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TATA CONSULTANCY SERVICES: GLOBALIZATION OF IT SERVICES

Our business philosophy is based on our desire to make our customers feel that they are being serviced by a local organization.

— S. Mahalingam, Chief Financial Officer, Tata Consultancy Services

The shift of North American technology jobs to low-wage countries like India cannot be stopped because not only are Indian companies a third of the cost, but they actually are better.

— Pradeep Sood, President of Indo-Canada Chamber of Commerce

In February of 2008, as S. Mahalingam (Maha), the CFO of Tata Consultancy Services (**Exhibit 1**) was making his rounds briefing investors worldwide, he stopped by Stanford University to visit his son's alma mater and talk about the strategic challenges facing TCS. He described high-quality challenges faced only by the elite segment of IT services companies. In a 10-year period, TCS had become a major force in the IT services market, competing head-on with such iconic industry leaders as IBM Global Services, Computer Sciences Corporation, Accenture, KPMG, and others. The key issue was how to maintain a breathtaking annual growth rate of 35 to 40 percent without sacrificing 25 to 30 percent margins. "By 2010 we want to become a \$10 billion-a-year company producing 25 percent margins," said Maha in a modest, but confident manner.

The company's strategy and positioning, combined with excellent execution and a fair number of macro factors breaking its way, had placed it front and center in the leadership competition for global IT services. Since the early 1990s, TCS had grown faster, made more money, created a better brand and reputation, and invested more heavily (as a percentage of revenues) in its future than its Indian or international competitors. The question on Maha's mind was whether TCS had the right strategy to continue to outmaneuver its competitors as it aimed to become the first Indian technology company to join the \$10B revenue club.

Gary C. Mekikian prepared this case under the supervision of Professor John D. Roberts as the basis for class discussion rather than to illustrate either effective or ineffective handling of an administrative situation.

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INDIA'S IT SERVICES INDUSTRY

Indian Economy

When India won its independence from the British Empire in 1947, Mahatma Gandhi and Jawaharlal Nehru inherited a country of 430 million people with a scant 11 percent literacy rate, and a complete lack of infrastructure. They also inherited the world's largest democracy, with a system of government based on English common law, the English language as the main vehicle for political, national, and commercial communications, and a rich history and tradition of scientific progress and invention. The tradition of computing innovation in India goes back to 100 B.C., when an Indian mathematician by the name of Pingala, in his work *Chandas Shastra*, described the first binary representation of numbers,¹ which in the seventeenth century was rediscovered by German mathematician Leibniz, and later perfected by George Boole to Boolean Algebra—a computation system on which all modern computers are based.

As India struggled to find her political and economic footing over the next 41 years, information technology was proliferating and fueling the growth of Western economies. By 1991, when Prime Minister P.V. Narasimha Rao took office, Western economies (and defenses) were completely dependent on complex information systems, and the subsequent technological revolutions would increase the demand for software engineers at rates far exceeding the capacity of Western universities to produce them.

Prime Minister Rao's promised reforms, including devaluation and partial convertibility of the rupee, relaxation of rules for foreign investment and new business formation, as well as reduction of tariffs, coincided with a confluence of economic and technical events in the West that ignited the Indian economy. India entered the 1980s with a population of 687 million generating \$437 billion (in \$ at PPP) in gross domestic product,² and by the 1990s its GDP had ballooned to \$1.2 trillion, while the total population neared 850 million people. By the time the Internet bubble burst in 2001, India's 1 billion people were producing over \$2.6 trillion in GDP. In 2003, Goldman Sachs predicted that India's GDP would be larger than Japan's by 2032, would surpass Italy in 2015, France in 2020, and Germany in 2025,³ all this assuming a little over 5 percent growth rate throughout this period. In 2007, India reached a GDP of \$4.77 trillion after growing at rates of 8 percent (2003, 2004) and 9 percent (2005, 2006) and Indian business publications predicted that India's economy could continue growing at these rates without accelerating inflation.

India's IT Services Market

From 1960 to 1990, given the prohibitive cost of computer hardware and software, only universities, the government of India, and select conglomerates like Tata and Reliance could afford to spend money on information technology. To meet their internal computing needs, these

¹ B. van Nooten, "Binary Numbers in Indian Antiquity," in T. R. N. Rao and Subhash Kak, eds. *Computing Science in Ancient India*, pp. 21-39.

² "EIU CountryData – India," Economist Intelligence Unit, 2006.

³ Dominic Wilson and Roopa Purushothaman, "Global Economics Paper No. 99," October 1, 2003.

large organizations employed their own software engineers to develop custom software for IBM, Digital Equipment Corporation, Burroughs, and a few other mainframe makers who were able to import computers into India. Ill-conceived government policies and U.S. export restrictions during this time stifled adoption of information technology domestically, and prevented the development of IT-related exports. In 1991, when Prime Minister Rao started liberalizing the economy, India's domestic market for software stood at \$115 million, or 0.075 percent of the worldwide market. By 2005, the software and IT services market in India had grown to \$3.5 billion, and closed the year in 2007 at \$5.5 billion, a respectable 0.32⁴ percent of the total worldwide market (**Exhibit 2**).

