PG0-003
MAY 06, 2011

PANKAJ GHEMAWAT
STEVEN A. ALTMAN

Industry Case Study:

The Indian IT Services Industry in 2007

"Many years ago, there was an industrial revolution; we missed it for reasons beyond our control. Today there is a new revolution – a revolution in information technology, which requires neither mechanical bias nor mechanical temperament. Primarily it requires the ability to think clearly. This we have in abundance. We have the opportunity to participate in this revolution on an equal basis; we have an opportunity, even, to assume leadership in this revolution. If we miss this opportunity, those who follow us will not forgive us for our tardiness and negligence."

—TCS Deputy Chairman F. C. Kohli, 1975 Speech to Computer Society of India

"India is likely to be the next software superpower."

—Microsoft Chairman Bill Gates, 2000 Speech at Davos

"Saudi oil, Japanese cars, and Indian services – some industries can truly transform a nation."

—NASSCOM McKinsey Study 2005

In the fiscal year ended March 2007, the Indian IT (information technology) Services industry posted revenues of $23.5 billion, including $18.0 billion in exports.[1] With sustained growth above 30% per annum since the early 1990s, the industry had spurred a global offshore services boom reaching far beyond IT itself. India had become a global center for offshore execution of business processes ranging from call center operations to advanced data analytics and engineering. Including these IT-Enabled Services and products, India's technology sector earned $39.6 billion, contributing 5.2% to India's GDP, and was projected to reach $73-75 billion by 2010.[2,3]

India was succeeding in IT Services despite a domestic context that still faced substantial development challenges, as illustrated by the country's rankings in the World Economic Forum's *Global Competitiveness Report*. For example, India ranked 60th out of 117 countries on "basic requirements" such as institutions, infrastructure, macroeconomics, health, and primary education, but ranked among the world's leaders in areas such as innovation, science, and engineering.

This case was prepared by Professor Pankaj Ghemawat and Steven Altman, Research Assistant, as the basis for class discussion rather than to illustrate either effective or ineffective handling of an administrative situation.

The stakes riding on India's continued success in IT Services were tremendous. According to one analysis, 20-25% of India's economic growth through 2010 would be driven by IT and related sectors.[4] Recent press reports, however, had questioned the sustainability of India's competitiveness in IT. Wages for IT professional in India were rising 15% per annum, the Indian rupee was appreciating rapidly against the U.S. dollar, and developing countries around the world were seeking to replicate India's success. Furthermore, the leadership of large Indian firms such as TCS and Infosys at the top of India's IT Services sector was being seriously challenged for the first time. Foreign firms, including global leaders such as IBM and Accenture, had plans to invest more than $10 billion in India by 2010.[5] India and its firms were girding themselves for intensifying competition.

Global IT Services

The IT Services industry emerged in late twentieth century to support the computers and related IT infrastructure that had become essential to modern business and life. As IT became increasingly complex, companies turned to outside specialists to develop and manage their systems. Global IT Services revenues in 2005 were $625 billion, expected to reach $825-875 billion in 2010. (See **Exhibit 1** for current and projected breakdown of industry revenues by service line.) Companies and governments also spent $510 billion on salaries and benefits for internal IT staffs in 2005, expected to grow to $517 billion by 2010.[6]

Gartner analysts segmented IT Services into *Product Support* and *Professional Services*. *Product Support* included *Hardware Support and Maintenance* ($87 billion) and *Software Support* ($49 billion), covering installation, technical support, and repairs for IT hardware and software. *Product Support* services were sold both via long-term support contracts and per-incident fee-based arrangements.

Professional Services included *Consulting* ($52 billion), *Development and Integration* ($193 billion), *IT Management* ($155 billion), and *Process Management* ($94 billion). These services formed a rough process-chain for how IT was deployed within the business context. *Consulting* helped companies align business and IT strategies and adjust operations to take advantage of IT. Consulting recommendations often led directly into *Development and Integration* projects, which involved development of customized IT solutions and their deployment into a company's existing IT infrastructure and business flow. *IT Management* involved ongoing operation of IT infrastructure, application software, and help desk operations on behalf of clients. *Process Management* went beyond operating IT systems to run IT-enabled business processes for clients, such as transaction processing.[7]

Consulting and *Development and Integration* services were typically sold on a project basis while *IT Management* and *Process Management* were generally sold via long-term outsourcing contracts. These contracts often involved the service provider hiring members of a client's IT staff and purchasing the client's IT equipment (removing it from the client's balance sheet). IT Services contracts were typically structured either on a fixed price or a time-and-materials basis. Under fixed price contracts, profitability was often contingent on achieving productivity improvements over the life of the contract and might be deferred until such gains were achieved.

Process Management was a core element of a related market called IT-Enabled Services (ITES) or Business Process Outsourcing (BPO), often abbreviated as ITES-BPO. (The combination of IT Services and ITES-BPO was often abbreviated IT-ITES.) While Gartner's *Process Management* market estimate included only a portion of the ITES-BPO space, many IT Services companies were active across the span of this adjacent market. Per IDC research, ITES-BPO was a $385 billion business in 2005. Other related businesses with high participation from IT Services companies included IT Hardware ($424 billion) and Software Products ($211 billion).[8]

Industry Structure and Margins

The ten largest IT Services vendors commanded 26.6% of the global market, with IBM holding the largest market share at 7.5%. Five broad categories of competitors were present in the top twenty firms: (1) Companies with heritage in IT hardware such as IBM, Fujitsu, and HP; (2) Services pure-plays such as EDS and Accenture; (3) Government contracting specialists such as Lockheed Martin and Northrop Grumman; (4) BPO specialists such as Automatic Data Processing (ADP) and First Data; and (5) European and Japanese telecommunications companies such as NTT, Deutsche Telekom (T-Systems), and BT.[9] (See **Exhibits 2** and **3** for market share data.)

According to a survey by Gartner, median gross margins for IT Services companies by service line in 2004 were 21-30%. Business consulting and IT consulting had the highest gross margins at 38% and 36.3%. Data center and staff augmentation had the lowest gross margins, 22.9% and 23.3%. Project based contracts provided higher margins (33.5%) than ongoing outsourcing contracts (27.8%). Across all service types, smaller companies earned higher gross margins. The average gross margin for companies with revenues of $100 million or less was 34.4%.[10]

Customers and Demand

The bulk of IT Services demand came from the advanced economies, with North America, Western Europe, and Japan accounting for 90% of the global total. However, IT spending in emerging markets was growing very rapidly with 20% and 19% growth rates in India and China respectively in 2006.[11] Large corporations accounted for roughly 60% of global IT spending, but IT expenditures by small and medium sized businesses were growing at 7% versus only 2-3% spending growth by large corporations.[12]

IT spending was cyclical, reflecting general macroeconomic conditions as well as technology specific trends. (See **Exhibit 4** for 9-year GDP versus technology spending growth trend.) A survey of North American CIOs conducted in September and October of 2007 indicated 5% median IT operational budget growth in 2007, up from 4.1% in 2006, 2.5% in 2005, and 0% in 2004. However, operational spending was forecast to increase only 2.5% in 2008.[13] IT capital investment trends also sounded a more cautionary note. Capital budgets increased only 1% in 2006 and were projected to remain flat in 2007.[14] There was also anecdotal evidence that macroeconomic softening in the U.S. could be leading to a slowdown in IT spending by large U.S. corporations. However it was expected that this would be at least partially offset by faster spending growth by smaller and non-U.S. companies.[15]

Clients consistently ranked technical expertise as the most important criterion for selection of IT Services vendors followed by varying combinations of experience, financial stability and price. While buyers did not generally cite vendor brands as an important factor, research indicated that brands did have substantial influence on their ultimate decisions.[16] Relationships also played an important role in vendor selection. IT Services companies built relationships both with clients at the company level as well as with individuals who could carry their reputation into new companies as they changed employers. Chief Information Officers (CIOs) typically led the decision-making process but deliberations often involved the CEO and executives from human resources, legal, and business units. The largest deals also typically required board of directors approval. Industry analysts such as Gartner, Forrester, and IDC were important influencers, especially via their evaluation of vendor capabilities with respect to specific technologies and project types. Specialized consultants were also involved in assembling multi-vendor contracts that were becoming increasingly common.

There had been some notable shifts in contracting patterns in recent years. Average contract values had declined since 2002 as clients shifted to smaller and shorter contracts, often dividing work

among multiple vendors. Contracts also increasingly tied vendor compensation directly to business value delivered to clients, with creative metrics designed to align client and vendor interests. Terms were also often tailored to the maturity of the technologies and business processes involved (See **Exhibit 6** for example contract terms.) Re-negotiation was also common due to unforeseen technology, strategy, and market changes. One study of large IT outsourcing deals found that one-fourth of contracts were renegotiated prior to expiration.[17]

Service Delivery Trends

The maturation of the IT Services sector was marked by a gradual shift to more standardized products and services and more systematized processes for delivering them. Historically, IT was viewed more as an art than a science. Before the development of general purpose tools and "higher level" languages, programmers built custom software for each client starting from the most basic coding required to control the client's particular computer hardware. For example, each large enterprise would have a custom payroll application, built around that company's own computer hardware and business requirements and reflecting the creative input of that company's own programmers. Custom solutions were expensive to develop and maintain, often incompatible with other systems a company might build or acquire, and prone to quality problems. As the industry matured, a range of standards, tools, and methodologies provided a set of building blocks for more efficient development of IT systems.

In parallel with the development of more standardized IT hardware and software, processes for delivery of IT Services also became more systematized. A major milestone was the development of the Capability Maturity Model (CMM) by the Software Engineering Institute (SEI) at Carnegie Mellon University. The CMM was written under a contract from the U.S. military for use in assessing the ability of defense contractors to complete IT projects. Originally published in 1989 for software development, CMM (now CMMI) has since then been expanded and revised substantially.

CMM appraisals measured the maturity of an IT organization's *processes*. Appraisals ranged from Level One (Initial) to Level Five (Optimizing). To receive a high CMM appraisal, a company had to achieve stringent standards of process discipline and have systems in place to monitor processes and improve them over time. Many organizations reported that process improvement based on the CMM led to improvements in cost, schedule, productivity, quality, and customer satisfaction.[18] Critics, however, commented that CMM resulted in a bureaucratic focus on filling out forms.

In contrast to process assessments such as CMM, there were no broadly accepted measurement standards for output performance in IT Services. Surveys, however, indicated that performance was highly uneven across projects and vendors. According to The Standish Group, only 34% of IT projects in 2004 fully met business expectations on-time and on-budget, half were "challenged"– they were completed and become operational but over budget, late, and with fewer features and functions than initially specified, and the rest were considered to have failed.[19] According to a Forrester Research survey in 2005, only 37% of users felt their IT shops delivered new or enhanced applications on-time and only 42% felt they were delivered with expected levels of quality.[20] Fewer than 5% of organizations achieved "best in class" 99.9% availability of computer systems.[21]

Offshore IT Services

Offshoring (shifting selected activities to lower cost international locations) first appeared in the custom application development and maintenance (CADM) sub-sector of IT Services in the late 1980s and surged in the late 1990s and early 2000s. With systematization of software development processes, appraisal methods such as CMM, and better and cheaper telecommunications, many

activities in the software development process could be partitioned and performed by people located in different places. In particular, detailed design, coding, and testing could be undertaken anywhere in the world where suitable talent, equipment, and telecommunications links were available. (See **Exhibit 7** for a SWOT analysis by neoIT comparing alternative offshore locations.)

The growth of offshore software development was spurred by the large differential in skilled labor costs between advanced economies such as the United States and emerging markets such as India. (See **Exhibit 8** for drivers of decisions to offshore per client survey.) Software development was very labor-intensive with personnel-related costs accounting for 70-80% of total costs.[22] Indian IT professionals, for example, earned only 12% of the wages of their American peers.[23] (See **Exhibit 9** for global wage levels and employment.) NeoIT estimated that a typical offshore project delivered savings of 25-30%. The impact of lower salary costs was partially offset by communication and travel costs, change management costs, physical infrastructure, and other costs. Nearshore[a] project savings were estimated at 10-15%. Infosys estimated that a client's first offshore project typically cut only 5-10% of costs, increasing to 20-30% for a second project and up to 40% thereafter.[24] Nasscom research estimated 25-50% savings for IT Services work offshored to India.[25] (See **Exhibit 10** for breakdown of cost impacts of offshore delivery.)

The distance between onsite and offshore locations, and corresponding time zone differences, was cited as both an advantage and a disadvantage for delivery of IT Services. With an approximately twelve hour time difference between the U.S. and India, teams could work around the clock, passing work back and forth across locations to accelerate projects. Indian teams could also log onto U.S. computer equipment while it was idle during the night. However, distance had negative impacts on communication among team members as well as quality of life impacts such as the requirement for long distance travel and for telephone calls and e-mail responses outside of regular work hours.

While offshore delivery was first adopted by large multinational corporations, smaller companies were also participating in growing numbers since the late 1990s. A study by Duke University and Booz Allen Hamilton indicated that larger firms were most likely to use offshore delivery for IT and administrative back office functions while among smaller companies the most frequent function adopted for offshore delivery was product development (R&D, product design, and engineering). In addition to cost savings, smaller firms disproportionately cited "growth strategy" and "competitive pressures" as drivers of offshoring.[26]

Market Potential and Penetration

In 2005, McKinsey conducted a detailed bottom-up assessment of the potential market for offshore IT Services. The "offshoring potential" of each service line within the IT Services industry was assessed according to its (a) labor intensity, (b) automation potential, (c) business risk, (d) need for co-location, (e) complexity of interaction, and (f) local knowledge requirements. The study concluded that the total addressable market for offshore IT services was $150-180 billion. Furthermore, it indicated that while offshoring had been concentrated to date in the application development and maintenance service line ($30-36 billion potential, 31% penetration), the largest opportunity existed in what the study called Traditional IT, including hardware/software maintenance, network administration, and help desk services ($70-85 billion potential, 2% penetration). (See **Exhibit 11** for addressable market projections by service line.)

