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The Evolving Indian Offshore Services Environment: Greater Breadth, Depth, and Scope

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Introduction

The rapid expansion of services offshoring has sparked a public debate (Hira and Hira 2005) and an unprecedented soul-searching among economists about the formerly sacrosanct belief that trade globalization was an unalloyed benefit (Gomory and Baumol 200; Blinder 2006; 2007; Samuelson 2004). Richard Freeman (2005) has observed that in the last two decades what he calls the "great doubling" has occurred in which approximately 1.5 billion very low-cost workers have been added to the global economy. The first "phase" of the impacts of this doubling was the well documented offshoring of manufacturing to China. Since the recession that came in the wake of the collapse of the Internet Bubble, the offshoring of information technology-enabled work has garnered much attention in the media and, increasingly, among scholars. If China is the icon for manufacturing offshoring, it is India that is the icon and prime destination for the relocation of service work.

The context and goal of this paper is to provide the outlines of the development of the Indian offshored services sector. The analysis is prospective and inductive in orientation, as it is based upon interviews and a number of firm case studies executed by corporate executives and managers.[1] It is informed by the international business studies literature that suggests that the establishment of offshore facilities by MNCs can help promote rapid learning in formerly less sophisticated environments (Bartlett and Ghosal 1989; Kogut and Zander 1993). For the

[1] In November 2006, we conducted 35 interviews in Mumbai, Hyderabad, New Delhi, and Bangalore from November 1 to 15, 2006 at the following firms: Adobe, Arada Systems, Bhirgus Software, Broadcom, Cisco, Citrix, Computer Associates, Dell, Desmania Design, eValueServe, Firstsource, Google, Grant Thornton, I-Flex, Insilica, Marketics (now WNS), Medusind Solutions, Motorola, SAP, Sasken, Sidbi Ventures, Sonoa Networks, Tejas Networks, Texas Instruments, Telsima, TCS, Tutorvista,Wipro, Yahoo!, Yatra. In two previous research trips to India in April 2004 and April 2005, we interviewed a similar number of firms, though we concentrated more heavily on business process outsourcing firms. In addition, we have organized two conferences on offshoring for which executives provided case studies. At the December 2006 conference the following firms were represented: ABN AMRO, Cognizant, ePLDT, eValueServe, Freeborder, Global Executive Talent, Google, HCL, India Semiconductor Association, IronPort (now Cisco), Infosys, IBM, KPMG, Primavera, Sabre Holdings, Softtek, Symantec, Tensilica, Texas Instruments, TCS, Wipro, Yahoo!

phenomenon under investigation in this article MNCs have not been relocating operations to India to access the inimitable local knowledge or markets (Dunning 1994; Malnight 1995), but rather a capable low-cost labor force. The Indian case is of particular interest in the sense that even while developed nations have been expanding global fulfillment of ATS in India, Indian competitors and/or service providers have been building the capability to further penetrate home country markets. The multiplicity of actors operating in India is causing the emergence of a rich ecosystem that is entraining the development of yet further capabilities encouraging yet further ecosystem evolution (Mathews 2003). A powerful cumulative causation process is currently in operation.

Our motivation is to describe the parameters of the Indian ecosystem for service provision. The ecosystem is evolving extremely rapidly in terms of size, sophistication, and the spectrum of activities undertaken. The foreign MNCs are transferring increasingly sophisticated activities to India. Even while, Indian ATS provision firms are learning from their customers abroad. In addition, indigenous entrepreneurs and Indians returning from abroad are also contributing to the creation of new capabilities in India. In the computer systems integration fields, Indian firms, such as Infosys, TCS, Wipro have, in less than a decade, matured into serious competitors to the global leaders, such as Accenture, IBM, and EDS. This intense and sustained maturation process is creating an ever richer and more potent ecosystem...

India's increasing significance as an economic actor on the world scene is remarkable because it is based almost entirely on the export of non-physical goods, such as software and an array of other activities that can be somewhat imprecisely grouped into the catch-all category called "administrative and technical services." These exports are almost entirely in the form of data streams (and, of course, Indian professionals that are dispatched abroad to work at their

customer's premises) – be they the voices of telephone operators answering customers' queries, data entered into a computer, data entry and analysis, sophisticated product designs, or software programming. Exactly, the work that Robert Reich (1991) suggested in his concept of the "symbolic analyst" was the future of employment. He prophesied that symbolic analysis would grow in importance in the advanced economies. Little did he foresee that it was the analysis of symbols on a computer screen that was exactly the type of work that would be the basis of a new globalization wave.