A number of legal and geopolitical changes in the early 1990s unshackled the domestic market and set the stage for sustained growth that continued unabated in 2008. First, in 1992, amendments offered to Parliament strengthened India's Copyright Act of 1957 to protect software from hitherto rampant piracy. Second, the liberalization of the economy and changes in Foreign Direct Investment (FDI) rules increased FDI from next to nothing in 1990, to \$4.7 billion⁵ in 2003, although the total amount had been uneven from year to year. Finally, record numbers of Indian engineering and science student enrollments in American and European universities in the early 1990s set the stage for a disproportionate representation of Indian migrant entrepreneurs during the Internet bubble. These events, combined with the abundance of inexpensive and competent technical resources, lured hundreds of multinational companies and entrepreneurs of Indian origin to set up operations in India, bringing with them Western business practices and corresponding reliance on sophisticated information technology. As a proportion of national GDP, the Indian technology sector's revenues grew from 1.2 percent in 1998 to an estimated 5.5 percent in 2008.⁶ Industry observers predicted that the domestic IT services and software markets would continue to grow to \$11.7 billion in 2008.⁷

India's IT Enabling Infrastructure

Software engineering is fundamentally knowledge work, with computer scientists and programmers as the "raw materials." The seeds of India's rise in this area of the knowledge economy were sown in the early 1950s, with the establishment of the first Indian Institute of Technology (IIT) in Hijli, Kharagpur, in the eastern part of India. The institute, modeled after the Massachusetts Institute of Technology in the U.S., opened five other campuses through 1994 (Mumbai, Chennai, Kanpur, Delhi, and Guwahati) and in 2001, conferred IIT status to University of Roorkee, India's oldest engineering college. With acceptance rates of 1-2 percent of applicants, IITs quickly attracted the best and the brightest technical minds in the country, helping the institute establish itself among the elite technical universities in the world. Today, IITs and other Indian technical schools produce in excess of 103,000⁸ English-speaking

⁴ NASSCOM estimated that the worldwide technology products and related services sector spend was USD 1.7 trillion in 2007. NASSCOM Factsheet from the NASSCOM Strategic Review 2008, http://www.nasscom.in/upload/5216/Strategic_Review_Feb2008.doc (March 18, 2008).

⁵ Carl Dahlman and Anuja Utz, "India and the Knowledge Economy: Leveraging Strengths and Opportunities," World Bank, 2005.

⁶ NASSCOM, loc. cit.

⁷ NASSCOM, loc. cit.

⁸ "National Association of Software and Service Companies (2005)," 2005 Strategic Review, Ch. 6: Sustaining the India Advantage. NASSCOM, p.158.

computer science graduates, exceeding the number graduating from U.S. universities by at least 20,000 per year.

The Rise of India's IT Firms

For a few years in the mid-1990s, TCS and other leading IT consultancies, and especially Indian firms, held the combination keys to the time bomb that many scientists and politicians feared would unleash Armageddon on the Western world. This time bomb was commonly known as the Y2K, or Year 2000 problem, which afflicted almost all computer code developed for mainframe computers since the 1960s. As the twentieth century came to a close, the Y2K problem threatened to bring multi-trillion dollar Western economies to a halt, shut down computerized defense systems in North America and Europe, leave nuclear power plants without control systems, and imperil key public health and transport systems.

At this time, the provision of IT services was the exclusive domain of large Western technology companies and accounting firms with consulting arms, but Indian companies were being invited to help governments and large multinationals alike to resolve the Y2K problem in their software before time ran out. Chief Information Officers (CIOs) who would once talk only to their trusted suppliers like IBM, Andersen Consulting (also known as Accenture) and the like found themselves shipping millions of lines of proprietary software code to India to have the time bombs diffused in Indian Y2K factories. Even prestigious companies like Accenture were subcontracting Y2K work to Indian companies. As the race against time gathered steam, Indian IT consulting firms were there with the right tools, resources, and market position to take advantage of the opportunities. It is now common knowledge that Indian firms played a large part in facilitating humankind's technological transition from the second to the third millennium without major disruptions.

In the late 1990s, as Y2K concerns subsided, companies turned their attention and resources to the burgeoning Internet revolution sweeping first the consumer world, then the business world. Once again, the developed world could not mobilize enough software engineers to help companies project their computing resources over the Internet, as demanded by their customers and stakeholders alike. And, once again, Indian software houses were called on to Internet-enable the software applications they had just remedied, and they arrived with deep pools of software engineers to take advantage of the tremendous upsurge in demand for IT services.

As the Internet bubble inflated out of control, the stock markets reached dizzying heights on expectations of ever increasing earnings. Companies, in some cases (such as Enron), went to criminal lengths to boost their numbers and increase the value of their stock options. In 2001, as the stock market came crashing down, companies started draconian cost-cutting measures, and Congress started investigating accounting firms and top company executives for their role in the stock market "pump-and-dump" practices. Companies looked to offshore or outsource non-strategic, IT-enabled, back-office operations. Once again, TCS was there with the right strategy to supply huge portions of the Business Process Outsourcing (BPO) demand.

In 2002, in response to the widespread accounting irregularities of the late 1990s, the U.S. Congress passed legislation (Sarbanes-Oxley or SOX Act Section 201), which effectively made it illegal for external audit firms to sell consulting services to their clients, including IT consulting services. Starting in the early 1990s, first Arthur Andersen, and then other accounting firms had set up separate divisions to deliver consulting services. SOX Section 201 required the companies to go one step further and divest their consulting divisions altogether. While SOX seems arcane to the casual observer, it significantly altered the way IT services were sold. Western accounting firms had had exclusive access to Global 2000 chief financial officers, and chief information officers traditionally reported to the CFOs. This reporting relationship created opportunities for the IT services arms of accounting firms to lock in lucrative IT services contracts, even as their accountants acted as external auditors and arbiters of their client's compliance with FASB⁹ rules.

TATA CONSULTANCY SERVICES (TCS)

House of Tata

Jamsetji Nusserwanji Tata is widely loved and recognized by Indians as the father of the modern Indian economy; a man who set out to create businesses not merely to enrich himself, but to build wealth for his beloved country. Born in 1839, in the sleepy town of Navsari in Gujarat, to a respected family of Parsee priests, Jamsetji was the first in his family to dedicate himself to the study and practice of business. His early liberal studies at Elphinstone College in Bombay, subsequent apprenticeship in his father's small merchant and banking firm, and spiritual values endowed by his priestly lineage, provided the perfect launching pad for Jamsetji's keen intellect and burning desire to succeed. His dreams took flight in 1868, when he set up a private trading company, which became the foundation of the Tata Group. A few years later, in 1874, he set up Central India Spinning, Weaving, and Manufacturing Company, entering the highly competitive textiles industry, and setting the stage for Tata Group to start and grow Indian businesses in fields that were fueling the fires of the industrial revolution in the west. After Jasmsetji's passing in 1904, his sons, Sir Dorab Tata and Sir Ratan Tata, and later generations of Tatas, presided over Tata Group's entries into such diverse industries as luxury hotels, electricity, steel, consumer goods, airlines, chemicals, automotive, cosmetics, tea, technology, engineering, communications, and others.