An updated market assessment by the Indian industry association Nasscom estimated the total addressable market for offshore IT Services was $200-250 billion in FY06, implying only 10-14%

[a] Nearshore locations such as Latin America for the United States and Eastern Europe for Western Europe offered greater geographic and cultural proximity to clients while still providing savings versus onshore services.

penetration.[27] Supporting estimates of a large untapped market, Gartner predicted that nearshore and offshore IT Services would grow sixfold from 2004 to 2010.[28]

Global IT Labor Market

According to a 2005 study by the McKinsey Global Institute, global employment in IT Services was 6.3 million FTEs, projected to grow to 6.9 million by 2008. Of these positions, 42% were filled by professional software/IT engineers, 24% by generalist university graduates, and 12% by support staff, with the remaining 22% comprised of middle and senior managers, analysts, and finance/accounting professionals.[29] IT Services employment was concentrated primarily in advanced economies with 74% of employment located in North America, Western Europe, and Japan. India had the largest employment among lower cost countries with 6%.

Based on another bottom-up analysis, McKinsey estimated that up to of 44% of IT Services jobs could be performed offshore. Feasibility of offshore delivery varied widely among service lines with *application maintenance* and *custom application development* at the top with 79% and 77% of employment respectively, followed by *System Integration* and *IT outsourcing* at 55% and 46%. For *IT consulting*, a maximum of 10% of employment was deemed feasible for offshoring. This analysis implied there could be demand for up to 3 million FTEs in offshore IT Services by 2008. Adoption projections, however, were more modest. A variety of factors influenced adoption rates including cost pressures, availability of suitable labor, organizational, operational, and technical constraints, as well as legal, regulatory, political, and social factors. From a base of 371,000 FTEs in 2003, actual offshore employment demand in IT Services was projected to grow to 770,000 by 2008, including 422,400 engineers, 215,500 generalists, and 77,400 support staff. The largest occupational category was projected to be "young professional engineers" with demand for 187,500.[30] (See **Exhibit 12** for offshore employment demand from the IT Services sector.)

The same McKinsey study assessed labor supply for offshore services in low-cost countries. There were 33 million young professionals in low-cost countries, but only between 4.6 and 6.4 million were deemed *suitable* for employment with multinational companies, with the balance screened out due to inadequate language skills, education or training, or cultural fit. Furthermore, only 2.8-3.9 million were deemed *accessible* to multinationals with the remainder, while suitable, either projected for employment in their domestic labor markets or located in geographic areas with insufficient air transport links and unwilling to relocate.[31] A comparison of supply versus demand indicated there was surplus labor supply across all job categories.

Of particular importance for IT Services was the supply of "young professional engineers" in low-cost countries. Total demand in 2008 was estimated at 596,000 (including the 187,500 demanded by the IT Services industry), and suitable supply was estimated at 946,000. Given growth projections, it was estimated that these workers could become supply constrained by 2023, but workforce development initiatives already underway were expected to keep supply ahead of demand.

In contrast to a projected offshore supply surplus, there were concerns about a potential shortage of IT talent in the United States, the largest market for IT Services. There had been a 50% decline in the proportion of college students declaring majors in computer science from 2000 to 2006[32] and computer science bachelor's degrees granted fell 28% from 2004 to 2006[33]. Computer science enrollments, however, were highly volatile and had also declined to a similar extent between 1983 and 1987.[34] Meanwhile, the U.S. Department of Labor projected a 25-50% increase in employment in most IT related occupations between 2004 and 2014.[35] Proponents of offshoring argued that this implied an environment where the alternative to offshoring would not be higher cost local development, but rather not doing some projects at all.

The availability of U.S. H1-B visas (for skilled workers in "specialty occupations") was an important driver of workforce mobility. Indian IT firms were among the largest users of these visas (Infosys was the top H1-B employer in 2006 followed by Wipro.[36]) Limits on the number of H1-B visas that could be granted per year varied over time, peaking in the early 2000s at 195,000. The cap for FY07, set at 65,000 visas, was fully exhausted on its first day. Some cited limited availability of visas to send workers onsite as a driver of Indian IT firms shifting additional work offshore to India. Both American and Indian technology firms were vocal advocates for expanded visa availability.

Critiques

While offshoring had grown rapidly in the late 1990s and early 2000s, many offshoring projects had failed to meet client expectations. Laura Dillman, CIO of Wal-Mart commented that "We tried offshore development, and we weren't very successful. We found that the hourly rate was less but that it took more hours [to complete projects]."[37] A survey by offshoring consultant Ventoro indicated that only half of respondents actually achieved savings via offshoring and that offshoring actually increased costs for 25% of respondents. In a 2005 DiamondCluster survey, 36% of respondents cited performance as a reason "outsourcing didn't deliver" versus 7% who cited failure to achieve cost savings. Vendors, however, would often cite insufficient client preparation as the most frequent cause of failure.

Offshoring had also become hotly politicized in the United States and Western Europe. In the U.S., for instance, TV "newshost" Lou Dobbs had run sustained tirades against offshoring to lower-cost countries. And in the U.K., the industry's second-most important market, a television station had mounted a sting operation that purported to show that personal information on hundreds of thousands of Britons that had been provided to Indian BPO operations had been sold illegally in India for as little as £8 per person. According to a March 2006 poll by the Pew Research Center, 71% of Americans believed "outsourcing is bad for the American economy because it sends good jobs overseas."[38] Economic research studies, however, indicated the benefits of offshoring could exceed the costs to the U.S. A study by the McKinsey Global Institute estimated that for every dollar of business services offshored, the U.S. economy gained $1.12 to $1.14 via cost savings, freeing up of workers to perform other jobs, repatriated profits, and exports.[39]

Historical Development of IT Services in India

The Indian IT sector dated back to the installation of the first mainframes in the 1950s and 1960s in Indian research institutions.[40] However, the growth of the industry was held back by the slow rate of computerization: the Indian government was afraid increased computer usage would threaten job creation. In addition, the government adopted an import-substitution based economic policy where hardware and software had to be developed indigenously, and technology could only be imported when strictly necessary. Until the mid-1980s, hardware importers had to pay tariffs as high as 350% and wait up to four years for import clearances. Software imports were simply banned.

The first independent Indian IT Services firm, Tata Consultancy Services (TCS), was set up by the Tata Group in 1968. Additional firms were established in the second half of the 1970s, including Computer Maintenance Corporation (CMC), a state-owned firm set up to service IBM computers when IBM left India in 1977 after refusing to dilute its stake in its local operations to a minority interest as demanded by the government. (CMC was acquired by TCS in early 2002.) Indian IT Services firms initially operated as data entry providers in the domestic market, purchasing one or two computers, developing their own software, and processing raw data from clients into reports.

Although the export potential of the industry was first identified in the late 1960s, major exports did not begin until the 1980s, and in this period virtually all of the export volume was accounted for by the practice known pejoratively as "body shopping," whereby Indian engineers were sent overseas to work onsite on client projects, under the direction of client management. Some progress was made during the latter half of the decade on liberalizing imports. By 1986, the total duty on computer imports was reduced to 160% and software imports were allowed subject to a 112% duty. However, the sector's emergence would have to wait for broader changes in the Indian context.

India's Changing Macro Context

Since independence in 1947, the Indian government had stressed central planning and self-sufficiency rather than market-based capitalism and economic internationalism. Despite on-off attempts at modest reforms since the late 1970s, the government continued to occupy the "commanding heights" of the Indian economy at the beginning of the 1990s. The public sector accounted for over one-third of GDP. The state-controlled financial system, most of which had been nationalized two decades earlier, mopped up government debt, propped up perennial public-sector lossmakers, and otherwise distorted domestic capital flows. Inflows of foreign capital, technology, and products were strictly controlled. All foreign investment required clearance from bureaucratic agencies, foreigners were generally not allowed majority stakes, and imports were subject to either restrictive licenses or some of the world's highest tariffs. The workings of the private sector were subject to several other forms of regulation as well: price controls were in place for many products, companies had to obtain licenses from the government in order to relocate existing facilities, establish new plants, expand production, and introduce new technology or product lines, and it was virtually impossible to discharge employees. Ramshackle infrastructure, corruption, and a creaky legal structure added to the transaction costs of doing business in this environment.

In 1990-91, India experienced an economic crisis that was sparked by balance of payment problems and fueled by a long-running fiscal deficit: foreign exchange reserves dropped to dangerously low levels, the rate of money supply growth dwarfed the rate of GDP growth, and by August 1991, inflation was at 17% and rising. After defeating the opposition in a general election in May 1991, the incoming Congress party government, led by Prime Minister Narasimha Rao and Finance Minister Manmohan Singh, started the process of devaluing the Indian Rupee, from Rs. 20 per U.S. dollar to Rs. 26 by the end of the year. The Rupee continued to depreciate, to nearly Rs. 43 per U.S. dollar by the beginning of 1999, which, allowing for differences in the two countries' inflation rates, amounted to a 17% devaluation in real terms since 1991.

Less expectedly, the new government embarked on the first major effort to overhaul the Indian economy since independence. As a result, the Indian economy opened up significantly to the outside world, at least by its own historical standards. The Indian private sector experienced progressive product market liberalization (including exposure to foreign competitors) and some improvements in capital market efficiency, although labor legislation continued to make it difficult to discharge workers. Little was done, however, in this first wave of reforms, to enhance the efficiency of public sector enterprises (including banks), let alone privatize them, and progress in improving infrastructure was modest at best. While India's traditional "Hindu growth rate" of 2-3% improved to 5-7%, progress at improving health, education, and welfare for India's poor was limited.

Of these macro reforms, the ones that impinged most directly on the IT sector were the depreciation of the Indian Rupee and the easing of restrictions on imports. The software industry in particular had never been subject to production and export licensing, and foreign investment in it was already treated more liberally than in many other industries. In fact, a common joke within the industry as of the mid-1990s was that it had succeeded because there had been no Ministry of

Software: the technological revolution that spawned it had not been anticipated by the government, and so few controls applied to it.

Despite jokes to the contrary, government did play some important supporting roles in the emergence of Indian IT. One of the barriers to offshoring in the early 1990s was India's poor telecommunications infrastructure. The national government addressed this with the establishment of the Software Technology Parks of India (STPI) where satellite communications were provided along with tax incentives to promote investment in software exports. Bangalore was the first STPI and remained the most successful at present with 1300 companies operating in the park today. Liberalization of telecommunications in the late 1990s further facilitated the Industry's growth via major improvements in service and cost.[41] The STPI legislation also provided a range of major tax and regulatory benefits for the software industry: duty-free imports, a ten-year tax holiday from the usual 30% corporate tax rate, and up to 100% foreign ownership.[42] Also, the government had played a central role in developing India's talent pool, for example via support for the elite Indian Institutes of Technology (IITs) dating as far back as the 1950s.

Accelerated Growth

The sector's growth began accelerating in the 1980s as the "body-shopping" model became entrenched in the market. American and European clients contracted for Indian engineers to be sent overseas to work onsite on client projects. In 1980-81, the industry employed about 2000 people in 25 firms and generated $30 million in exports. By 1990-91, exports were up to $128 million. By 1993, employment was over 35,000 in nearly 700 firms.[43] India's early success in IT Services was concentrated almost entirely in custom application development and maintenance (CADM) and within this service line, Indian programmers worked primarily on the most labor-intensive routine coding portions of clients' software projects.

Indian IT firms, however, were not content to remain only exporters of trained programmers. Seeking superior value capture opportunities, they began managing their own projects and in some cases shifting from time-and-materials to fixed price contracts. With accountability for project execution and economics, they began experimenting with sending some of the work back to India to be completed by colleagues there. The percentage of export revenues earned from on-site contract programming declined from approximately 90% to below 80% from the early 1980s to the early 1990s.[44] The potential benefits of this nascent "offshoring" phenomenon were immediately apparent: travel and living expenses could be reduced dramatically (onsite pay for Indian IT professionals averaged $5000-6000 per month[45]), project teams could work around the clock by passing work back and forth between teams in the U.S. and in India, and companies could invest in larger pools of technical specialists in India with the ability to leverage them across multiple projects.

Despite its attractions, however, offshore delivery was difficult to implement. Offshoring required refinement of the methodologies and processes by which companies produced software. For example, requirements had to be defined very clearly up front in order for teams to deliver software 7500 miles away that met client expectations. New processes for managing the development process were also required. As these processes evolved, Indian software development centers became world quality leaders, as measured by CMM assessments. Motorola's software development center in Bangalore was the first commercial software operation in the world to achieve CMM Level 5.[46] In 2003, 75% of the world's CMM Level 5 software centers were located in India[47] and as of early 2007, this figure still stood at 48%.[48] High CMM appraisals also played an important role in the marketing of Indian IT Services, helping firms win clients' confidence to send important work to distant and at that time mostly unfamiliar firms.

A major milestone in the shift to offshore delivery from India was the global race to fix the "Y2K Bug" which required older software programmed with two-digit date fields to be updated prior to the year 2000. This one-time demand spike required large numbers of programmers trained in older programming languages, which India could provide in abundance. Successful experiences working with Indian vendors on Y2K updates led to increased confidence in offshoring and a sustained increase in demand growth. By FY00, Indian IT Services companies derived 33% of their revenues offshore, a figure that would rise to 60% by FY06. Including ITES, these figures were even higher: 43% in FY00 and 70% in FY06.[49]

With the offshore delivery model for software development well established by the early 2000s, India's IT companies pursued growth by increasing their penetration of the core CADM service line in both new and existing verticals, by developing new offerings in higher value-added service lines such as systems integration and consulting, and by entering the adjacent ITES-BPO market. From FY01 to FY06, the percentage of India's IT Services revenues derived from CADM work declined from 80% to 49%.[50] Major firms also pursued growth via geographic expansion, opening software development centers in Eastern Europe, China, and other low-cost locations.