The impact of the relocation of work to India on developed nations is not explored directly in this paper, as there are ample studies whose results conjecture that the impact will range from minimal to suggesting a shift that could range into the tens of millions of jobs (Bardhan and Kroll 2003; Kletzer and Jensen 2005; McKinsey Global Institute 2005; Blinder 2006; 2007). Though measuring the impact on the developed nations is not our goal, the evolution of the Indian ecosystem obviously will impact the types and number of jobs that might be relocated. Put different, if the Indian ecosystem continues its current evolutionary trajectory work that may not initially have appeared offshoreable may eventually become relocatable. Put differently, work that may have appeared to be solidly place-based could later become moveable.

This paper provides an evolutionary perspective on the role of India in the emerging global division of labor in providing service labor to the global economy. We provide confirmation to the findings by organizations such as McKinsey (2006) and Blinder (2006; 2007) that offshoring will not be confined to routine jobs (Levy and Murnane 2003), but rather jobs that do not require in-person interaction with non-remotely accessible factors or consumers, be they human, social, or inanimate. The first section provides a historical perspective on the emergence of Indian service labor provision. The second section examines the role of Indians

that have emigrated in facilitating the entrance of India into the global service economy. Here we disagree with the simplistic formulations advanced by some scholars to explain the international linkages, and advance a more nuanced interpretation. Sections explaining the deepening of skill levels in the major Indian services firms and the MNCs follow this. In a subsection, the models that the MNCs have developed to manage their increasingly important Indian subsidiaries are outlined. The next section discusses the emergence of "high-opportunity" entrepreneurship in India and suggests that global class technology startups are now emerging there. The penultimate section reflects upon what the emergence of service and entrepreneurial ecosystems might mean for the location of work in the global economy.

An Evolutionary Perspective

A historical perspective is necessary to understand the current ecosystem and the key organizational forms operating within it. A crude indicator of the growth of Indian ATS provision to the global economy is through employment. As Figure One NASSCOM Employment indicates, the aggregate employment growth in all sectors has been from 232,000 in March 2000 to 1,251,000 in March 2007 (Nasscom 2007). [2] The overall compound annual growth rate is over 23 percent with the business process portion growing more quickly. The second dimension is that the amount of higher value-added activities undertaken in India is growing. This is illustrated in Figure One by the category of R&D services, which, though admittedly more development than research, has expanded at nearly 18 percent per annum. One gauge of the rising visibility of R&D services is that in 2007 did NASSCOM begin treating it separately in its aggregate statistics. This recognition illustrates what anecdotally has been

[2] The Indian fiscal year runs from April 1 to March 31. So statistics announced on March 31, 2007 of fiscal year 2006-2007 refers to 9 months of 2006 and three months of 2007.

recognized by interview-based observation (Dossani and Kenney 2006). The third dimension refers to the proliferation of vertical industry segments that are offshoring their ATS operations to India. One way to understand the evolution of India's role and ecosystem as a provider of ATS is to illustrate it through a set of snapshots of different moments in its history.

1995

One of the most remarkable facts about ATS provision from India is how quickly it has grown in size and evolved in terms of activities and value-added. Consider the situation in 1995, which is stylistically illustrated in Figure 2 1995. At that time, Indian firms were largely confined to software programming with the majority of their workers being "body-shopped" to the U.S. and Europe (Heeks 1996; D'Costa 2003). A few MNCs such as British Air, Citicorp, and General Electric Capital had small subsidiaries for software coding and transaction processing services. For example, British Air transported its used ticket stubs to India where they were processed and entered into the computer. In Bangalore, TI and HP had small technology development operations. There were probably fewer than 100,000 employees providing work to offshore clients. Bandwidth was scarce and expensive and few overseas customers were willing to trust Indian vendors. Moreover, though changing rapidly, India had a reputation as a difficult environment for foreign investment. As Figure Two indicates, not only was the sector small, but it was also low value added. However, offshoring was growing rapidly, and, in retrospect, was prepared to undergo a dramatic expansion.

2000

In 2000, only five years later, the situation had evolved significantly. India had deregulated telecommunications, there was a dramatic buildout in domestic and global telecommunications bandwidth, and accelerated by the Internet an effort to digitize documents and workflows. This profoundly affected the global accessibility of data as it was now removed from its physical form. The Internet Bubble in the U.S. created a significant shortage of IT and software workers in the U.S. The much hyped Y2K problem convinced many corporate customers that they should replace old legacy software with new standardized software packages. This created an enormous amount of work, much of which was routine coding and programming. Here, the Indian software services vendors using low-cost labor could offer dramatically lower prices than their developed nation counterparts.