By 2007, the Tata Group was one of India's largest and most respected business conglomerates, with revenues in 2005-06 of \$21.9 billion (Rs 967,229 million), the equivalent of about 2.8 per cent of the country's GDP, and a market capitalization of \$57.6 billion. Tata companies together employed some 246,000 people. The group's 28 publicly listed enterprises—among them stand-out names such as Tata Steel, Tata Consultancy Services, Tata Motors and Tata Tea—had a combined market capitalization that was the highest among Indian business houses in the private sector, and a shareholder base of over 2 million. The Tata Group had operations in more than 54 countries across six continents, and its companies exported products and services to 120 nations.

⁹ Financial Accounting Standards Board. The mission of the Financial Accounting Standards Board is to establish and improve standards of financial accounting and reporting for the guidance and education of the public, including issuers, auditors, and users of financial information.

TCS before 1990¹⁰

TCS was formed in 1968 as a management consulting company by bringing together 20 senior executives from various Tata businesses. Their mission was to dispense business consulting to the Tata group of companies, and this heritage went on to guide the development of TCS into a world-class IT consultancy. Meanwhile, TCS quickly moved into information systems development by automating Tata Enterprises' payroll and financial systems. TCS also entered the service bureau business by using four IBM mainframe computers to deliver bulk data processing for businesses and government. Thus, from its inception, TCS had to develop models for management consulting, information systems design and development, and outsourced IT services. TCS' only competition at this time were data centers established by IBM, but this competition would only last until 1977 when IBM decided to exit India, rather than conform to a new law restricting foreign investors to a minority interest in Indian operations. TCS quickly gained business through word-of-mouth and generated a small profit in its first year (**Exhibit 3**). However, its growth was constrained by government control of equipment purchases.

The Burroughs Alliance

In the early 1970s, TCS signed an agreement with Burroughs, a large U.S. hardware manufacturer, to act as its exclusive marketing agent in India. In the end, the alliance proved to be more beneficial in generating software sales than hardware sales. TCS imported and sold the first Burroughs computer in 1974 but, because of import restrictions, sold only six more machines before 1978. During this time, TCS purchased its own machine to learn software programming on the Burroughs technology. Burroughs referred many domestic software projects to TCS and was the source of TCS' first software services export when in 1974, TCS sent programmers to the U.S. to develop a system for the Detroit Police. This early export activity allowed TCS to fulfill foreign exchange requirements to buy more Burroughs equipment. While Burroughs provided most of TCS' export business during the next few years, domestically TCS received 80 percent of its external revenues from bureau services, mainly for the government. Growth in private sector software sales in the 1970s was slow due to the inaccessibility of hardware to Indian firms.

TCS's first domestic competition emerged in 1975 from Datamatics, a software services firm formed by ex-TCS employees. TCS' second competitor came from within Tata Enterprises itself. In 1978, Burroughs approached TCS to form a joint venture to manufacture its computers in India. Wanting to remain hardware-independent, TCS declined the offer. In its place, Tata Burroughs Ltd. was formed as a separate company within Tata Enterprises. Tata Burroughs Ltd. later became Tata Unisys Ltd. When Burroughs later merged with Sperry to become Unisys Ltd., the company not only manufactured hardware but also sold software services, placing it in direct competition with TCS.

Although initially difficult, the break with Burroughs proved to be fortuitous in the long term. Ramadorai, then executive vice president of TCS commented: "When we gave up Burroughs, the pressure was on to build the business. Our strength was our line-of-business experience, our ability to learn quickly, and our confidence." TCS management decided it must gain experience

¹⁰ Source: This section is adapted from Dheer, Viard, and Roberts, 1995, "Tata Consultancy Services: Globalization of Software Services," Graduate School of Business, Stanford University, Case SM-18.

working on IBM machines because its Burroughs business would begin to decline. In addition, the break forced TCS to focus on selling its own services outside India rather than relying on Burroughs, from which all its overseas work had previously originated.

Competing with Western Consultancies

In 1979, TCS posted a representative in Tata Enterprise's New York office to begin marketing its services in the U.S.—the largest market for IT services (**Exhibit 4**). In its marketing, TCS focused on sending consultants to selected jobs where they could be exposed to new technologies and then brought home to teach others, an approach TCS management referred to as “bootstrapping” and continued to apply in the 1990s.

By the time TCS arrived on the shores of the U.S. and Europe, the Western economies had amassed immense portfolios of custom software applications that languished on antiquated computers. As enterprises purchased new and faster computers, the need to migrate existing software from old platforms to new platforms went largely unmet. TCS quickly decided to invest in software migration and project management technologies that would automate substantial segments of software migration projects.

Since technology could not fully automate the migration process, TCS relied on its four-to-one labor cost advantage to provide further savings to its target markets. TCS' message stood out in the market and helped it win its initial customers. Before TCS, large enterprises contemplating new systems had two options: build a custom application, or buy an application off-the-shelf that closely approximated its requirements, and spend a vast amount to customize it. TCS introduced a third alternative: migrate an existing application that had 90 percent of the functionality that the enterprise needed, and add the other 10 percent after migration. This alternative was often significantly less expensive and risky.

Software Migration Factory

Developing custom applications or implementing software packages required collocating consultants with customers for extended periods of time. Software migration did not have such a requirement. Since the legacy software encodes the customer's existing business process, collocation was only required during the last phase of the project, which entailed enhancing the functionality of the software to meet new or additional requirements. The diagram in **Exhibit 5** shows the process for migration projects.