Foreign companies had also made major commitments to the Indian IT Services sector. Early "captive" operations such as Motorola's were later joined by large operations of foreign IT Services firms. IBM Global Services, the world's largest IT Services firm, was India's largest foreign employer. Accenture had also built a large presence via organic growth while EDS and CapGemini had built capacity in India via their investments in MphasiS and Kanbay. Foreign firms used their Indian operations both to serve foreign clients and to participate in the domestic market.

National Association of Software and Service Companies (Nasscom)

One of the driving forces behind the growth of Indian IT Services was the National Association of Software and Service Companies (Nasscom). Founded in 1988, Nasscom was a highly effective industry association dedicated to promoting the interests of India's IT sector. Under rotating leadership by executives from India's top IT firms, the association consistently took pro-competitive positions advocating protection of intellectual property rights, open access for foreign competitors, and better security and infrastructure. It also worked with top consulting firms to develop research to improve visibility into the industry's development and to highlight issues to be addressed. As of 2006, Nasscom had over 1050 members accounting for over 95% of the revenue of the software industry in India, including both domestic and foreign-owned companies.[51]

Indian IT Services in 2007

In FY05, India was the dominant location worldwide for offshore services with an estimated market share of 65% for offshore IT Services and 46% for offshore BPO.[52] By FY07, Indian IT Services industry revenues were $23.5 billion (including $18.0 billion from exports). Total Indian IT-ITES (including BPO) was $39.6 billion.[53,54] (See **Exhibit 13** for historical growth trend.)

The success of the Indian IT Services sector was reflected in the performance of its leading firms. In 2006, the top five IT Services firms with the bulk of their operations located in India (TCS, Infosys, Wipro, Cognizant, and Satyam) delivered 36% revenue growth with a combined 22% net income margin. In contrast the top five Western firms (IBM Global Services, Accenture, EDS, CSC, and CapGemini) grew 5% with 5% net income margins. This contrast was also reflected in stock market valuations. From 2004 to 2006, the combined market capitalization of the top five Indian IT Services firms surged from $40 billion to $82 billion, approaching that of the top five Western firms which had grown from $105 billion to $111 billion over the same period.

Export Markets

In FY07, India's IT Services exports totaled $18.0 billion and broader IT and ITES exports totaled $31.3 billion.[55] Nasscom projected total IT and ITES exports would grow to $60 billion by 2010.[56] India's top export market for IT Services was the United States (66.5% in FY06) followed by the U.K. (15.3%). For comparative perspective, the U.S. accounted for 44% of global IT spending. Combined with Australia (1.5%), Singapore (1.3%), Hong Kong (0.8%), and Canada (0.6%), countries where English was commonly spoken (former British colonies) accounted for 86% of total exports. The Indian diaspora, especially in the U.S., was also cited as an important link. By some accounts up to one-third of the technical workforce in Silicon Valley traced its roots to India, and ten percent of new technology ventures there were led by Indians. Other markets included Japan (2.8%), Germany (2.3%), and the Netherlands (1.4%). While substantial investments had been made to build capabilities to serve clients in languages other than English, rapid growth in historical core markets had kept the geographic breakdown of exports fairly constant since 2003.[57]

Custom application development remained the dominant export service line (49.1% of FY06 exports), followed by application management (11.9%), support and training (9.3%), IS outsourcing (6.4%), systems integration (2.8%), and IT consulting (2.6%) and software testing (2.1%).[58] (See **Exhibit 14** for exports by service line.) Indian firms continued to emphasize penetration of higher value-added service lines in order to improve their economics and capture a larger share of major, often multi-vendor, outsourcing deals. IT Consulting had proven particularly difficult to penetrate but was viewed as strategic because consulting projects often led to downstream implementation work. Among vertical segments, BFSI (banking, financial services, and insurance) was the largest market (38.1%), followed by high-tech/telecom (19%), manufacturing (12.9%), and retail (7.6%).

The Domestic Market

The Indian domestic market for IT products and services was historically dominated by hardware sales ($6.5 billion in FY06) with limited penetration of outsourced services. Recent years, however, had seen rapid growth in spending on IT Services with revenues reaching $4.5 billion in FY06 and 25% growth projected in FY07.[59] Outsourced services accounted for an estimated 45% of total services spending (with the remaining 55% going to in-house IT staff and associated overheads).[60] Combined with software and ITES, services overtook hardware for the first time in FY06.[61]

IT Services spending was highly concentrated with four verticals accounting for over 90% of total spending: financial services (31%), manufacturing (29%), communications and media (17%), and government and education (14%). Revenues by service line were driven both by underlying demand for the service and by penetration of outsourcing versus use of in-house staffs. System integration was the largest service line (33% of outsourcing revenues, 50% penetration) followed by deployment and support (23%, 50% penetration) and discrete outsourcing (16%, 40% penetration).[62]

The vendor landscape in the domestic sector was more fragmented than in the export sector with the top ten players accounting for 30% of the market, the next ten firms accounting for 12%, and the remaining 58% by many smaller generally regional vendors.[63] Foreign multinationals were major competitors in the Indian domestic market. Firms such as IBM and HP leveraged their strengths in hardware to build up sizeable services businesses. IBM, in particular, had won many of the largest outsourcing contracts including a $600-800 million deals for IDEA Cellular and Bharti Tele-Ventures. Large Indian vendors were critiqued for lacking focus on domestic clients, however domestic business varied widely across firms. Wipro and TCS had always been active participants in the domestic market while Infosys and Cognizant had focused almost exclusively on exports.

The domestic software market had historically been held back by high rates of piracy. Despite anti-piracy efforts such as consumer education, legal action, and the introduction of lower cost versions of software products, piracy remained rampant. According to one study, piracy had declined from 74% to 72% from 2004 to 2005. This compared favorably to China, however, where piracy had declined from 90% to 86% over the same period.[64]

Labor Inputs

With labor costs exceeding 70%[b] of total operating expenses at major firms, the supply of skilled labor was always a top consideration for IT Services executives and industry analysts. Since the industry's inception, writings on India's IT sector almost invariably cited "India's abundant pool of capable English-speaking engineers" as the primary enabler of its success. In recent years, however, some analysts had begun citing the availability of skilled labor as a constraint on the industry's growth. Headlines such as "India's Looming IT Labor Shortage"[65] began appearing, heralding predictions that rising wages and high attrition rates would soon render India uncompetitive in offshore services. This section presents some of the key statistics that have informed this debate along with the industry's main responses to concerns about labor availability.

Indian IT-ITES employment grew from 284,000 people in FY00 to 1.6 million people in FY07 (690,000 in IT Services Exports, 553,000 in ITES-BPO Exports, and 378,000 in the domestic sector).[66] (See **Exhibit 15** for employment trends.) Per a 2005 McKinsey study, projected export growth would drive employment demand up to 850,000 IT professionals and 1.4 million ITES-BPO professionals by 2010. The same study estimated that as of 2005, India had the largest pool of talent appropriate for offshore IT-ITES, 1.77 million people or 28% of the worldwide total (followed by China with 11%). India graduated 350,000 engineers per year, but McKinsey estimated only 25% of them were suitable for employment in multinationals or in offshore services companies.[67] Growth in output of graduates from Indian academic institutions was projected to meet the growing demand for skilled personnel in IT Services. However, a shortfall of 500,000 employees in ITES was expected by 2010.[68]

Rapid employment growth had contributed to wage inflation. Average pay for Indian IT professionals rose ~15% in 2006.[69] Wage growth was most pronounced for experienced workers. Nasscom cautioned, however, that rapid wage growth in India did not necessarily imply erosion of India's labor cost advantage. Per Nasscom, "A 15% increase in people related costs for an FTE in India amounts to an increase of $900-1,100 USD; in comparison a 3% increase in people-related costs for an FTE in the US amounts to an increase of $1,200-1,400 USD."[70] Nonetheless, there was anecdotal evidence of some firms selecting other countries over India due to rising wages. A recent Wall Street Journal article, for example, profiled Silicon Valley firms that had shifted work back to the U.S. due to declining wage differentials.[71] (See **Exhibits 16** and **17** for wage trends.)

Tighter labor markets also resulted in growing attrition rates, and attrition was exacerbated by hiring activities of large foreign multinationals. Until very recently, foreign IT firms operating in India hired experienced professionals instead of building the training capabilities required to hire personnel fresh from university and reportedly paid salaries 20-25% higher than Indian firms.[72] To control attrition, firms raised wages, offered stock or options, invested in training, and added perks.

Nasscom was spearheading a set of initiatives designed to address potential talent shortages. In 2005, Nasscom signed a Memorandum of Understanding (MoU) with the India's University Grants

[b] This ratio of labor cost to total cost is as reported in company financial statements and includes non-wage components of labor cost. Wages may have accounted for less than half of total labor costs, though published data were not available to provide a more precise estimate.

Commission under which IT firms would contribute to improving the readiness of graduates for employment in the sector. The MoU included a "Faculty Development Program" under which IT firms would assist with training of university faculty, an agreement for IT firms to contribute to upgrading physical infrastructure at universities and to curriculum development, and a commitment by firms to provide explicit guidance on their projected demand for specific skills.[73] Individual IT firms also established direct partnerships with universities covering research and teaching collaboration.

In addition to its academic interface activities, Nasscom coordinated a set of industry initiatives to help firms address their HR challenges. An industry-wide skills assessment and certification program was developed to help companies find appropriate talent. Training seminars and a regular newsletter ("HR Connect") were launched to help companies adopt best practices for talent management. Nasscom also sponsored regular labor market studies to provide industry participants a regular flow of up-to-date labor market data on which to base HR policy decisions.

As far back as the 1980s, entrepreneurs had responded to the demand for IT training in India and built private IT schools, geared specifically to preparing students for employment with major IT firms and assisting firms with upgrading employee skills. In 2006, the Indian IT training market was estimated to have grown 14% to Rs. 14.53 billion (approximately $360 million).[74] NIIT, India's largest IT training firm claimed to have trained one third of India's software professionals.[75]

IT companies also responded to tighter labor markets by making adjustments to their HR and business strategies. Whereas firms had initially recruited only engineers from top institutes, they broadened their recruitment to a wider range of backgrounds and invested in in-house training capabilities to compensate for the lower initial skill levels of these new hires. Firms also added locations in smaller Indian cities to access formerly untapped labor pools, and some cited hedging exposure to the Indian labor market as a contributing factor behind decisions to open delivery centers outside of India, primarily in Eastern Europe, Latin America, and China. Furthermore, Indian firms addressed margin pressure due to rising wage rates with broader cost reduction and efficiency improvement programs: increasing the proportion of work delivered offshore, shifting organizational pyramids to increase the proportion of less experienced (and hence less costly) workers, increasing workforce utilization, and implementing programs to reduce SG&A costs.

Other Factor Inputs

After skilled personnel, major factor inputs for IT Services companies included computer hardware and software, travel, telecommunications and other infrastructure, and real estate. Computer hardware could be imported free of basic customs duty, subject to a 12% additional duty equivalent to the excise tax payable on domestic hardware as well as a special 4% additional duty on IT goods.[76] However, speaking at the inauguration of the Dell Computer's "most comprehensive manufacturing facility outside the U.S." in Chennai in March 2007, company founder and CEO Michael Dell complained Indian tariffs were unfavorable for computer manufacturers. He commented, "India is losing investments because of its tariff structure," indicating that per Dell's analysis taxes made up 21-25% of the cost of computers sold in India and that they were a factor in one of the company's suppliers choice to invest $5 billion in a facility in Vietnam instead of in India.[77] Software could be imported free of basic customs duty, subject only to an 8% additional duty equivalent to the excise tax payable on domestic packaged software. No excise taxes were levied on custom software or software downloaded via the Internet or pre-installed on computer hardware.[78]

Travel formed a major component of Indian IT firms' cost structures due both to the regular need to send staff onsite to meet with and serve foreign clients as well as for regular movement of personnel within India for training and other internal staffing purposes. As of this writing, India was

the fastest growing aviation market in the world, with passenger numbers up 20% in 2006.[79] Intense competition among full-service and budget airlines contributed to service enhancements and fare reductions. Airport infrastructure, however, was badly overburdened contributing to frequent flight delays. India's famous system of railways was also being upgraded , but was still plagued by aging equipment and infrastructure, slow travel times, delays, and safety issues. Hotel construction failed to keep pace with demand growth, leading to a 40.4% increase in revenue per available room in the first six months of 2006, on top of a 31% increase in 2005.[80] Indian IT firms, however, sidestepped the hotel shortage via the construction of their own in-house accommodation facilities. Infosys, for example, expected to have 15,000 company-owned hotel rooms across India by June, 2006 and estimated that for $15 per night it could provide guests at its Bangalore headquarters the equivalent treatment of a $150 three-star hotel. Upon completion of this plan, Infosys would have more sleeping rooms than any hotel chain in India.[81]

Indian telecommunications tariffs had declined 60% from 2001 and 2004[82] on the heels of major reforms in the sector. Since the late 1990s, domestic long-distance services had been deregulated, international long-distance service had been opened up to private operators, and a 25% stake in the state-owned incumbent privatized (to the Tata Group which was also the parent of TCS), and ISPs were permitted to set up international gateways and buy bandwidth from foreign providers. India's first private undersea cable linked it to Singapore in 2004. Indian telecommunications costs, however, remained above internationally competitive levels.[83]

Other aspects of India's infrastructure continued to be problematic. For example, firms had to stock back-up generators, batteries, and fuel in order to ensure continuous power supplies. Some also ran fleets of buses to ensure employees would have reliable transportation to and from work.