Large MNC SIs such as IBM and Accenture were exploring the Indian environment for low-cost software talent that they could use to lower cost. The existing MNCs also were expanding their operations. GE Capital International Services was one of the leaders as it began to relocate to India corporate activities ranging from credit card back office operations and call center work to its internal finance and accounting operations. As Figure Three indicates, the IT field was the largest and most active, but financial institutions such as HSBC, Citigroup, and American Express were expanding their Indian operations, even as they outsourced more to India.

Roughly contemporaneously, and, affiliated with the activities of the existing MNCs, Indian firms were being formed to offer customer relationship management, i.e., call centers and data entry, which roughly coincided with the first wave of business process relocation, as opposed to software services. This spread of offshoring from the IT sector to possibly all ATS shifted the debate to a concern about the offshoring of this low-level service work. Indian

service workers were now interacting with every day citizens, and there were hints of more to come.

2003

By 2003, there was greater recognition that ATS offshoring might be a serious concern and this was indicated by the alarming February 3 *Business Week* headline asking "Is Your Job Next?" Though *Business Week* was not focussed on India, there was little doubt that India was the increasing focus of attention. No longer was the discussion focussed only on the threat to manufacturing labor from China and Mexico or even coders from India, now the threat appeared to be aimed at U.S. service workers (for an early formulation of this, see Bardhan and Kroll 2003; with reference to India, see Dossani and Kenney 2003).

The Dot.com Bubble had a double effect upon offshoring. First, the global telecommunications buildout for the Bubble created an enormous over-leveraged infrastructure, which, when the Bubble collapsed, was sold at bankruptcy prices that enabled the dramatic lowering of data transmission costs. Second effect was that the accompanying recession encouraged firms of all types to search for ways of lowering their cost structure. Offshoring to lower-cost environments was an important strategy in this endeavor. So from 2000 onwards, there was a rush to offshore to India both through offshore outsourcing and offshoring to subsidiaries. The experience foreign firms gained through contracting to Indian firms in the Y2K process also introduced the foreign executives to India capabilities. As Figure 4 indicates, in the intervening three years since 2000 there had been a dramatic proliferation of MNC subsidiaries and independent Indian outsourcing firms especially in the non-software services fields. The leading Indian software services firms were expanding very rapidly. The MNC

outsourcing firms such as IBM, Accenture, and EDS were until 2003 growing, but seemed to not have decided that India would become the center of their offshore operations. Though growth was rapid, both the popular press and academic research, saw Indian ATS provision as largely confined to the low-end of the software value ladder (D'Costa 2003).

2006

By 2006 the Indian ATS ecosystem had not only expanded, but, more interestingly, was of greater complexity (Figure 5). The Western IT and finance firms that initiated the movement of ATS to India had been joined by firms from a much wider variety of industries; many of which had never had ATS contractors or subsidiaries abroad. Also, the diversity of ATS undertaken in India had expanded. For example, General Motors' first overseas R&D laboratory aimed at the U.S. market was established in Bangalore (Dossani and Kenney 2007b). The Indian SIs exemplified developments in the ecosystem. Though not yet in terms of revenues, as we shall see below, in terms of employment, the Indian SIs now rivaled the large international SIs – this was quite an accomplishment for firms that only ten years earlier were considered just body-shoppers. The final change is the increasingly dynamic entrepreneurial ecosystem in India. Not only has India become a location of choice for developed nation and, particularly, Silicon Valley startups, but a startup culture is emerging in India, even as a cadre of Indians being trained in the Indian operations of Silicon Valley firms.[3]

[3] Israel's experience with entrepreneurial spinouts from Silicon Valley subsidiaries is instructive here. For more, see Breznitz (2007).

The Indian Ecosystems

Economic ecosystems exist and have existed in all nations. Our particular interest here is in two interrelated ecosystems, the first for offshore services provision and the second for entrepreneurship. The entrepreneurial ecosystem is what the Global Entrepreneurship Monitor terms "high-opportunity entrepreneurship," to distinguish it from small-scale startups often in the informal retail, agricultural, or manufacturing that have little chance of growing to be significant firms. The expansion of offshore service provision created the space within which the entrepreneurial ecosystem could grow.