The following are the major process steps for migration:

1. Legacy source code and sample test data set are produced and copied on to magnetic (and later digital) tapes and shipped to TCS' Indian offices.
2. Compiler class tools are used to automatically read and “translate” legacy source code from an archaic programming language to a more modern programming language, which is then compiled and run on the target, modern computer and operating system.
3. Testing tools and manual intervention are used to compare the functionality of the ported software to the legacy software. Since the systems are supposed to have identical functionality, the ported software is normally tested with little or no customer interaction.
4. Pre-existing and newly introduced software bugs are identified, corrected, and documented.

5. The ported software is delivered back to the customer and “acceptance testing” is conducted at the customer site.
6. Upon acceptance of ported software, Waterfall or Spiral software development methods are used to design and develop enhancements to the software.

Note that only steps 5 and 6 required TCS engineers to be collocated with their customers. In the early 1980s, TCS made significant investments developing automation tools in collaboration with leading U.S. and Canadian universities. Further, its engineers received extensive specialized training in the use of its growing portfolio of proprietary tools.

TCS began its foray into world markets with a project at a U.S. bank consortium to migrate its software from Burroughs to IBM hardware, beginning what would become a substantial migration business. By the mid-1980s, migration services accounted for a large portion of TCS’ international revenues. As TCS delivered more and larger migration projects, Western customers took notice of the firm’s custom software development capabilities, as well as its abilities in performing complex systems integration and packaged application implementation.

In the 1980s, TCS expanded its service line both domestically and internationally to achieve rapid growth (**Exhibit 3**). Domestically, economic reforms had lowered the price of computing power, even though the landed cost of hardware remained as high as three times its cost outside India. With the drop in prices, more Indian firms were able to purchase their own hardware, reducing their reliance on service bureaus but increasing their need for new software. As a result, TCS moved away from bureau services toward providing software development services and packaged application software. In a series of strategic moves, TCS released a business and project management product and its popular EX financial package, both for personal computers. It also released a Computer Aided Software Engineering (CASE) package, which had limited market appeal because it ran on mainframes. By the late 1980s, bureau services had decreased to 20 percent of TCS’ domestic revenues, while software development and application packages reached 42 percent and 38 percent respectively. As TCS gained experience in all aspects of IT services, it evolved into a full-service provider, assuming total project management responsibilities. To support this increased growth, TCS widened its recruiting to include REC (Regional Engineering College) graduates and non-engineering majors. In the late 1980s, TCS opened up more locations in India for visibility and increased service.

Internationally, the nature of TCS’ services was also changing. With the deployment of IT technology occurring much faster outside India, the nature of TCS’ domestic and international projects began diverging in the late 1980s. International projects required knowledge of the most recent technologies and familiarity with applying systems strategically rather than to automate existing operations. However, TCS management still emphasized the importance of domestic work in supporting its international efforts. Mr. Sahni, senior vice president of TCS, said, “A domestic base is important for learning and experimentation. Domestic experience gave us project management skills, which allowed us to move away from ‘body-shopping.’¹¹” Domestic work also provided TCS with specific technical skills. For example, a domestic communications software package called “C-Dot” led to international work in communications. A wide-area net-

¹¹ Consultancies in which non-U.S. nationals hired skilled professionals in their own countries and imported them to the U.S. under the H-1B classification for two- to three-year assignments at consultancies or companies.

work constructed for India's defense laboratories led to network projects with Motorola, AT&T, and Philips. Even maintaining its own hardware gave TCS skills to produce systems software for hardware vendors.

TCS also began delivering more of its international services in an offshore mode (**Exhibit 6**). With advances in telecommunications and refinements in its procedure for partitioning work, TCS began performing more of its foreign projects in its Indian facilities. A relentless focus on process and automation resulted in TCS becoming the leading Indian firm in developing methodologies and tools, and reduced the amount of work performed on-site in a given foreign project from an average of 80 percent in the early 1980s to as little as 60 percent in the early 1990s.

By 1992, TCS' strategy of entering the largest IT services market, the U.S., had paid off, as it led the Indian IT firms in both software production and export volume to the U.S. and Europe (**Exhibits 7, 8, and 9**). Building on its successes, TCS developed and implemented an aggressive plan for international expansion beyond the U.S. and Europe. The plan included hiring top talent from the India Institute of Technology and India Institute of Management campuses, and training them in technology and languages, especially in German, Japanese, and French. At any given time, approximately 20 percent of TCS' personnel were on-site overseas, 25 percent were offshore (in India working on foreign projects), 25 percent were on domestic projects, and 30 percent were in training or research.

TCS faced several human resources challenges in positioning itself as a global firm. First, its exponential growth in people was straining its ability to continue providing general and specialized extensive training. Second, TCS had historically emphasized technical excellence, hiring 70 percent of its recruits from engineering backgrounds and tailoring its incentive systems to achieving technical proficiency. This made it difficult to penetrate major markets like the U.S. where TCS was less established and significant business and marketing skills were key to competing with western consultancies. Sahni commented: "Marketing is still our weakest area. Our focus has been on technical excellence and those people are at the top [of the organization]. Our reward systems are geared toward technical excellence."

TCS Answers the Client-Server Call: 1990 to 1995

The focus on technical excellence was about to propel TCS into the domain of large, multi-national IT services competitors, with the signing of a multi-year, multi-million dollar contract with SEGA/Inter settle, a Zurich-based organization owned by Swiss banks. In 1991, TCS assumed full project management responsibility to automate both domestic and international clearing and settlement of securities traded on the Swiss stock exchange. Anderson Consulting was the incumbent and dominated IT projects in the banking industry, but SEGA/Inter settle could not ignore the significant cost differential, especially when evaluated against the backdrop of technical excellence that TCS was known for. It was also during this period that IBM's grip on corporate computing unraveled almost overnight, leaving CIOs the world over wondering how to best migrate their expensive software assets from IBM mainframes to less expensive and flexible personal computers (as client devices) and Unix computers (as server devices). TCS, with its new focus on project work and armed with a state-of-the-art software migration factory, kicked into high gear to take advantage of the sea-change in both technology and new business

strategies that required computing resources to be distributed closer to the users' own locations. From 1990 to 1995, TCS increased its revenues from \$38 million to \$90 million, while delivering an operating profit of \$25 million; its work force more than doubled to 5,000 people during the same period.