Commercial property values and office rents were rising rapidly in many major Indian metropolitan areas and compared unfavorably to rents in alternative international locations. For example, rents in the Delhi and Mumbai central business districts had increased 133% and 75% respectively from June 2006 to June 2007. Rent increases in outlying areas and in smaller cities were generally more modest. As of June 2006, Class "A" bare shell office rents in Mumbai and Delhi central business districts averaged $105 and $89 per square foot per year. In Gurgaon and Noida, popular areas for IT-ITES firms outside of Delhi, rents were $33 and $13 per square foot per year.[84] For comparison, Class "A" rents in Midtown New York, Chicago, and Silicon Valley in Q1 2007 were $72, $34, and $31 respectively.[85]

Macroeconomic, Currency, and Regulatory Environment

India's macroeconomic performance was reflective of the ongoing boom in IT Services as well as in other sectors. In 2006, real GDP growth was 9.4%, the fourth consecutive year of growth above 8%. Consumer price inflation, however, had increased from 4.2% in 2005 to 6.2% in 2006.[86] To combat inflation, the Reserve Bank of India (RBI) raised its overnight lending rate by 1.5 percentage points to 7.75% between January and June 2007. While wholesale price inflation fell from 6.7% in January 2007 to 5.1% in mid-May, some commentators still raised concern that the Indian economy could be overheating, citing record high industrial capacity utilization and a widening trade deficit.[87]

For Indian IT Services companies, with revenues largely earned in U.S. dollars and costs primarily in Indian Rupees, the INR/USD exchange rate was of special importance. From October 1, 2006 to October 1, 2007, the Rupee had appreciated from Rs. 45.9 to Rs. 39.8 per dollar.[88] Infosys estimated that every 1% shift in the exchange rate impacted its operating margin by 50 basis points.[89] For Cognizant, with a greater proportion if its workforce based in the U.S., the same shift in the exchange rate would have a 20 basis point impact. It was estimated that 31% of Cognizant's costs were

denominated in Rupees.[90] Infosys and TCS engaged in active hedging programs to manage their currency exposure, while Cognizant in general did not maintain hedges.

As of this writing, there was ongoing controversy regarding future tax benefits for IT Services firms in India. The tax benefits firms enjoyed under the Software Technology Parks of India (STPI) were set to expire in 2009. These benefits included a 10-year exemption period from income taxes on export profits as well as exemptions from many indirect taxes, such as on procurement of capital goods. In broad terms, the IT sector had been promised continued benefits under the government's new Special Economic Zones (SEZ) program. However, questions remained as to the treatment of firms located in STPIs under the new program. Nasscom was advocating for maximum benefits for IT Services companies under the SEZ program.

India's rankings in the World Economic Forum's Global Competitiveness Report reflected the country's unusual status as a leader in some advanced sectors such as IT Services, but more broadly still a country facing substantial development challenges. The rankings were structured around three categories: "basic requirements" deemed necessary for countries in early stages of economic development (institutions, infrastructure, macroeconomics, and health and primary education) where India ranked 60th out of 117 countries, "efficiency enhancers," typically a priority for countries at moderate levels of economic development (higher education and training, market efficiency, and technological readiness), where India ranked 41st, and "innovation factors" of key importance to advanced economies (business sophistication and innovation), where India ranked 26th. Some of India's ratings on index components were especially revealing. For example, India ranked 1st worldwide on local equity market access, 3rd in quality of management schools, 4th on availability of scientists and engineers, 4th on intensity of local competition, and 7th on quality of math and science education. However, it ranked only 69th in overall infrastructure quality, 76th on primary school enrollment, and 97th in quality of electricity supply.[91] The country's literacy rate stood at only 61%.[92]

Major IT Centers within India

The geographic composition of India's IT sector had changed substantially over time. The first software cluster to develop was located in Mumbai (then called Bombay). While on-site contract programming was the dominant form of business, access to an international airport and to telecommunications facilities were key factors, along with access to trained personnel via proximity to a major engineering institute. Satisfying these criteria, the software industry expanded in Mumbai, Delhi, and Chennai (then Madras) as well as to a lesser extent in Bangalore during the 1980s.[93] With the shift to offshore delivery, direct international air links became less important and the ability to deliver a high quality of life at Indian development centers became more important. With a comfortable climate, the prestigious Indian Institute of Science, and a relatively well run state government, Bangalore surged ahead to become the home of India's dominant IT Services cluster. Key milestones in Bangalore's development included Infosys's relocation of its headquarters to Bangalore from Pune in 1983 and Bangalore's selection by Texas Instruments in 1984 for an export-oriented development center. By the early 2000s, however, Bangalore's livability had been seriously diminished by overburdened infrastructure and rising property prices. However, the depth of the cluster's networks and capabilities continued to attract local and foreign operations.

In 2005, 88% of Indian IT and ITES exports (from STPI locations) originated in the top five cities: Bangalore (37%), Delhi/National Capital Region (17%), Chennai (15%), Hyderabad (11%) and Mumbai (8%). While growth continued in these core centers, firms also spread investment into new locations (including Tier II cities) to access broader labor pools, take advantage of lower property costs, and benefit from incentives offered by state governments. Upcoming locations included

Ahmedabad, Kochi, Kolkata (formerly known as Calcutta), Pune, and Thiruvanathapuram, among others. Operating costs in Tier II and III cities were typically 15-20% lower than in Tier I cities.[94]

States within India used a variety of policy levers to actively compete for IT investment. Financial incentives and concessions were offered to the sector, in some states by agencies set up specifically to promote IT investment and shepherd companies through the process of setting up in the state. Infrastructure spending was targeted toward the requirements of IT companies and their staffs. States also invested in education and workforce training and certification tied to the requirements of the IT sector.[95] (For an example, see **Exhibit 18** for Karnataka's government initiatives focused on the IT industry. With Bangalore as its capital, Karnataka was India's top state for IT Services exports.)

Economic Impact of IT Services in India

While IT-ITES direct employment was less than 0.15% of India's population, its impact on the country in the last quarter century had been transformational. In 2006-07, IT-ITES contributed 5.2% of India's GDP. In 2005, IT Services were 9% of India's total exports of goods and services and IT-ITES combined exports were 16% of the country's total.[96][97] Surging export revenues and FDI in IT-ITES had played a key role in the growth of India's foreign exchange reserves from $5.8 billion in March 1991 to $204 billion in May 2007.[98] In FY07, IT-ITES employees accounted for 10-11% of India's personal income tax revenues, 9% of personal air travel demand, 12% of credit cards issued, and 11% of all housing loans by value.[99]

Projected economic impacts of IT-ITES growth were even more dramatic. In 2006, CLSA Asia-Pacific Markets conducted a survey of 42,453 IT-ITES employees in India to better understand the spending patterns and economic impact of the sector and its employees. The study predicted that 20-25% of India's incremental nominal GDP growth in FY07-10 would come from IT-ITES. Over this period, the sector was projected to hire 80-85% of India's employable engineers and contribute four million incremental direct and indirect jobs across all categories. The largest areas of indirect employment would be in residential real estate (0.39 indirect jobs per IT employee) and domestic help (0.35). IT-ITES employees would absorb 70-75% of projected housing demand and two-thirds of new commercial space. Broader impacts were projected in tourism, financial services, retail, and other sectors that would service IT companies and their employees.[100]

Furthermore, the growth of IT-ITES also had noticeable effects on the shape of India's income distribution pyramid. Per CLSA, at least 20% of movement out of the "deprived" category (<$2050 per year) would be the result of IT-ITES growth, primarily via indirect employment. Also, 11% of growth in the "rich" category (>$22,700) and 20% of the upper middle class "strivers" category ($11,300 to $22,700) was projected to be attributable to IT-ITES.[101]

Major IT Services Firms in India

India's IT Services sector was much more concentrated than the global industry. The top 3-4 players (revenues over $1 billion) earned 45% of revenues, the next 7-10 players (revenues $100 million to $1 billion) earned 25%, offshore operations of IT majors earned 10-15% and smaller players (over 3000, revenues <$100 million) earned the remaining 10-15%.[102] The largest firms were also the fastest growing and held a substantial and growing profitability advantage over smaller firms. In 2005, the top 3-4 companies had EBITDA margins of 26-33% and ~40% revenue growth while the next 7-10 had 12-26% EBIDTA margins and ~35% revenue growth.[103] This section profiles the largest India-based IT Services firms as well as the global industry leaders with particular emphasis on their Indian operations. (See **Exhibits 19** and **20** for comparative financial and performance data on top firms including historical data on TCS and Accenture.)

Tata Consultancy Services

Mumbai-based Tata Consultancy Services (TCS) was India's oldest and largest IT Services firm and the largest independent software firm in Asia. In its 2007 fiscal year (ended March 2007), TCS revenues had grown 41% to $4.3 billion USD with 44% and 22% gross and net income margins respectively.[104] It closed the fiscal year with a $27.7 billion market capitalization. In FY07 TCS added 32,462 new employees (22,750 net of attrition) to grow its total workforce to 89,419 employees (including employees at subsidiaries). The non-Indian proportion of TCS's workforce rose from 6.5% to 9.6% in FY07 as the company grew its operations in China, Hungary, Poland, and Latin America.

In early 2001, TCS publicly articulated the goal of becoming one of the top 10 global IT Services companies by 2010. By the end of 2006, TCS had already achieved this goal along multiple dimensions: it ranked 5th globally in market capitalization, net income, and number of employees when ranked against its direct competitors (excluding telecom, BPO, and government focused vendors). On revenues, it ranked 12th but had targeted a goal of $10 billion by 2010.

TCS offered the broadest scope of services among the Indian IT Services firms. The company derived 76.2% of its FY07 revenues from Core IT Services: technology services (including CADM), enterprise solutions (including enterprise resource planning, supply chain management, and customer relationships management), testing/assurance, and business intelligence/knowledge management. In addition, in the early 2000s, TCS began to pursue five "growth engines" each of which the company saw as offering the potential to contribute $1 billion in revenues in the medium term: IT infrastructure services (6.0% of revenues), platform-based BPO (5.8%), engineering and industrial services (5.8%), global consulting (3.4%), and asset-based offerings such as enterprise software products (2.8%). In BPO, TCS focused its efforts on areas where it could leverage its technology platforms and industry expertise, and avoided low margin call center operations.

The same emphasis on breadth was evident in the geographies and the industries ("verticals") that TCS served. TCS operated 175 offices in 50 countries and was first Indian IT firm to engage in large-scale penetration of geographies other than the U.S. by moving into the U.K. and (later) continental Europe, and more recently, had been the first to build up a large Latin American business. TCS also was a major participant in the Indian domestic market. Overall, the Americas accounted for 56.2% of TCS's revenues in FY07, U.K. and Europe for 28.5%, India for 9.0% and other geographies for 6.3%. In terms of verticals, TCS again had a very broad presence but its key revenue generators were banking, financial services and insurance (42.2%), telecom (17.0%), manufacturing (15.3%), retail (7.1%), life sciences and healthcare (4.3%), transportation (3.2%), and energy and utilities (2.4%).

Fixed-price contracts—as opposed to time and materials contracts—accounted for 41% of TCS's revenues, versus significantly lower levels at other Indian competitors (e.g., 27% at Infosys). While TCS had pioneered the offshore delivery of IT Services, it had been less aggressive in shifting work offshore than its competitors. In FY07, TCS generated 41% of its revenues from offshore delivery versus 50% for Infosys. TCS had a reputation for conservative compensation policies. According to a Deutsche Bank analysis, TCS paid its junior employees on par with its peers, but senior employees on average were paid comparatively less.[105] Despite these policies, TCS's 11.3% attrition rate was the lowest among large Indian IT firms.

Marketing was an area that had not been viewed as a competitive strength for TCS. In 2006, TCS conducted a project both internally and via use of outside consultants to develop a plan to enhance its global brand image. The analysis led TCS to focus its messaging on operational excellence, with the tagline, "Experience Certainty." TCS internal metrics indicated that it led the industry in on-time and on-budget delivery of high quality software. Furthermore, external research indicated the clients

desired predictable delivery of IT services more than any other differentiator. In 2007, TCS launched the largest marketing campaign in the history of India's IT Services sector to promote this message.

TCS was founded in 1968 as a division of Tata Sons, the primary promoter company of India's venerable Tata Group. The company went public in India in August 2004 in India's largest IPO to date. Tata Sons retained approximately 80% of TCS shares and periodically sold additional TCS shares to fund other Group investment priorities. There was speculation that TCS would add an overseas listing, but the company had made no announcement to date on the matter.

Infosys Technologies

Bangalore-based Infosys Technologies was India's second largest IT Services firm. The company posted an operating profit of $852 million on revenues of $3.1 billion in FY07 with revenue growth of 44% and operating profit growth of 42%. Infosys employed 72,241 people in 39 offices worldwide and had a market capitalization of $28.7 billion USD. In Q4 FY07, Infosys drew 49.7% of its revenues from application development and maintenance, 18.4% from package implementation, 7.3% from testing, and 5.2% from business process management. The company's consulting business was growing rapidly, accounting for 4.3% of revenues in Q4 FY07 versus 3.0% during Q4 FY06.[106]

Infosys was generally recognized as strongest among its peers at branding and marketing. Infosys spent 6.7 percent of its revenues in FY07 on sales and marketing, versus the technology industry average of only 1-2%[107]. The Infosys brand was valued at Rs. 22,915 crore (approximately $5.2 billion) at the end of FY06.[108] HR and training programs were also viewed as among Infosys's key strengths.

Infosys consistently delivered strong financial performance with industry-leading offshore billing rates and high profit margins. One of the factors enabling its strong profit margins was the high proportion of revenues derived from offshore work (i.e. work performed in India). Infosys derived 50.2% of its revenues from offshore services in Q4 FY07. Infosys was aggressively acquiring property in India to facilitate its continued growth. Some analysts, however, raised the possibility that Infosys might be sacrificing revenue growth to protect its profit margins. Infosys had also been criticized for the firm's limited use of M&A and very small presence in the Indian domestic market.