The service provision ecosystem encompasses the large established Indian firms, the MNCs, and the entrepreneurial startups. It also includes the central government through the medium of the Software and Technology Parks of India (STPI); the lobbying arm of the industry, NASSCOM; university and research institutions; and a plethora of facilitating organizations such as real estate developers, lawyers, talent search organizations, training agencies, facilities management firms etc.; all of which ease the establishment and operation organizations providing services globally. Though the main reason for this ecosystem's existence is to supply existing firms, new startups can also draw upon it. The rapidly expanding entrepreneurial ecosystem certainly benefited and, perhaps, would not have been possible with the service provision ecosystem that predated it.

The Service Provision Ecosystem

The service providers in India are diverse in terms of industry segment, business model, and size. Service activities as a category are being reconceptualized by management as a function that can be done anywhere – in the same way as much manufacturing beginning in the

1960s came to be dissociated with location. Effectively, doing service work in India has become analogous to doing manufacturing in China. Even as China has developed a powerful ecosystem to support manufacturing including global-class ports and a rapidly improving logistic system, India appears to be well on its way to developing the infrastructure, physical and human, for service provision. An excellent example is financial services, so even while many financial service firms use Indian service providers, they are establishing Indian subsidiaries. For example, JP Morgan Chase plans to have 9,000 employees in India by the end of 2007, Bank of America employs 1,500 employees in two different Indian cities, Deutsche Bank has plans to increase the size of its Indian operations to 2,000 by the end of 2007, while Credit Suisse announced the establishment of a 1,500 person subsidiary in India. In the case of Deutsche Bank, part of their Indian operation will be research staff. Goldman Sachs and Morgan Stanley, the elite investment banks, already have significant research employment in India. The world's largest financial institutions have complicated global offshoring and outsourcing strategies, but it is in India where they have concentrated their largest offshore operations. The effect of so many activities, an increasing number of which are quite sophisticated, is a rapid maturation of an ecosystem. For new entrants or existing firms, the growing and increasingly sophisticated labor pool makes it is possible to rapidly mobilize a labor force to undertake all but the very most sophisticated projects. This suggests that a virtuous circle of increasing returns is now extant.

One sign of the maturation and the leadership role India has taken in providing offshore services is the number of the Indian MNC subsidiaries receiving global mandates for the provision of certain service activities. For example, Bangalore is the headquarters for Hewlett-Packard GlobalSoft, which is a globally focused software development and IT services division with offices in Eastern Europe and Mexico. Put differently, the Bangalore headquarters has profit

and loss and management responsibility for the global operations. The business process outsourcing (BPO) division providing financial and other services, H-P Global eBusiness Operations, with approximately 6,000 employees worldwide is also headquartered in India. Another example is SAP Labs India employing over 3,000 persons, and is now the largest SAP laboratory outside of Germany. It has been given a leadership role for the development of certain software functions. Adobe India has been delegated global responsibility for PageMaker and Framemaker software.

The result of the intensity and magnitude of this growth is an ATS ecosystem ever more capable as workers, managers, and executives gain experience, and the supporting "soft" infrastructure of intermediaries matures. The sheer density and richness of the ecosystem provides opportunities for "recombinant" innovation in business models (Hargadon 2003). It is also creating resources that can be mobilized for entrepreneurship.

Ecosystem for Entrepreneurship

The evidence for an entrepreneurial ecosystem for ATS (and software products) emerging is, at the moment, only suggestive. Given the increasingly experienced labor force and an increasing willingness on the part of Indians in U.S. high-technology firms to return to manage startups, many of the human resources are in place. These returnees also have U.S. networks that can be used to mobilize resources such as venture capital, key customers, and other professionals that can assist a startup. Moreover, the entrepreneurial support network that exists to support startups in Silicon Valley has increasingly globalized (Patton et al. 2007). The returnee to India imparts the Silicon Valley ethos of rapid execution to the lower-cost Indian engineers. They are both the carriers and the translators of socio-cultural values.

The most successful entrepreneurial regions in the U.S. are endowed with established firms that can be tapped for experienced management and engineering talent. As late as 2003, such talent would have been scarce in India. This has changed significantly as MNC subsidiaries have promoted Indians to positions of responsibility in which they are learning global-class management and R&D skills. The increasingly sophisticated work is training a cadre of Indian managers that already have or will soon also have the capability to establish and manage startups. With the NRIs and the training Indian managers are getting, a key requisite for creating an entrepreneurial ecosystem, high-quality entrepreneurs that understand global markets and a labor market replete with experienced managers, exists.