Throughout the 1980s and 1990s, TCS faced challenges in its expanding recruitment from the ongoing "brain drain" from India's technological institutes, particularly the IITs, to the United States. While Silicon Valley was benefiting from the entrepreneurialism of Indian engineers and computer scientists selected at the highest end of the talent pool,¹² TCS and other India-based firms expanded their recruiting from computer science to other engineering disciplines. They reached out beyond the IITs to the Birla Institutes of Technology and the regional engineering colleges, whose graduates, it was perceived, were more likely to stay in India. Ironically, the added jobs for engineers implied by the brain drain at the top to U.S.-based firms and universities may have encouraged more students to enter engineering colleges in India, resulting in 'deepening' of India's pool of IT workers over time.¹³

Yet, scarcity of top talent remained. In common with other top Indian IT firms, TCS faced the problem of their junior hires being perceived as well-selected and well-trained, and thus good targets for poaching by other, often smaller, firms. Indian IT firms faced yearly attrition rates of above 20 percent and increasing wage bills, as firms bid for talent.¹⁴

TCS Addresses the Year 2000 Problem

As TCS was ramping up to take advantage of the client-server revolution, CIOs, under pressure from their boards and tight, local IT labor markets, started talking to TCS (and other Indian firms) about providing Year 2000 remedial services. By the time the western economies realized the scope of the problem in their legacy software systems, the race was on to tie down every available IT resource around the world to rid all critical systems of the Year 2000 problem before time ran out.

TCS quickly developed a 17-step assembly line in its facilities near Chennai, India, and started signing contracts with large multinationals, to "migrate and upgrade" their legacy software. It enhanced one of its proprietary tools, Production Quality Compiler Compiler (PQCC), to read through millions of lines of code with Year 2000 afflictions and apply remedies in a semi-automated manner. While other Indian firms also rushed to get a piece of the Year 2000 work, TCS managed to get the preponderance of the business due to its technical prowess in automation tools, technologies, and processes. From 1995 to 1999, revenues ballooned from \$125 million to \$419 million while still delivering an impressive 32 percent operating margin (**Exhibit 3**).

¹² Saxenian, AnnaLee (1999) *Silicon Valley's New Immigrant Entrepreneurs* (San Francisco CA: Public Policy Institute of California).

¹³ Commander, Simon et al (2004), "Must Skilled Migration be a Brain Drain? Evidence from the Indian Software Industry," *IZA Discussion Paper* No 1422, December.

¹⁴ Ibid.

TCS Misses the Internet Revolution

While the world was struggling to get a handle on the Year 2000 problem, another trend was sweeping the IT landscape—the Internet revolution. When Netscape went public in August of 1995, the world was agog at the stratospheric rise of its stock. As CIOs were hunkering down for a protracted Year 2000 battle, and TCS was busy processing hundreds of millions of lines of computer code in its factories, Internet companies were coming out of the business landscape like mushrooms after a rain to challenge their “brick-and-mortar” counterparts. While TCS and other Indian firms were busy doing mission-critical work, companies such as International Integration, Inc. (i-Cube), Razorfish, Scient, Viant and others quickly started and had multibillion-dollar IPOs. The newcomers helped traditional and new companies establish Internet businesses. Mahalingam commented: “Given our rich portfolio of mainframe and client server software engineering automation tools, we should have quickly extended our tools to help build and deploy e-commerce applications. Companies like Broadvision, E-piphany, Commerce One, and others got there before we did.”

But this was a temporary setback in TCS’ ascent as a world-class IT services company. When the Internet bubble burst in 2001, Internet companies sporting multi-billion dollar market valuations were jettisoned into oblivion, leaving the IT markets to the traditional mega-players like IBM and Accenture, consulting arms of large accounting firms, and Indian firms like TCS.

The bursting of the tech bubble, the increase in immigration restrictions, and perceived increases in American anti-foreigner sentiment following September 11th, 2001, appeared to have also resulted in dramatic reductions in India’s brain drain to the United States. During the period 1964-2001, a third of IIT’s overall graduates and the overwhelming majority of computer science and software engineers left for the United States. By 2008, however, only 16 percent of IIT graduates were doing so.¹⁵ At the same time, a reverse brain drain of Silicon Valley veterans returning to India created new opportunities and new challenges for TCS and other firms. Between July 2004 and December 2005, 30,000 technology professionals returned to India.¹⁶ According to Nandan Nilekani, CEO of Infosys, “Expatriates are returning because India is hot.”¹⁷ Ironically, surveys showed that while only 13 percent of Indian returnees found it difficult to settle initially in the United States, 34 percent reported difficulties settling in when they returned home.¹⁸

TCS Catches the Cost-Cutting and Sarbanes-Oxley Compliance Wave

The post-Internet bubble period was marked by two events that further fueled the growth of TCS. First, a mild recession in the developed countries forced companies to revert from hyper-investment mode to cutting cost and people, almost overnight. Second, the implosion of Enron, and the corporate governance scandal that followed, doomed a venerable accounting firm, Arthur Andersen, and prompted Congress to enact Sarbanes-Oxley (which effectively barred accounting

¹⁵ Evalueserve survey cited by Andy Mukherjee, “Indian Talent Pays Back Taxpayers, Shuns U.S.”, Bloomberg News, June 3, 2008.

¹⁶ Rai, Saritha (2005) “Indians find they can go home again” New York Times, December 26.

¹⁷ Ibid.