Infosys was making the industry's most visible push into business consulting. It hired Stephen Pratt in 2004, formerly the top-selling partner at Deloitte Consulting, to serve as CEO of its new subsidiary, Infosys Consulting Inc. The unit was based in the United States and focused primarily on U.S. clients. As of FY07, the new unit was not yet profitable but expected to reach profitability soon and was viewed as a powerful source of downstream IT revenues.

To strengthen its position in BPO, Infosys bought out the portion it did not own of its BPO subsidiary, Progeon, and renamed it Infosys BPO. While Infosys was a smaller player in BPO than Wipro, it had a relatively rich service mix. Low-margin voice services (call center operations) made up less that 30% of Infosys's BPO work compared to the industry average of over 60%.[109]

In March 2007, S. Kris Gopalakrishnan took over as CEO from Nandan Nilekani, who continued as co-chairman. Mr. Gopalakrishnan announced four priorities for the company: (a) improve competitiveness in operational excellence, (b) improve customer experience with large transformational deals, (c) increase employee engagement especially outside of India, and (d) deepen services by building competencies and broaden service portfolio through innovation and incubation.

Infosys was set up by a group of software professionals headed by N. R. Narayana Murthy in 1981 with an initial capitalization of only $1000 USD. Infosys had long been a leader among Indian

companies in terms of transparency and disclosure. It was the first Indian company to adopt U.S. GAAP accounting (1995) and first to list on an overseas exchange (NASDAQ, 1999) – making more than 100 Infosys employees dollar millionaires (at least temporarily).

Wipro Technologies

Bangalore-based Wipro Technologies was India's third largest IT Services exporter and a major competitor in the domestic market. Wipro's Global IT (excluding domestic) sales in FY07 were $2.5 billion and its Global IT workforce was 67,818 employees (50,354 in IT Services and 17,464 in BPO). Wipro's Asia-Pacific IT Services and Products business (including the Indian domestic market) posted revenues of $550 million. Wipro Technologies was the primary business of parent company Wipro Limited, which also included older business lines such as soaps, shampoos, and light bulbs that defined the company prior to its entry into IT in the 1980s. The company's original name was Western India Vegetable Products Limited, reflecting its heritage in production of edible oils. Wipro Limited's FY06 revenues were $3.4 billion.[110]

Wipro's "string of pearls" strategy called for aggressive growth via acquisitions, resulting in a more diversified business than its peers. The company made eight acquisitions between 2002 and 2006 for a total value of $231 million.[111] Wipro built India's largest outsourced R&D business, leveraging its acquisitions of Ericsson India R&D in 2002 (value undisclosed) and NewLogic ($56 million) in 2005. R&D was the largest contributor to Wipro's Global IT Services revenues in FY07 accounting for 35% of revenues (followed by application development and management, 23%). Wipro derived 60% of its IT revenues from the Americas, 29% from Europe, 3% from Japan, and 8% from India and the rest of the world. Wipro was also the first Indian IT firm to establish software development operations in the Middle East.

In 2002, Wipro acquired Spectramind for ~$100 million staking an early position in ITES-BPO. The business, renamed Wipro BPO, was India's second largest third party BPO operation in 2005. While historically focused on voice services, Wipro BPO had aggressively moved into higher margin offerings and was in process of exiting the low margin outbound voice business. BPO accounted for 8% of Wipro's Global IT Services revenue in FY07 and the company had major growth plans for it.

Outsourced infrastructure management was also a strength for Wipro. According to one analyst, "While a TCS or an Infosys has an edge when a TOS (total outsourcing solution contract) emphasizes ADM (application development and maintenance), Wipro has an edge if it includes substantial proportion of IMS (infrastructure management services)."[112] Wipro credits its large position in the Indian domestic market for the development of services such as infrastructure management which the company initially offered to domestic clients before taking them international. In 2007, Wipro added to its infrastructure offerings with the $600 million acquisition of U.S. based Infocrossing.

Wipro's more diversified business mix also posed challenges for the company. Its net margins were the lowest among major Indian IT firms, partially due to the company's disproportionate presence in lower margin BPO segments. Wipro also had historically experienced higher employee attrition rates than its peers. It also depended on a higher proportion of experienced hires, without the level of internal training capacity of TCS and Infosys. While analysts praised Wipro's success in making strategic acquisitions, they also cautioned about integration challenges and the potential for acquisitions to mask the company's organic growth performance.

As of January 2007, Wipro was pursuing four strategic initiatives: (a) geographic expansion focused on Canada, Latin America, and Europe, (b) account management including creation of a "mega accounts" team as well as dedicated teams to quickly ramp up for large deals, (c) leveraging alliances via creation of a dedicated alliance management team targeted to achieve earn 10% of global

IT revenues from alliances by FY2010, and (d) transformational initiatives such as investing in innovation, leveraging the company's broad service portfolio and adopting the "Wipro Way."[113] The company's current marketing campaign was based on the tagline, "Applied Innovation".

Wipro's Chairman and CEO, Azim H. Premji, held 82% ownership in the company. That stake made him the 25th wealthiest person in the world on the Forbes 2006 list of billionaires. From 1999-2005, he was also the wealthiest Indian according to Forbes.

Cognizant Technology Solutions

Cognizant was based in Teaneck, NJ, but 75% of its employees were located in India, making it the fifth largest "Indian" IT Services firm. Cognizant's 2006 revenues were $1.4 billion and the company had 38,000 staff. The company's revenues had grown 61% in 2006, far outpacing the average of 40% growth recorded by its peers. Cognizant began operations in 1994 as the in-house information systems division of Dun & Bradstreet (D&B) and was later owned by IMS Health. It completed its IPO in 1998 and became an independent entity in 2002 when IMS Health divested its majority stake.

Cognizant differentiated itself on its superior ability to understand, interact with, and serve Western clients. This was reflected in Cognizant's economics in the fact the company has the highest average billing rate for *onsite* employees ($71.00 per hour versus $68.08 for Infosys and $66.11 for Wipro as of late 2005)[114] and in its faster growth rate. Analysts at Forrester Research indicated superior customer relationships were a key driver of Cognizant's ability to grow faster than its competitors. "Part of Cognizant's positioning is due to...the fact that it is easier for Western companies to do business with than any of the other top-tier vendors."[115] One of the source of this advantage was Cognizant's assignment of MBAs to customer accounts to deepen its understanding of customer needs from a business perspective. This practice reportedly resulted in high customer satisfaction driving faster revenue growth with existing clients.[116]

Cognizant's margins lagged those of its peers. Its 2006 operating margin was 18% versus 28% for Infosys and 25% for TCS. One factor depressing Cognizant's margins was its lower staff utilization. Cognizant may have required a larger staff reserve to facilitate its rapid growth. Margins were also depressed by Cognizant's lower percentage of offshore revenues. Cognizant's business was also less diversified than its major competitors. Cognizant derived virtually all of its revenues from application management and development in 2006 and 86% of its revenues from the United States.

IBM Global Services

Armork, NY based IBM Global Services, a division of International Business Machines Corporation, was the world's largest IT Services firm with 207,000 people,[117] $48.2 billion USD revenues in 2006, and 27.5% gross margin. IBM Global Services revenues were broken down into Global Technology Services, further divided into Strategic Outsourcing (35%), Integrated Technology Services (15%), Business Transformation Outsourcing (4%), and Maintenance (12%); and Global Business Services (33%), including consulting. Revenue growth in 2006 was 1.9%. Global Services contributed 53% of IBM's revenues and 37% of its pre-tax income. IBM's global R&D expenditure was $6.1 billion, [c] 6.7% of revenues.[118] IBM's strategy called for the company to offer the industry's most comprehensive innovation-driven portfolio of services to design, build, deploy, and manage IT.

According to Interbrand, IBM was the third most valuable brand in the world ($56.2 billion in 2006), trailing only Coca-Cola and Microsoft.[119] The old adage among IT managers was that "nobody

[c] Not limited to IBM Global Services; includes Hardware R&D and compared versus IBM total revenues of $91 billion USD

ever got fired for choosing IBM." IBM had deep industry expertise across a broad range of sectors and used that knowledge to sell the business value of its technology services to senior executives. IBM had a strong record of using consulting to sell follow-on technology implementation services. Critics, however, complained that IBM was expensive, inflexible, and locked customers in to IBM-proprietary technologies. While IBM was present in 170 countries, many smaller branches were operated by local partners hampering IBM's ability to deliver consistent services on a global basis.

IBM was under pressure from Wall Street to improve margins and accelerate growth. The company identified four "growth engines": (a) business performance transformation (consulting-type services drawing on capabilities from across IBM), (b) emerging geographies such as Brazil, Russia, India, and China, (c) new markets (retail on demand, sensors & actuators, and information-based medicine), and (d) acquisitions. Results from the first three quarters of 2007 indicated IBM's Services business was making progress toward accelerating growth and improving margins. Revenues were up slightly more than 10% and growth had accelerated in the third quarter. Gross margins rose from 29.7% to 29.9% in Global Technology Services and from 22.6% to 23.7% in Global Business Services.[120]

IBM was rapidly expanding in India, having grown its workforce there from 9000 people in 2004 to 53,000 in 2007. In 2006, IBM announced plans to invest $6 billion in India to pay for "increased resources including hiring and training, infrastructure costs (facilities, real estate, taxes), capital expenditures to support IBM and client requirements, and expansion of our software development in India." Per a Goldman Sachs analyst, IBM expected net savings of $300-400 million from "moving more of its services delivery and support to lower-cost countries and increasing integration between its various geographies."[121] IBM was also a major competitor India's domestic IT Services market.

IBM asserted, however, that its shift to global delivery was about much more than labor arbitrage. Bob Moffat, SVP of Integrated Operations, explained in a podcast, "IBM really does view this on a global sense, and it's how can we leverage our multi-national presence for operational advantages, getting the right skills at the right place at the right time, at the right cost, to really leverage the worldwide pools of labor that exist, right, to really be able to give a client value."[122] IBM was also adapting its internal organization for globally integrated operations. Its "human supply chain" concept was designed to ensure optimal utilization of scarce skills on a global basis, though there were indications of employee resistance to resulting travel and relocations.

According to a BusinessWeek article, IBM's investment in India was designed to head off Indian firms' growth in IBM's core outsourcing segment. "While Indians have had a huge impact on software programming services, they are just starting to make a mark on the strategic outsourcing business – which includes managing data centers. IBM hopes that by rapidly automating data center tasks and establishing superior service processes, it will be able to establish an insurmountable lead in this area." Larry Longseth, a VP at IBM's strategic outsourcing unit said, "We see that if we don't move quickly, the Indians will do to strategic outsourcing what they have done to applications development."[123]

Accenture

The Accenture name entered the marketplace in 2001 after its predecessor, Andersen Consulting split off from erstwhile accounting giant Arthur Andersen. Andersen Consulting was formed as an organizational unit in 1989 from the consulting practices of Arthur Andersen and its worldwide partner firms. The company's major service lines were Consulting, Technology, and Outsourcing.

In FY07, Accenture was the world's third-largest IT Services firm with revenues of $21.5 billion ($19.7 billion net of client reimbursements) and net income of $1.2 billion. It ended the year with 170,000 employees in 49 countries. Accenture was organized around 17 industry groups, aggregated

into five operating groups: Products (25% of revenues - including industrial and consumer products), Communications and High Tech (23%), Financial Services (22%), Resources (16% - including energy and chemicals), and Public Service (13% - formerly called Government). Geographically, Accenture's revenues came from: Europe, Mid-east, and Africa (48%), Americas (43%), and Asia-Pacific (9%).

In 2003, Accenture launched what the company termed its "High Performance Business Initiative" that became the centerpiece of the company's strategy and market positioning. Accenture would seek to differentiate itself from "technology-centric competitors" by providing an integrated suite of services designed to help companies achieve "high performance" along the dimensions deemed most important in their particular industries. Accenture announced in 2003 that this strategy would involve (a) growing the company's management consulting services, (b) extending the company's leadership in systems integration and technology services, and (c) accelerating the growth of its outsourcing services. Accenture also launched a global marketing campaign under the tagline, "High Performance. Delivered."[124] In 2007, CEO Bill Green summarized the strategy, "We believe we have a strong market differentiator in our ability to serve clients from idea, through design, implementation and operation to do it globally and across every industry."[125]

Accenture's heritage as part of Arthur Andersen and its strength in business consulting gave it a very strong network of senior executive relationships. The company's relationships with IT staffs, however, were sometimes more strained. Some described Accenture teams as primarily loyal to CEOs and business unit heads, at times adopting an adversarial stance against CIOs and IT staffs.

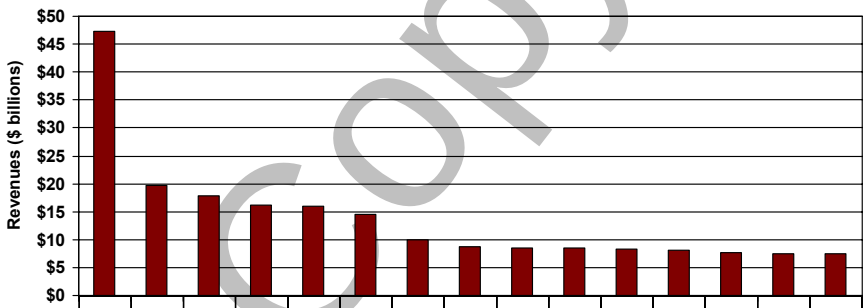
Accenture's "Horizon 2012" plan called for the company to reach $30 billion in revenues by 2012 and detailed 37 specific initiatives designed to reach that target. These initiatives include a major expansion of Accenture's global delivery capabilities. As of August 2007, Accenture had 71,000 "global delivery" employees including 35,000 in India and 11,000 in the Philippines. During the 2007, India overtook the United States to become Accenture's largest employee base. Accenture priced its offshore services very aggressively, sometimes below the rates offered by Indian competitors.