Until recently, few global class venture capitalists deeply knowledgeable about technology markets operated in India (Dossani and Kenney 2002; Dossani and Desai 2006). This is changing, as major Silicon Valley venture capital firms establish Indian operations. In addition, there are an increasing number of domestic venture capital firms, although these have yet to become important actors. These private initiatives are being encouraged by the relaxation of various regulations inhibiting VC firm operation. If Indian entrepreneurs continue to create firms that have successful exits either through listing on global or Indian markets or merger and acquisition, then more investment is assured. There already have been successful exits on the Indian markets, such as Sasken, a fabless semiconductor contract services firm, and a few on the U.S. exchanges such as Exl, which is a BPO firm. However, acquisition has been the favored exit path. Examples of acquisition include, IBM and the BPO startup Daksh ($160 million), IBM and an older Indian IT infrastructure maintenance firm, Network Solutions (undisclosed), EDS and the BPO startup MphasiS ($380 million), EDS and the software testing firm RelQ ($40 million), the Indian BPO firm WNS and Marketics ($60 million), and R.R. Donnelly and the

high-end BPO firm Office Tiger ($250 million). It is certain that there will be more acquisitions as foreign and Indian firms pursue inorganic growth. Previous success and the large number of recent startups suggest that an entrepreneurial ecosystem is being established in India and, particularly, in Bangalore.

The role of Indian universities in the development of this ecosystem is limited but expanding. The average Indian university graduate is an excellent worker, while the graduates from the elite universities and Indian institutes are as good as any in the world. In terms of research, the elite Indian institutions are improving, but they are not yet on a par with Tier One U.S. research universities in terms of publications. Thus far Indian professors have been involved in very few global-class startups. One exception is Tejas Networks where one of the founders was a professor at an Indian Institute of Technology. Whether the role of universities will change in the short-term is uncertain. At this point, the most important contribution of the Indian higher education system to the entrepreneurial ecosystem is a graduate that can effectively work in the global economy.

Until recently, most startups were offering services and thus largely dependent upon labor cost arbitrage, and not particularly unique skills. The emergence of a dynamic, multifaceted entrepreneurial ecosystem creating technology-based product (as opposed to service-based) startups for the international and domestic markets is more recent. This suggests the emergence of a deeper labor market in terms of personnel and more globalized venture capitalists. If these initial indications are borne out a global-class ecosystem for entrepreneurship may be forming centered in Bangalore. This would be an enormous achievement for India, which is still very much a developing nation.

Entrepreneurial Startups

Judging a nation's entrepreneurial propensities or activities is difficult, as can be seen by the 2004 Global Entrepreneurship Monitor rankings that rated Poland above Israel and Canada far above Finland. Peru, Uganda, Ecuador, and Jordan were the global leaders. India and China, the two newest economic giants, were not even measured. For this reason, we do not enter the debate about whether Indians are entrepreneurial (an odd debate considering that the U.S. has hotbeds of entrepreneurship, while there are many other locations with minimal entrepreneurship). This section has a modest goal. Namely, to describe the dimensions of Indian technology-based entrepreneurship and reflect upon its potential to expand.

Figure Six categorizes venture capital-financed firms by whether they are meant to serve the domestic or foreign market and by the location of the headquarters. Our first observation is that the number of startups in each of the three relevant quadrants is growing. The Quadrant One startups are those established in U.S. particularly Silicon Valley, but for various reasons, most often cost, establish an Indian subsidiary. In these startups the precise division of labor varies. For some firms, the division is between lower and higher value-added functions. In other cases, Silicon Valley retains only the headquarters, marketing, and/or product architecture functions. The divisions of labor may vary by firm, technology, or simply corporate strategy. Regardless of the reason for offshoring, these startups transfer knowledge through their operation.

Figure Six about here

The extant assumption that the Indian subsidiary must necessarily undertake lower value-added work than is done in Silicon Valley should be qualified. In certain respects, this is correct as most of the top executives are in the U.S. And yet, our recent interviews suggest that this characterization fits many, but not all, firms. For example, Insilica's Silicon Valley headquarters

has approximately 15 employees including the C-level executives (all of whom are NRIs), marketing, sales, and operations, the functional heads of imaging and the ASIC SOC groups, and a couple of engineers to support program management for customers (Raghunathan 2006). The rest of the firm is located abroad. On the other hand, consider the case of Sasken, which was established by a group of NRIs in Fremont, California in 1989. The management team relocated the entire operation including the headquarters to Bangalore, India from where it has grown to employ over 3,000 employees around the world (Swaminathan 2006). These illustrations suggest the wide variety of arrangements being fashioned. Most important is that the Quadrant One firms are part of a growing tendency for Silicon Valley startups to establish an Indian subsidiary early in their life-cycle or even to have an Indian operation as an integral part of their business plan. This is indicative of the more general tendency, which is that all high-opportunity startups in Silicon Valley receiving venture capital funding must have thought through the benefits and costs of early globalization.