¹⁸ Wadhwa, Vivek (2009) A Reverse Brain Drain. *Issues in Science and Technology*, Spring.

firms from owning IT services companies). Fortune 1000, and later, Global 2000 companies who would never consider abandoning their long time IT services vendors, started considering TCS for strategic projects. From 2000 to 2006, TCS grew its revenues from \$530 million to \$4.3 billion, of which, \$3.9 billion came from export markets with margins topping 25 percent (**Exhibits 4 and 10**). TCS had now arrived as a multi-national, full-service, IT consultancy, with practices ranging from software development, maintenance, migration, packaged application implementation, data center operations outsourcing, to the nascent, but fast-growing field of business process outsourcing.

2008: TCS Position and Challenges

As TCS aimed for a \$10 billion revenue target in 2010, the low-cost IT services delivery model had been firmly embraced by Global 2000 corporations, thus keeping a lid on price increases while pressuring labor costs. TCS, according to 2003 figures (**Exhibit 11**), still enjoyed a favorable labor cost differential when compared to the U.S., but increasingly, TCS was being required to employ local resources for high-value services. The low-cost delivery model, focus on tools and technology, and access to abundant local engineering resources that helped TCS take advantage of succeeding waves of technology and business revolutions in the 1990s and early 2000s were no guarantee of continued success as a global leader.

While TCS was globetrotting to cater to cost-conscious multinationals, countries in Eastern Europe, South America, and Asia were investing in their IT infrastructures, aiming to grab a share of the now global IT services market. By 2007, with global telecommunication infrastructure overcapacity, engineers in Russia, Brazil, Uruguay, and the Philippines, could deliver quality work similar to that of TCS, but at substantially lower labor costs.

Resurgent IBM, EDS, CSC, and relative newcomer Indian firms such as Infosys, Wipro, and others, implemented the same low-cost delivery model that had by then made TCS successful. Furthermore, with economies worldwide, led by China and India, growing and consuming resources at unprecedented rates, innovation, global reach, and ability to deliver Upstream Projects¹⁹ were becoming key factors in vendor selection.

Maha believed TCS was up to the challenge, and had the strength to execute just about any strategy that could help it cross the \$10 billion mark by 2010. It had 169 sales offices in 35 countries, and 42 delivery centers in 11 countries. Its End-to-End service model included Business and IT Alignment Consulting and Business Process Outsourcing. It had also successfully extended its brand from India to the rest of the world as a high-quality, low-cost, and reliable IT services partner. As an employer of choice in India, TCS received a large share of engineering graduates from the best universities, including IIT campuses. Finally, as U.S. and European companies moved significant parts of their operations to India, TCS, as a global player, was competing for a share of the \$320 billion Indian IT infrastructure upgrade business over a five-year period.²⁰

¹⁹ Gary Mekikian and Prof. John Roberts, "Note on the IT Services Industry," Case No. IB-80, Stanford Graduate School of Business, 2008.

²⁰ Source: TCS internal documents, and S. Ramadorai's presentation to U.S.-India Business Summit in November of 2006, titled, "Doing Business in India: An IT Success Story".

Maha summarized TCS' challenges:

Our challenge is to continue transforming ourselves from a totally Indian company to a totally global company without forgoing labor cost arbitrage, wherever that arbitrage opportunity exists. The challenges we are presented with start with macro strategy as we continue to position ourselves against other global IT services company, to micro issues such as incentives and localization.

In February 2008, TCS was a truly global competitor, in the ranks of Accenture and IBM Global Services, and faced tough strategic choices. Maha considered the options:

- Should TCS partner with packaged software makers such as Oracle and SAP, or compete with them?
- Should TCS continue price leadership or move more aggressively into premium services such as management consulting and complete business solution delivery?
- In the absence of stock options, what kind of incentives should TCS put in place to account for geographic cost of living and resource competition?
- Should TCS grow organically or through acquisitions?
- Should TCS focus more on non-market issues, such as U.S. Congressional opposition to outsourcing high tech jobs?
- Should TCS recruit and promote executives from countries where the company had a significant amount of business?

Exhibit 1 TCS Organization

Corporate

CEO & MD	S Ramadorai
CFO	S Mahalingam
Corporate Affairs	Phiroz Vandrevalla
Global Sales & Operations	N Chandrasekaran
Global Human Resources	S Padmanabhan

Geography Heads

North America	Surya Kant
United Kingdom	A S Lakshminarayanan
Europe	Girish Ramachandran
	Girija Pande
Asia Pacific	Johnson Lam
	Masahiko Kaji
Iberoamerica	Gabriel Rozman
MEA	Manoj Sahai
India	S Venkatramani

Source: TCS internal documents and annual report.

Exhibit 2
Indian IT Industry Performance by Sector 2004-2008

USD billion	FY2004	FY2005	FY2006	FY2007	FY2008 E
IT Services	10.4	13.5	17.8	23.5	31.0
-Exports	7.3	10.0	13.3	18.0	23.1
-Domestic	3.1	3.5	4.5	5.5	7.9
BPO	3.4	5.2	7.2	9.5	12.5
-Exports	3.1	4.6	6.3	8.4	10.9
-Domestic	0.3	0.6	0.9	1.1	1.6
Engineering Services and R&D, Software Products	2.9	3.8	5.3	6.5	8.5
-Exports	2.5	3.1	4.0	4.9	6.3
-Domestic	0.4	0.7	1.3	1.6	2.2
Total Software and Services Revenues	16.7	22.5	30.3	39.5	52.0
Of which, exports are	12.9	17.7	23.6	31.3	40.3
Hardware	5.0	5.6	7.1	8.5	12.0
-Exports	n.a.	0.5	0.6	0.5	0.5
-Domestic	n.a.	5.1	6.5	8.0	11.5
Total IT Industry (including Hardware)	21.6	28.2	37.4	48.0	64.0

N.A.: Not available

Note: Figures may not add up due to rounding off.

Source: NASSCOM Factsheet from the NASSCOM Strategic Review 2008,

http://www.nasscom.in/upload/5216/Strategic_Review_Feb2008.doc (March 18, 2008).