Exhibit 1. Worldwide IT Services Spend History and Forecast by Service (USD Millions)

		2004	2005	2006	2007	2008	2009	2010
Product Support	Hardware Maintenance & Support	83,629	86,715	88,787	91,292	93,625	96,420	99,592
	Software Support	45,693	49,285	52,680	56,502	60,466	64,901	69,907
Consulting & Systems Integration	Consulting	47,912	51,613	54,945	58,881	62,684	66,652	71,015
	Development and Integration	180,638	192,534	204,007	218,058	231,382	244,829	259,344
Core Outsourcing	IT Management	146,721	154,902	163,913	176,364	189,234	203,195	218,443
	Process Management (part of BPO)	85,451	93,744	99,808	107,625	116,162	125,953	137,268
TOTAL		*590,044*	*628,793*	*664,140*	*708,722*	*753,554*	*801,950*	*855,569*

Source: Gartner Dataquest, Market Statistics 2006 (November 2006)

Exhibit 2. Worldwide Top 15 IT Services Vendors by Revenue, 2005 (USD Million)



	IBM Global Services	EDS	Fujitsu	HP	Accenture	CSC	Lockheed Martin	Northrup Grumman	CapGemini	NEC	ADP	Hitachi	SAIC	NTT Data	T-Systems
Market Share (%)	7.5	3.1	2.8	2.6	2.5	2.3	1.6	1.4	1.4	1.4	1.3	1.2	1.2	1.2	1.2
Revenue Growth 2004-05 (%)	2.4	-0.5	0.2	4.6	13.1	6.1	10.1	4.7	15.0	0.8	10.6	3.0	22.0	3.2	1.6

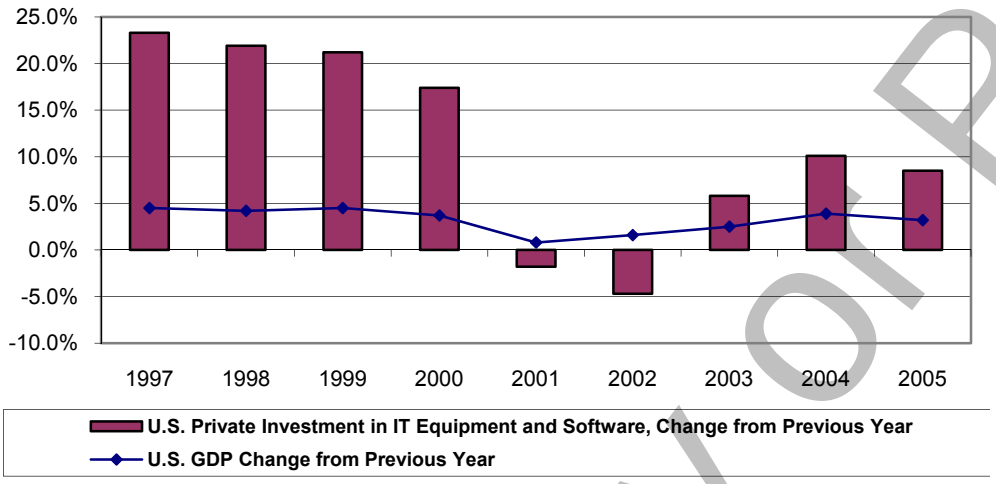
Source: Gartner Dataquest (August 2006)

Exhibit 3. Market Share by Service, 2005

Service	TCS	Infosys	IBM	Accenture
Consulting	0.5%	0.1%	6.3%	4.1%
Development and Integration	0.7%	0.6%	8.0%	4.2%
IT Management	0.1%	0.0%	13.1%	2.0%
Process Management	0.1%	0.1%	1.7%	2.5%
Software Support	1.1%	1.1%	3.4%	0.6%

Source: Gartner Dataquest (August 2006)

Exhibit 4. Growth of U.S. Private Investment in IT versus GDP Growth, 9-year History



Source: U.S. Bureau of Economic Analysis, cited in Computer Economics, "Ten-Year Trends in IT Spending and Outlook for 2007," January 2007.

Note: BEA statistics on IT investment include both capital investment and operational spending in the year the expenditure was made, regardless of how companies account for the spending

Exhibit 5. Vendor Selection Criteria (Historical Ranking)

	2000	2001	2002	2003	2004
Technical Expertise	1	1	1	1	-
Application Expertise	2	2	2	2	-
Business/industry Knowledge	8	5	5	6	3
Costs/Price	5	3	3	5	5
Ability to Work With Partners	4	4	4	8	5
Delivery Methods/Tools	5	5	7	9	NA
Reputation/Market Image	7	5	6	6	NA
Business Expertise	NA	NA	NA	NA	7
Willingness to Transfer Skills	NA	NA	NA	3	4
Compatible Corporate Culture	3	9	8	10	11
Number of Respondents	232	336	346	245	215

NA = not applicable
Notes: The survey in 2004 assumed technical expertise would still be No. 1.
Application expertise was omitted by error in the 2004 research.
2004 results have been normalized to match other years, accordingly.

Source: Laura McLellan, "Dataquest Insight: Selection Criteria for IT Professional Services Providers Are Less Variable than Provider Think", Gartner Dataquest, August 31, 2006.

Exhibit 6. Alignment of Contract Terms with Stage of Technology Life Cycle

Stage	Contract Terms	Pricing	Service Levels
Innovation	Short project, no cancellation penalty, fluid	Time and materials	Few, if any
Early Adoption	Implementation and rollout project, flexible contract	Fixed bid, pay at milestones, emphasis on speed	Tied to dates, deliverables
Dependence	Multiyear maintenance, enhancement, and support services	Predictable pricing; either per devices, per user, or fixed price per month	Robust service level agreements (SLAs), reliability, quality, and enhancement
Maturity	Standardized, leveraged services, utility or offshore delivery models, maintenance and support	Low-cost, usage-based pricing	Standard SLAs
Sunset	Support, risk avoidance services, multiyear with transition	Price based on need for specialists to support, maintain	Strong support and problem solution

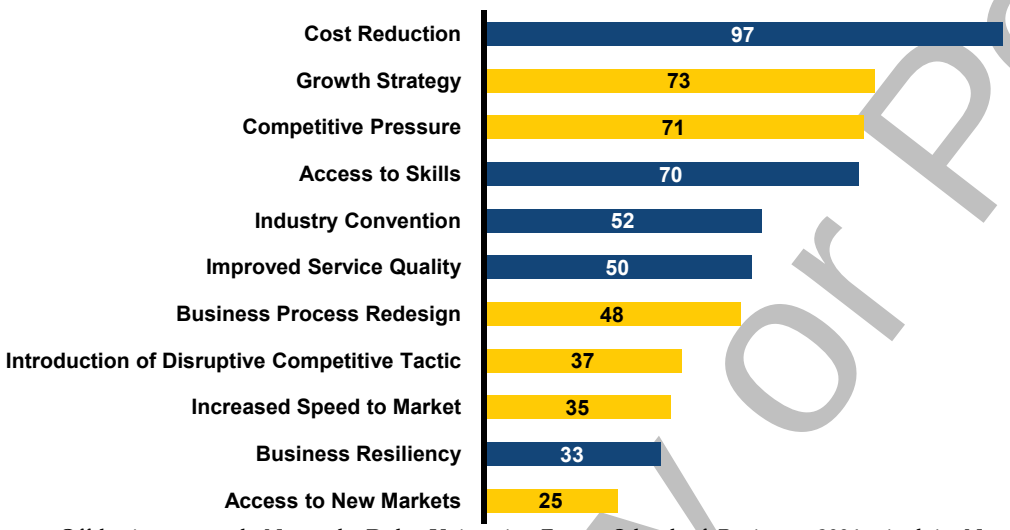
Source: Forrester Research (cited in Nasscom Strategic Review 2007, p. 45).

Exhibit 7. SWOT Analysis of Selected Global Offshore Locations

Country	Strengths	Weaknesses	Opportunities	Threats
India	* Huge skilled labor pool * Superior service maturity * Strong government support * Cost competitiveness	* Infrastructure * Bureaucracy	* Move up the value chain * Expand in countries other than the U.S.	* Emerging low cost nations * Unstable geopolitical situation * Rising Costs
China	* Very cost competitive * Large labor pool * Strong government support	* Low service maturity * Lack of English language proficiency * Negative perception of geopolitical risk	* Further penetration into Japanese market * Penetration into English-speaking countries * Non-voice BPO	* Increasing salary levels may dilute low-cost advantage
Poland	* Proximity to western Europe * EU membership * Compatible time zones * Cultural compatibility	* Lack of service maturity * Comparatively smaller labor pool	* Lucrative western European market	* Other CEE nations
Russia	* Low wage rates * Highly skilled ITO labor pool * Ability to carry out complex ITO projects	* Lack of project management skills * Unfavorable geopolitical situation	* High end niche markets * Technical non-voice BPO	* Brain drain * Government apathy
Mexico	* Proximity to U.S. * Large labor pool * Spanish language proficiency	* Lack of English language proficiency * Low maturity * Not very cost competitive	* Leverage near-shore opportunities with U.S. * Other Spanish speaking countries	* Other emerging Latin American countries
Hungary	* EU membership * Language and cultural compatibility	* Small labor pool * Low service maturity	* Penetration of western European markets, particularly France and Germany	* Other neighboring countries
Philippines	* Cost competitiveness * Excellent English language proficiency	* Low maturity for ITO * Labor pool not highly skilled in ITO * Unfavorable geopolitical situation * Lacks infrastructure	* Leverage existing relationships with BPO players to get ITO deals * Penetrate English speaking markets other than U.S.	* Emerging low cost nations (especially for non-voice projects)
South Africa	* Superior English language proficiency * Time zone compatibility with western Europe	* High wage rates * Education system incompatible with ITO * Low maturity	* UK market	* High cost structure

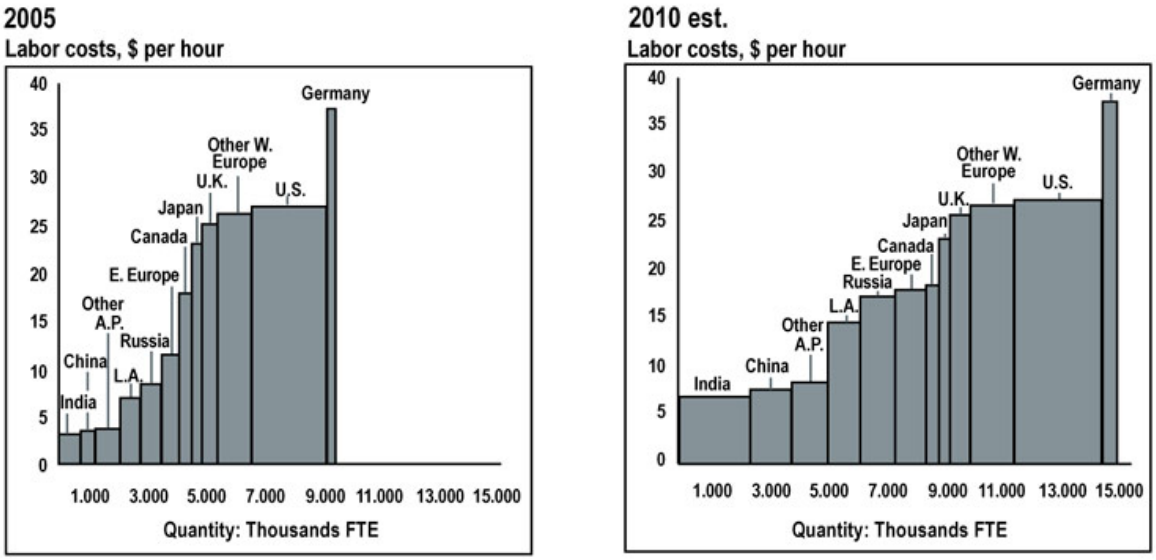
Source: neoIT (cited in IXIS Securities, "Software – IT Services," May 22, 2006)

Exhibit 8. Motivators of Offshoring and Outsourcing



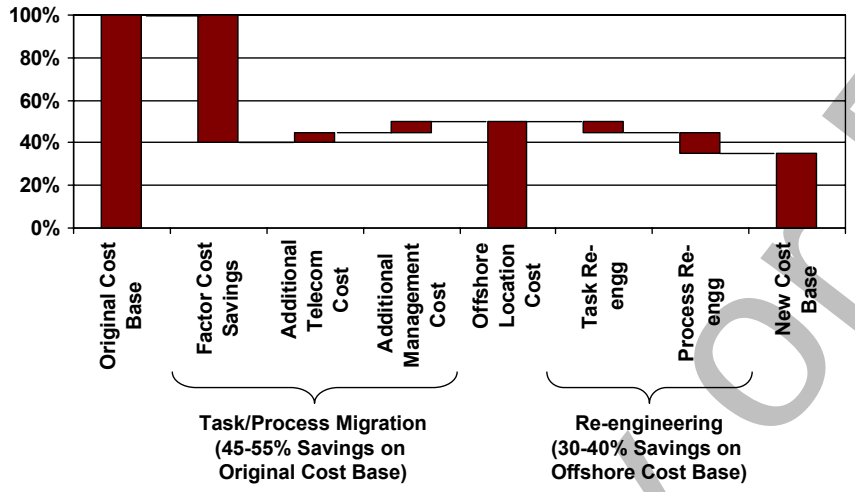
Source: Offshoring research Network; Duke University Fuqua School of Business; 2006, cited in Nasscom 2007 India Leadership Forum Key Observations

Exhibit 9. Evolution of Global Skilled Workforce (Hourly Labor Cost versus Thousands of FTEs)



