting the legacy of Porter's original construct.

- In considering educational institutions as the major supporting industry, we differ with Heeks (2006) who viewed the absence of related and supporting industries as one of the signs of the absence of a fully functioning diamond in the Indian IT-ITeS sector. According to our analysis the educational institutions, by supplying a steady stream of internationally competitive manpower, have effectively established themselves as the major supporting industry, thereby generating a fully functioning diamond.
- Vigorous domestic competition: There has been no methodical attempt in accounting for the domestic competition in the industry. To quote Heeks (2006) "The extent and impact of domestic rivalry in India's software industry is difficult to pin down". In contrast, we have analysed the extent of domestic competition by providing (a) a detailed account of the industry structure that is pyramidal; and (b) the strategies the players have resorted to for sustaining their competitive edge in the industry. The industry structure along with the strategies adopted by the players in an industry characterized by vigorous competition with over 15,000 players of varying sizes offering products/services that encompass the entire value-chain gives evidence of the rivalry that is so fundamental to the Porter's construct.
- A growing international position with firms competing internationally in more differentiated industry segments: The study provided a vivid account of the progress of the industry from being a low-end service provider to emerge as the top outsourcing destination in present times. In the process, the study charted the gradual progression of the industry from being a service provider to a solution provider to various industry verticals like BFSI, manufacturing, telecom, retail, healthcare, and the government.
- Supportive role of the government: The study of the evolution of the industry against the backdrop of reforms initiated by the government gives evidence of the supportive role of the government, which in the formative years acted more as a regulator, while in recent years, it is playing the role of an enabler in consonance with Porter's construct.

Concluding observations

The primary objective of our paper was to investigate the factors that have contributed to the success of the Indian IT-ITeS sector, using Porter's diamond model. As Porter's construct was originally based on a business strategy perspective (Heeks, 2006), the study has important implications for practising managers and policy makers so as to ensure that the industry retains its competitive edge.

Managerial implications

Investigating the factors instrumental in imparting a competitive edge has important takeaways for practising managers. First, we observed the existence of a fully functioning diamond as the industry traversed from an investment-driven to the innovation-driven phase. This was made possible on account of continuous innovation in the industry resulting in the gradual progression of the industry from being a service provider to a solution provider.

Managers need to ensure continuous innovation so that this progression proceeds smoothly. Second, the "chance" factors highlighted how the industry weathered seemingly unfavourable events such as the Y2K problem, dotcom crash and recession in the US economy. It exhibited how the industry converted threats into opportunities. For an industry that is continuously evolving, this necessitates that managers be vigilant to leverage every opportunity, while being wise enough to mitigate the threats. Third, the strategies adopted by the players revealed that uniform strategy for all may not be beneficial since the industry remains highly heterogeneous. While the bigger players would do well to enhance their range of offerings so as to encompass the entire value-chain of IT, for smaller players or start-ups, the need is to focus on niche areas instead of being end-to-end service providers. Fourth, the domestic market has evolved to match the export market with increasing IT adoption; managers would do well to tap this market as well. In the process, they would be able to circumvent the export-market vulnerabilities. Lastly, since IT is essentially a people-centric industry, efforts should be made to motivate and retain the workforce.

Policy implications

The novelty of the model is such that it not only enables identification of the factors instrumental in imparting competitive advantage but also prescribes policies in accordance with the realms of the diamond so as to strengthen the various components that it encompasses. This would include upgrading education and training, reducing entry barriers to enhance competition, supporting locational clusters through investments in infrastructure, and enhancing size and sophistication of domestic demand (Heeks, 2006). Though all these prescriptions deserve due attention, upgradation of education and training needs to be undertaken with utmost priority so as to meet the ever-changing industry demands.

Most of the researchers in this area have opined that for sustainability, the industry needs to graduate towards the higher-end of the value-chain (D'Costa, 2004; Parthasarathi & Joseph, 2004). However, it needs to be reiterated that in practice, moving to higher margin products at once may lead to "margin retreat" (Stalk, 1992), that often results in "corporate suicide", particularly for an industry with high dependence on external demand. The experience of the Japanese manufacturing sector also highlights the fact that instead of attempting a big jump, small but continuous upgradation would be a preferred alternative in sustaining the competitive edge. The Indian IT-ITeS sector would do well if it fortifies lower-end offerings (in which it has a worldwide reputation) further and at the same time, innovates and graduates towards higher-end services. Lower-end services, which are less demanding in terms of skill would mitigate unemployment among India's educated class, brought on by the twin effects of low-absorbing capacity of the manufacturing sector and the mushrooming of educational institutes since the dawn of the 21st century churning out large number of graduates and post graduates every year. On the other hand, catering to higher-end services would ensure continuous innovation and higher revenue realization. Therefore, a balanced approach would be more appropriate from the point of view of overall welfare.

We conclude by quoting Dr. Pankaj Jalote (formerly Vice President – Quality at Infosys Technologies Ltd)²⁵ “There has been discussion and concern outside India as to why Indian companies have been so successful in software. ... They want to know India's magic formula. Everyone is intrigued, because no one expected India to succeed in a hi-tech field”. Our study attempted to discover this magic formula using Porter's construct. We posit that this formula would continue to work in the foreseeable future given the relative strengths of the various components of the diamond as emphasised in the study. This, coupled with the fact that India, the global sourcing leader, accounts for only 10% of the global IT spend (NASSCOM, 2013) implies that there still remains a large untapped market offering enormous growth potential. Strong macroeconomic fundamentals, favourable resource endowments, technological advancements, emergence of new business models, and supportive government policies would help in exploiting this opportunity.

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