Exhibit 3 TCS Financials

1968 – 1991 in Rupees

Year	Revenue (Millions rupees)	Indian IT Exports	Year	Revenue (Millions rupees)	Indian IT Exports	Year	Revenue (Millions rupees)	Indian IT Exports
1968	0.441		1976	33.5	20	1984	150	240
1969	2.58		1977	39.9	25	1985	119	280
1970	6.01		1978	46.6	30	1986	239	380
1971	10.0		1979	53.1	-	1987	325	540
1972	14.4		1980	62.8	-	1988	570	800
1973	17.7		1981	79.1	44	1989	663	1,150
1974	21.9		1982	97.8	103	1990	1,069	1,750
1975	23.8	8.5	1983	118	170	1991	1,602	2,350

TCS Financials 1992 – 2006 in Rupees

Year	Revenue* (Millions rupees)	Indian SW Exports** (Millions rupees)	Year	Revenue* (Millions rupees)	Indian SW Exports ** (Millions rupees)
1992	2,175	9,310	2000	31,424	298,960
1993	2,537	14,050	2001	41,714	378,460
1994	3,523	18,820	2002	50,124	478,350
1995	5,206	26,810	2003	59,395	596,710
1996	7,209	48,470	2004	98,446	799,770
1997	10,836	71,800	2005	133,779	1,085,110
1998	16,904	107,520	2006	189,143	1,537,440
1999	21,146	160,500			

*Source: Tata Consultancy Services - The figures in the table above are for the 12 month period April to March . For example, 1992 represents the period April 01, 1992 to March 31, 1993.

**Source : “Dataquest” – Annual Issues.

Exhibit 3
TCS Financials (continued)

TCS Export Revenues in U.S. Dollars, Margins, and Employment

Year*	Export Revenue (\$ millions)	Exports share of total revenues (%)	PBT Margin (% of total revenue)	Technology Employment (Primarily Engineers)	Total Employment**
1990	45.0	75.6	13.2	2,300	3,691
1991	52.3	80	17.3	2,600	4,748
1992	55.9	80.7	22.8	4,761	5,903
1993	64	79.2	22.2	6,450	5,782
1994	90.1	80.5	22.9	5,589	6,681
1995	125.1	81.9	24.7	6,071	7,963
1996	169.8	84.2	24.0	7,864	10,458
1997	243.0	88.2	25.6	9,929	13,070
1998	359.0	89.8	30.0	11,176	14,648
1999	418.9	86.1	28.7	12,770	15,823
2000	617.9	91.3	24.9	15,044	18,685
2001	797.3	92.7	29.4	17,607	19,840
2002	994.7	94%	23.9%	20,459	24,168
2003	1,137.5	84%	30.5	25,600	30,121
TCS which was earlier a Division of Tata Sons Ltd. was reorganized and an initial Public Offering (IPO) of its shares was made in the Indian Stock Market after which it was listed on the Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE) in India.					
2004	2,008.2	89%	26.75	38,400**	45,714
2005	2,623.8	87.5%	26.21	56,500**	66,480
2006	3,959.3	91.0%	26.00	76,000**	89,419

Sources: TCS Internal Documents .

Notes:

1. 1990-92 exchange rates are average rates for the year, based on the controlled rate of the time; convertibility for export income was introduced on 3/1/92; for 1993 onwards, year-end market rates are used.
2. Average export revenue growth rate in USD for 1990-2002 = 32.1 percent.
3. *Source: Tata Consultancy Services - The figures in the table above are for the 12 month period April to March. e.g. 1992 represents the period April 01, 1992 to March 31, 1993.
4. **Average estimates of technical headcount (engineers) for 2004, 2005 and 2006.

Exhibit 4
World IT Market: Sales and Production - 1992

	Sales	Production
United States	35.5%	57%
Japan	17.7%	13%
Germany	8.4%	7%
France	6.9%	8%
United Kingdom	6.0%	6.0%
Italy	4.0%	3%
Rest of World	21.3%	6%

Source: International Data Corporation.

World IT Market: Sales 2006

	Sales
United States	42.5%
Asia Pacific	16.6%
Europe	32.6%
Rest of the World	8.3%

Source: Datamonitor, 2007.