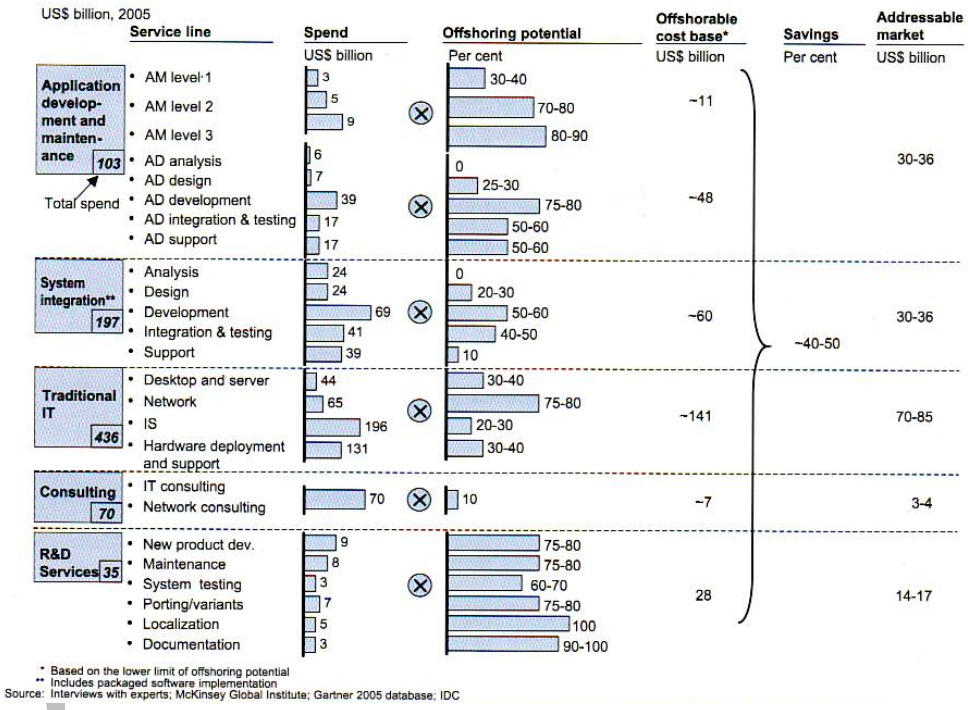
Source: IBM (based on IDC; MGI Labor Database; McKinsey analysis; IBM analysis)

Exhibit 10. Cost Comparison Onshore versus Offshore



Source: Nasscom (Nasscom Strategic Review 2007, p. 97) based on McKinsey Global Institute and Everest Research (2006)

Exhibit 11. Bottom-Up Assessment of Addressable Market for Offshore IT Services, 2005



Source: Nasscom-McKinsey Study 2005, p. 32.

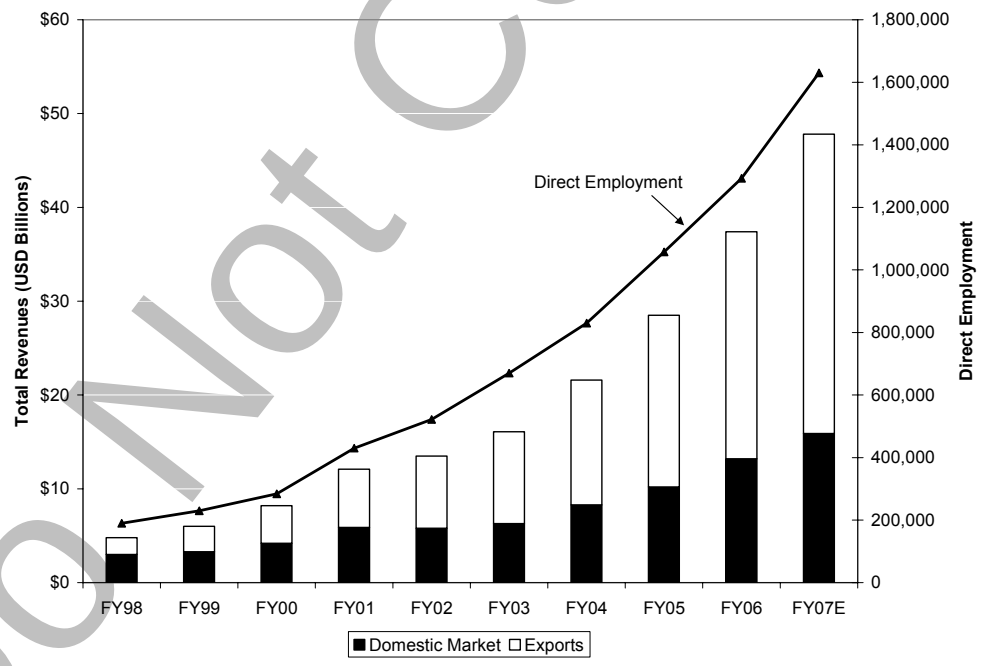
Exhibit 12. Projected 2008 Global Resourcing Employment Demand from IT Services Sector

Occupational categories	Sector employment, 2008	Max. global resourcing potential*	Max. low-wage demand, 2008*	Actual projected low-wage demand, 2008**
	FTEs, thousand	%	FTEs, thousand	FTEs, thousand
• **Professional staff**				
– Engineer, *YP*	1,454.8	56	813.1	187.5
– Engineer, *EXP*	1,430.0	47	665.0	153.3
– Analyst, *YP*	108.1	55	59.3	13.7
– Analyst, *EXP*	108.1	45	48.7	11.2
– Finance/Accounting, *YP*	115.7	28	32.4	7.5
– Finance/Accounting, *EXP*	105.4	24	24.9	5.7
– Generalist, *YP*	847.3	42	356.5	82.2
– Generalist, *EXP*	841.1	35	298.7	68.9
• **Management staff**				
– Engineer, *MM*	425.0	47	197.8	81.6
– Analyst, *MM*	33.8	50	16.9	7.0
– Finance/Accounting, *MM*	51.7	26	13.2	5.5
– Generalist, *MM*	374.0	42	156.0	64.4
– High-level manager	146.0	11	15.0	3.5
• **Support staff**	847.3	40	335.7	77.4

* Theoretical maximum not considering supply constraints or lower actual degree of adoption.
** Not considering potential supply constraints that would limit the clearing of the projected demand; incl. additional management overhead required at remote location.
Source: McKinsey Global Institute analysis

Source: McKinsey Global Institute, "The Emerging Global Labor Market: Part I – The Demand for Offshore Talent in Services", p. 179. (YP = Young Professional, EXP = Experienced, MM = Middle Manager)

Exhibit 13. Growth of Indian IT (including hardware, software, and services) and Related Business Services Industry



Source: Nasscom (Nasscom Strategic Review 2007, p. 54)

Exhibit 14. Indian IT Services Exports: Growth Trends in Key Service Categories (USD Billion)

	FY 2004	FY 2005	FY 2006
Project-oriented engagements	*4.04*	*5.58*	*7.71*
Custom application development	3.71	4.98	6.54
IT consulting	0.13	0.25	0.35
Systems integration	0.15	0.20	0.37
Network consulting and integration	0.05	0.15	0.17
Software Testing	-	-	0.28
Outsourcing engagements	*2.57*	*3.29*	*4.36*
Application management	2.27	2.69	1.59
IS Outsourcing	0.30	0.60	0.84
Others (SOA, Web Services, E-business/E-commerce)	-	-	*1.94*
Support and Training	*0.64*	*1.10*	*1.23*
TOTAL	**7.25**	**9.96**	**13.305**
* Includes network and desktop outsourcing (NDOS), hosting infrastructure services, infrastructure management services			

Source: Nasscom (Nasscom Strategic Review 2006, p. 60 and Nasscom Strategic Review 2007, p. 142)

Exhibit 15. Indian IT Sector: Knowledge Professionals Employed (excluding Hardware)

	1999-00	**2001-02**	**2002-03**	**2003-04**	**2004-05**	**2005-06**	**2006-07**
IT, Engineering and R&D, Software Products Exports	110,000	170,000	205,000	296,000	390,000	513,000	690,000
IT-enabled services Exports	42,000	106,000	180,000	216,000	316,000	415,000	553,000
Domestic sector	132,000	246,250	285,000	318,000	352,000	365,000	378,000
Total	**284,000**	**522,250**	**670,000**	**830,000**	**1,058,000**	**1,293,000**	**1,621,000**

Source: Nasscom (Nasscom Strategic Review 2006, p. 145, Nasscom Strategic Review 2007, p. 146, and Press Release date July, 2, 2007.)

Exhibit 16. Indian IT Services Sector: Median Pay (INR '000s)

Description	**Level**	**2003**	**2004**	**2005**	**2006**
Software Engineer	HA 1	267	290	322	376
Sr. Software Engineer	HA 2	424	439	491	560
Team Leader/Module Leader	HA 3	583	655	750	847
Project Leader	HA 4	850	935	1,004	1,216
Project Manager	HA 5	1,178	1,362	1,446	1,727
Programme Manager/Sr. Project Manager	HA 6	1,801	1,884	2,164	2,467
Head – Software Development/Large Business Unit	HA 7	2,670	2,740	2,912	3,404
Average Exchange Rate (INR/USD)		46.7	45.3	44.1	45.3

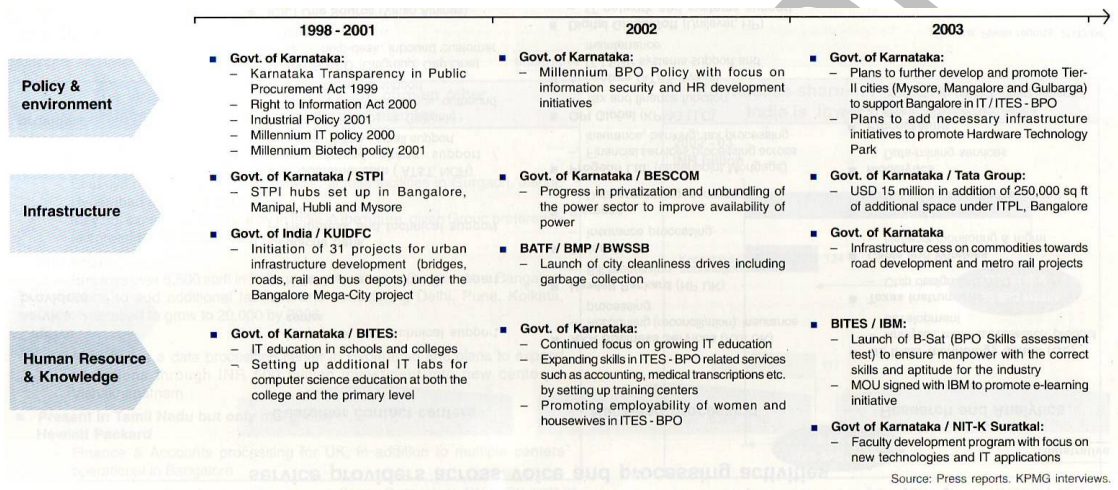
Source: Nasscom Hewitt Total Rewards Study (cited in Nasscom Strategic Review 2006, p. 150 and Nasscom Strategic Review 2007, p. 147)

Exhibit 17. Technical Wage Growth in United States

	1997	1998	1999	2000	2001	2002	2003	2004	2005
Computer Programmers	$20.43	$22.06	$22.29	$23.33	$24.31	$24.84	$28.90	$28.98	$30.89
Computer Systems Analysts and Scientists	$26.79	$27.89	$28.49	$29.26	$30.33	$32.86	$33.25	$35.12	$35.28

Source: U.S. Bureau of Labor Statistics (Department of Labor) National Compensation Survey

Exhibit 18. Karnataka State Government IT Initiatives, 1998-2003



Source: Nasscom – KPMG Study 2004: Choosing a Location for Offshore Operations in India

Exhibit 19. Standardized Financials, Accenture vs. TCS ($ millions unless otherwise noted)

	Accenture				*Tata Consultancy Services (TCS)*			
	2004	2005	2006	2007	2004	2005	2006	2007
Revenue	15,114	17,094	18,228	21,453	1,677	2,371	2,996	4,121
Cost of Services	10,497	12,002	13,234	15,411	929	1,353	1,663	2,303
SG&A	2,829	3,070	3,201	3,523	329	475	557	781
Operating Income	1,759	2,111	1,841	2,493	410	535	767	1,027
Net Income	691	941	973	1,243	370	474	652	914
Total Assets	8,013	8,957	9,418	10,747	801	1,233	1,921	3,006
Current Liabilities	4,394	4,931	5,816	6,963	382	384	532	735
Market Capitalization	24,471	21,753	24,487	31,262	10,152	15,708	20,991	27,663
Average Employees	91,500	111,500	131,500	155,000	30,121	37,918	56,097	77,950

Source: Standardized (Reuters) Financials accessed via OneSource in August and November 2007 and Employee Counts from Factiva. (Note: Accenture revenues are gross, including reimbursements)

Exhibit 20. Comparative Financial and Human Resources Metrics, last completed fiscal year

	TCS Year Ending Mar 07	**Infosys** Year Ending Mar 07	**Cognizant** Year Ending Dec 06	**IBM Global Services** Year Ending Dec 06	**Accenture** Year Ending Aug 07
Financials					
Revenue (in $B)	4.3	3.1	1.4	48.2	21.5
4-Year CAGR (%)	27	31	40	3	9
Gross Margin (%)	44.1	46.8	44.7	25.9	28.2
Operating Margin (%)	24.9	27.9	18.0	~10.5	11.6
SG&A/Sales (%)	19.0	14.7	24.1		16.4
Geographic Breakdown of Revenues[126]					
North America	52	63	86	43	43
Europe (including UK)	29	27	13	32	48
Asia, India, Rest of World	19	11	1	20	9
Onsite/Offshore Revenue Split (Q4 Only)					
Onsite Revenue (%)	56	50	60		
GDC/RDC Revenue (%)	4				
Offshore Revenue (%)	41	50	40		
Contract Type					
Time and Materials	59	73	75		
Fixed Price	41	27	25		
Human Resources					
Total Staff (Starting, 000s)	66	53	24	~190	140
Total Staff (Ending, 000s)	89	72	39	~207	170
Attrition Rate (%)	11	14	16		18
Utilization (w/ trainees, Q4) (%)	75	68	66		85
Employees w/0-3 Years Experience	49	59			

Source: TCS, Annual Reports, OneSource, Company Press Releases, Analyst Reports (Note: Accenture revenues are gross, including reimbursements; in company reporting margins are calculated based on net revenues. Accenture utilization rate is for full 2007 fiscal year and inclusion or exclusion of trainees is not specified.)