Exhibit 5 Software Migration Process

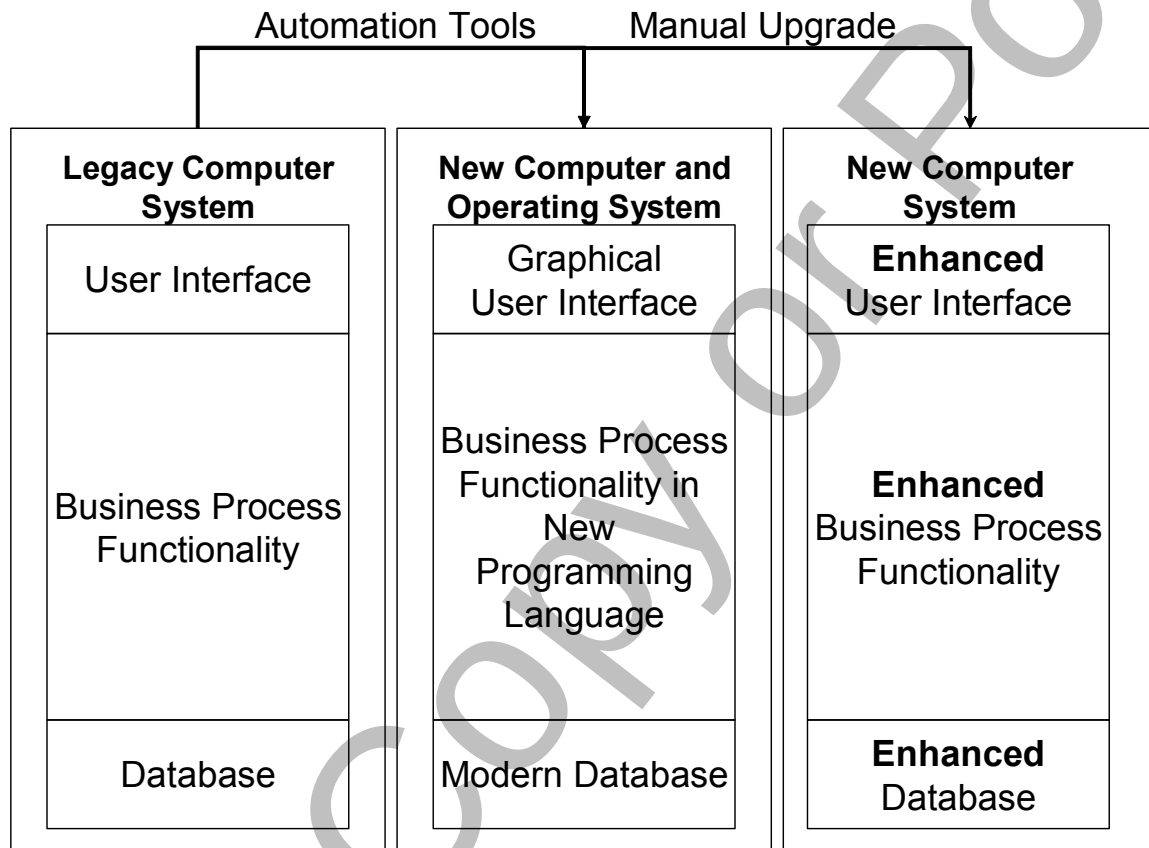


Exhibit 6
Indian IT Exports by Mode of Delivery - 1992

On-Site Services	74.6%
Offshore Services	18.9%
Packages	4.9%
Others	1.6%

Source: "Indian Software Industry," National Association of Software and Services Companies, 1992.

Exhibit 7
Indian IT Exports by Purchasing Country - 1992

United States	60%
Europe	18%
Southeast Asia & Pacific	10%
U.S.S.R.	1%

Source: "Indian Software Industry," National Association of Software and Services Companies, 1992.

Exhibit 8
Market Share of Indian Software Producers - 1992

	Revenues (millions rupees)	Share	Form of Ownership
Tata Consultancy Services	1,602	37.6%	Independent
Tata Unisys Limited*	524	12.3%	Joint venture between Tata and Unisys
Citicorp Overseas Software Limited	153	3.6%	Wholly-owned subsidiary of Citicorp
Wipro Systems Limited	147	3.5%	Independent
PSI Data Systems Limited	143	3.4%	Independent, privately held
PCS Data General India Limited	120	2.8%	Independent, privately held
Texas Instruments	102	2.4%	Wholly-owned subsidiary of Texas Instruments
Datamatics Limited	100	2.3%	Independent
Infosys Consultants Private Limited	95	2.2%	Independent, publicly traded
Siemens Information Systems Limited	90	2.1%	Joint venture with Siemens Nixdorf
Others	1184	27.8%	

* Formerly Tata Burroughs Ltd.
Source: Dataquest, July 1992.

Exhibit 9
Market Share of Indian Software Exporters - 1992

	Revenues (millions rupees)	Share	Form of Ownership
Tata Consultancy Services	1,281	30.1%	Independent
Tata Unisys Limited*	421	9.9%	Joint venture between Tata and Unisys
Digital Equipment (India) Limited	202	4.7%	Joint venture between Digital and Hinditron
HCL Hewlett-Packard Limited	180	4.2%	Joint venture between Hewlett-Packard and HCL
Citicorp Overseas Software Limited	153	3.6%	Wholly-owned subsidiary of Citicorp
PSI Data Systems Limited	143	3.4%	Independent, privately held
Wipro Systems Limited	107	2.5%	Independent

- Formerly Tata Burroughs Ltd.
Source: Dataquest, July 1992.

Exhibit 10
Market Share of TCS and Indian Software Exporters 2000 - 2006

TCS Total Revenue	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
Rs million (including other income)	23060**	31420**	43,706	55,179	71,227	106,394	132,455	186,332
Billion USD	0.53	0.69	0.92	1.15	1.56	2.44	2.97	4.29

TCS Export Revenue	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
Rs million	19160**	28700**	38,489	46,983	61,850	90,354	115,875	169,530
Billion USD	0.44	0.63	0.81	0.98	1.35	2.07	2.60	3.90

TCS Domestic Revenue	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
Rs million	3900**	2720**	5,218	8,196	9,377	16,040	16,579	16,802
Billion USD	0.09	0.06	0.11	0.17	0.21	0.37	0.37	0.39

Market Share TCS	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
Total	9.04%	7.91%	9.00%	9.16%	9.29%	10.84%	9.80%	10.81%
Export Service Mkt Share	11.08%	10.14%	10.64%	10.27%	10.50%	11.69%	11.02%	12.46%
Domestic Services Market Share	4.75%	2.38%	4.22%	5.67%	5.27%	7.71%	5.52%	4.64%
TCS Market Share - Domestic if Total Hardware is included	2.10%	1.01%	1.89%	2.58%	2.33%	3.43%	2.68%	2.35%

Source: TCS internal documents.

Exhibit 11
Wage Differential between United States and India (2002-2003)

Profession	U.S. Wage per hour (\$)	Indian Wage per hour (\$)
Telephone operator	12.57	Less than 1
Health-records technologists, medical transcriptionist	13.17	1.5 - 2
Payroll clerk	15.17	1.5 - 2
Data entry clerk	20.00	1.5 - 2
Legal assistant, paralegal	17.86	6 - 8
Accountant	23.35	6 - 10
Computer programmer	28.90	3 - 10
Financial research analyst	33 - 35	6 - 15
Software designer	60.00	6.00
Software engineer	120.00	18.00
Entry level programmer (annual salary)	\$50,000 to \$60,000	\$8,000 to \$10,000

Sources: Adapted from "Growth in the Services Outsourcing to India: Propellant or Drain on the US Economy?"
William Greene, International Trade Commission. Office of Economics Working Paper No. 2005-12-A.