Endnotes

[1] Nasscom Press Release, "Indian IT Software and Services Revenues to reach U.S. $50bn mark by FY07-08", July, 2, 2007 and Nasscom 2007 IT Services Market Factsheet (February 2007). Total IT Services revenue estimate of $23.5 billion is based on sum of $18.0 billion export revenues (from July 2007 press release) and $5.5 billion estimated domestic IT Services, based on $8.2 billion total domestic IT and ITES revenues (from July 2007 press release) and estimated 66.6% ratio of IT Services to total domestic revenues (from February 2007 Fact Sheet). Final breakdown of domestic revenues was unavailable.

[2] Nasscom Strategic Review 2007, p. 125 and p. 142.

[3] Nasscom Press Release, "Indian IT Software and Services Revenues to reach U.S. $50bn mark by FY07-08", July, 2, 2007.

[4] CLSA Asia-Pacific Markets, "Chain Reactions: Indian IT's Impact on Economy, Consumption, and GDP", February, 2007, p. 5.

[5] Nasscom Strategic Review 2007, p. 5.

[6] Gartner Dataquest, Market Statistics 2006 (November 2006)

[7] Gartner Dataquest, Market Statistics 2006 (November 2006)

[8] Nasscom Strategic Review 2007, pp. 137-138.

[9] Gartner Dataquest (August 2006)

[10] Gartner Group. Market Focus: IT Services Gross Margins, Worldwide, 2004 (Executive Summary), August 31, 2004.

[11] Nasscom Strategic Review 2007, p. 35.

[12] Cowen and Company, "IBM: Services Need to Sail," November 6, 2006, p. 7.

[13] Computer Economics, "2008 IT Spending Outlook: Anemic Growth," November 2007.

[14] Computer Economics, "IT Spending, Staffing, & Technology Trends", 2006-2007, pp 1-1 to 1.6.

[15] Phillip Gollner, "U.S. Tech Spending Seen Decelerating in 2007" Reuters, May 18, 2007. http://www.reuters.com/article/ousiv/idUSN1735724820070519?pageNumber=1

[16] Laura McLellan. "Dataquest Insight: Selection Criteria for IT Professional Services Providers Are Less Variable than Provider Think", Gartner Dataquest, August 31, 2006.

[17] Nasscom Strategic Review 2007, pp. 44-47.

[18] http://www.sei.cmu.edu/cmmi/results.html

[19] Standish Group CHAOS report, cited by TCS internal documents

[20] Forrester Research Business Technographics, "United States Technology User Benchmark Study," March 2005, cited by TCS internal documents

[21] Gartner, "Availability: How Do Your Applications Services Stack Up?" SPA-12-8280, January 17, 2001, D. Scott, cited by TCS internal documents

[22] Pankaj Ghemawat, "The Indian Software Industry in 2002," p. 2.

[23] IXIS Securities, "Software - IT Services," May 22, 2006, p. 13 (citing neoIT Research)

[24] IXIS Securities, "Software - IT Services," May 22, 2006, p. 7.

[25] Nasscom Strategic Review 2006, p. 179.

[26] Chris Disher and Arie Lewin, "The Power Link between Innovation and the Globalization of Talent", Presentation to the International Association of Offshoring Professionals, pp. 9-11.

[27] Nasscom Strategic Review 2007, p. 127.

[28] Gartner, "Positions 2005: Global Sourcing and the Impact of New Delivery Models on IT Services," March 1, 2006, p. 3.

[29] McKinsey Global Institute, "The Emerging Global Labor Market: Part I – The Demand for Offshore Talent in Services", June 2005, pp. 156-160.

[30] McKinsey Global Institute, "The Emerging Global Labor Market: Part I – The Demand for Offshore Talent in Services", June 2005, pp. 179.

[31] McKinsey Global Institute, "The Emerging Global Labor Market: Part II – The Supply of Offshore Talent in Services", June 2005, pp. 23-27.

[32] CRA Taulbee Survey, cited in Computing Research News, May 2007.

[33] CRA Taulbee Survey, cited in Computing Research News, March 2007.

[34] UCLA HERI Survey of College Freshmen, cited in Computer Research News, May 2005.

[35] U.S. Department of Labor Bureau of Labor Statistics, Occupational Projections and Training Data, 2006-07 Edition

[36] InformationWeek, "Who Gets H1-B Visas? Check Out This List," May 17, 2007.

[37] Julia King, "Wal-Mart to Add 250 IT Jobs, Expand Online Presence," *ComputerWorld*, December 5, 2005.

[38] Pew Research Center, poll conducted between 3/10/2006 and 3/12/2006, sample size of 795 adults, accessed via National Journal Polltrack.

[39] Nasscom Strategic Review 2004, p. 88.

[40] Much of the historical description that follows is based on U. Srinivasa Rangan, "Report on the Software Industry of India"," 1995, pp. 43-54.

[41] Association for Computing Machinery, "Globalization and Offshoring of Software: A Report of the ACM Job Migration Task Force," 2006, p. 111.

[42] Pankaj Ghemawat, "The Indian Software Industry in 2002", Rev. May 24, 2003.

[43] Pankaj Ghemawat and Murali Patibandla, "India's Exports Since the Reforms: Three Analytic Industry Studies," in Jeffrey Sachs, Ashutosh Varshney and Nirupam Bajpai, eds., *India's Economic Reforms*, Oxford University Press, 1999, p. 204.

[44] *Ibid.*, p. 206.

[45] CLSA Asia Pacific Markets, "Chain Reactions: Indian IT's Impact on Economy, Consumption, and GDP, February 2007, p. 14.

[46] Motorola Press Release, "India R&D Drives Motorola," August 23, 2005.

[47] Dataquest, "Why 'India Inside' Spells Quality", October 27, 2003.

[48] TCS Internal Documents

[49] Nasscom Strategic Review 2007, pp. 82.

[50] Nasscom Strategic Review 2007, p. 81.

[51] Nasscom website: www.nasscom.org

[52] Nasscom Strategic Review 2006, p. 136-137. Disaggregated figures for FY 2006 were unavailable, but India's combined share of offshore IT and ITES was estimated to be 58% that year, according to Nasscom Strategic Review 2007 page 50.

[53] Nasscom Strategic Review 2007, p. 125 and p. 142.

[54] Nasscom Press Release, "Indian IT Software and Services Revenues to reach U.S. $50bn mark by FY07-08", July, 2, 2007.

[55] Nasscom Press Release, "Indian IT Software and Services Revenues to reach U.S. $50bn mark by FY07-08", July, 2, 2007.

[56] Nasscom Strategic Review 2007, p. 126 and p. 142.

[57] Nasscom Strategic Review 2007, p. 35 and p. 56.

[58] Nasscom Strategic Review 2007, p. 58.

[59] Nasscom Strategic Review 2007, p. 9 and p. 71.

[60] Nasscom IDC Study on Domestic Services Market Opportunity, August 2006, p. 11.

[61] Nasscom Strategic Review 2007, p. 9 and p. 71.

[62] Nasscom IDC Study on Domestic Services Market Opportunity, August 2006, p. 12 and p. 17.

[63] Nasscom IDC Study on Domestic Services Market Opportunity, August 2006, p. 23.

[64] Nasscom Strategic Review 2007, p. 78.

[65] Engardio, "India's Looming IT Labor Shortage," *BusinessWeek,* December 16, 2005.

[66] Nasscom Strategic Review 2006, p. 156, Nasscom Strategic Review p. 156, Nasscom Press Release July 2, 2007.

[67] Pete Engardio, "India's Looming IT Labor Shortage," *BusinessWeek,* December 16, 2005.

[68] Nasscom Strategic Review 2006, p. 147.

[69] Nasscom Strategic Review 2007, p. 147.

[70] Nasscom Strategic Review 2006, p. 181.

[71] Pui-Wing Tam and Jackie Range, "Second Thoughts: Some in Silicon Valley Begin to Sour on India", The Wall Street Journal, July 3, 2007, p. A1.

[72] The Financial Express, "IBM's Indian Rope Trick," June 10, 2006.

[73] Nasscom, "IT Industry Communiqué for the Academia", Volume 1: April-May-June, 2005.

[74] NIIT Annual Report, 2006-2007, p. 15.

[75] NIIT website

[76] Nasscom Website: http://www.nasscom.in/Nasscom/templates/NormalPage.aspx?id=6171

[77] The Hindu Business Line, "In India, Taxes Add 20-25% to the Cost of Computers," April 21, 2007.

[78] Nasscom Website: http://www.nasscom.in/Nasscom/templates/NormalPage.aspx?id=6171

[79] India Knowledge@Wharton, "India's Airlines Find the Fast Growth Has Its Ups and Downs," January 25, 2007

[80] Deloitte, "Emerging Giants Boost Hotel Performance Across Asia Pacific," October 25, 2006

[81] Anand Giridharadas, "Addressing a Shortage of Hotel Rooms, Not People," *The New York Times*, December 26, 2006.

[82] Nasscom-McKinsey Report, December 2005, p. 145.

[83] Nasscom Strategic Review 2007

[84] Cushman and Wakefield Asia, Commercial Market Snapshot June 2007.

[85] Cushman and Wakefield, "Across the Nation," First Quarter 2007.

[86] Economist Intelligence Unit, Country Report: India, June 2007.

[87] The Economist, "India's Economy: Waiting for the Monsoon," June 9, 2007

[88] FXHistory.com

[89] CIBC World Markets, "Infosys: Tech Bellweather Still Has Room for Above Market Growth," October 3, 2007.

[90] CIBC World Markets, "Cognizant: Unlocking the Secret Sauce," October 3, 2007.

[91] Global Competitiveness Report 2006-07, World Economic Forum, pp 242-243.

[92] CIA World Factbook, accessed July 6, 2007.

[93] Pankaj Ghemawat and Murali Patibandla, "India's Exports Since the Reforms: Three Analytic Industry Studies," in Jeffrey Sachs, Ashutosh Varshney and Nirupam Bajpai, eds., *India's Economic Reforms*, Oxford University Press, 1999

[94] Nasscom McKinsey Report 2005: Extending India's Leadership of the Global IT and BPO Industries, December 2005, p. 105.

[95] Nasscom-KPMG Study 2004, "Choosing a Location for Offshore Operations in India"

[96] Nasscom Strategic Review 2007, p. 126 and p. 142.

[97] World Trade Organization (WTO) Trade Profile: India, April 2007

[98] Reserve Bank of India

[99] CLSA Asia-Pacific Markets, "Chain Reactions: Indian IT's Impact on Economy, Consumption, and GDP", February 2007.

[100] CLSA Asia-Pacific Markets, "Chain Reactions: Indian IT's Impact on Economy, Consumption, and GDP", February 2007.

[101] CLSA Asia-Pacific Markets, "Chain Reactions: Indian IT's Impact on Economy, Consumption, and GDP", February 2007.

[102] Nasscom Strategic Review 2006, p. 52.

[103] Nasscom – McKinsey Report 2005: Extending India's Leadership in the Global IT and BPO Industries, December 2005, p. 46 and p. 191.

[104] Per U.S. GAAP financials (TCS reports in both U.S. and Indian GAAP)

[105] Deutsche Bank, "TCS: King of he Hill", January 25, 2005.

[106] Citigroup, "Infosys Technologies: Buy: Disappointing Quarter; Strong Outlook", April 13, 2007.

[107] Venkatasha Babu, "The Race to $10 Billion: Who Will Get There Firs: TCS, Infosys, or Wipro?," *Business Today*, May 21, 2006.

[108] Infosys Annual Report FY 2006, p. 145.

[109] The Economic Times, "Infy: Progeon may shed its BPO name", April 12, 2006.

[110] OneSource Global Business Browser

[111] Venkatasha Babu, "The Race to $10 Billion" in *Business Today*, May 21, 2006, p. 87

[112] Venkatasha Babu, "The Race to $10 Billion" in *Business Today*, May 21, 2006, p. 87.

[113] U.S. Investor Meet January 2007.

[114] Santoriello, Julie, "Cognizant Technology Solutions: Raising Price Target on Favorable Margin Outlook; Strong Outlook for 2006", *Morgan Stanley*, February 9, 2006.

[115] Moore, Stephanie, "Cognizant's Secret Sauce: Best Practices in Getting to Know your Customer," *Forrester Research*, July 27, 2005.

[116] Ibid.

[117] Estimate

[118] IBM Annual Report 2006

[119] BusinessWeek Online, "The 100 Top Brands 2006"

[120] IBM Q3 2007 Earnings Release, October 16, 2007.

[121] The Financial Express, "IBM's Indian Rope Trick," June 10, 2006.

[122] IBM Investor Forum Webcast: Global Delivery, June 5, 2006.

[123] Steve Hamm, "IBM Wakes up to India's Skills," *Business Week Online,* June 5, 2006

[124] Accenture Annual Report, 2003.

[125] Accenture Analysts' Conference Call Q3 2007, June 28, 2007.

[126] IBM geographic breakdown is corporate data for all of IBM from Q3 2006, not only Global Services segment; in Accenture geographic breakdown revenues shown under North America include Latin America and revenues shown under Europe include Middle East and Africa.