Quadrant Two startups, from their inception, have nearly their entire engineering and product development in India. Admittedly, the line between Quadrants One and Two firms is blurred. For example, Arada Systems, a startup aiming to provide software solutions around IEEE 802.11 Wifi solutions to the telecommunications, industrial, outdoor and automotive markets, has its entire development team in India and only a thin staff of nine persons in the U.S. The plan was to expand the Indian team as the firm grew, because it would do all the development (Singh 2006). Another firm, TutorVista, which was conceived and launched in India, offers online tutoring to students in developing nations using Indian and Filipino teachers. The firm's venture investment came from the U.S. firm Westbridge Capital (now Sequoia Capital). Tutorvista's operations are entirely located in India, but its market is international

(Kannan 2006). Quadrant Two is a polyglot category including both firms that were conceived abroad, but have their operations in India, and firms conceived in India for the international market. In both cases, the number of Quadrant Two firms is expanding rapidly.

In Quadrant 4, there are two types of firms. One group, 4a, is the increasing number of startups, whose strategy has been to utilize growing Indian markets to establish their products prior to advancing into global markets. For example, Tejas Networks, which designs and markets optical telecommunications switches is an example of this. Established in May 2000 in Bangalore, by 2006 it had grown to 300 employees with 85 percent of its revenue coming from India. It expected to grow by 100 employees in 2007 and double its revenues. Tejas plans to increase its foreign sales with the goal of making a stock offering on the Indian market (Nayak 2006). The rapid expansion of Indian telecommunications and particularly wireless markets offers Indian firms an opportunity to reach significant scale prior to entering the international market. If successful, the Tejas strategy of using the burgeoning Indian market will be repeated by other firms.

In Quadrant 4b there are the startups for the Indian market. This is roughly analogous to the many successful Chinese startups that have listed on the U.S. and other markets (Patton et al. 2007). There are a wide variety of business models. Many are simple translations from the U.S. such as travel, auction, and job listing, etc. sites. While not original, given the burgeoning, computer-literate, middle-income strata in India, these can be successful investments. Other startups serve the burgeoning local cell phone market through offering applications such as ring tone downloads. As was the case with China, the rapid increase in wealth is creating a massive relatively underserved market with enormous pent-up demand for services of all sorts. Also, a large underserved illiterate market unable to speak English, or, in certain areas, even Hindi

exists. This provides opportunities for voice recognition/translation software. For local and international venture capitalists, an enormous market is emerging and it will offer investment opportunities requiring small capital investments, but offering very respectable returns.

India has some significant advantages for startups. The most important of these is a deepening talent pool. Certainly, low labor cost attracts foreign investors. The cost differences are remarkable. For example, in Silicon Valley building a comparable firm to Tejas Networks would have cost between $100-150 million, whereas Tejas, which is now on the verge of positive cashflow, cost between $30-50 million – a dramatic difference. In the case of a software/ASIC design firm, the cost comparison for a group of 50 engineers in India with an average cost of $40,000 per year in Bangalore yields a burn rate of $2 million per year versus in Silicon Valley where the average salary would be $180,000 per year and a burn rate of $9 million per year. The point being that the cost of a startup are remarkable different. The key question, of course, is whether the quality of labor is different and is this difference a difference that makes a difference.

The startups with global ambitions draw upon NRIs from Silicon Valley as executives and development team leaders, because of their experience and a work ethic necessarily to deliver a product. When asked to compare Indian engineers and Silicon Valley engineers, the NRIs believed interviewed stated that the Silicon Valley team, which had more seasoning, typically was superior, but not sufficiently so as to justify the cost differential. The point being that there were significant cost advantages to operating in India, but this is PREDICATED upon there being a skilled and capable work force in India that could be supplemented with trained, "battle-hardened" managers with deep experience and understanding of the U.S. and, in technology, the Silicon Valley, management style.

A common assumption regarding the startups aiming at the global market is that their operations are divided between India and the U.S., usually Silicon Valley. In our small sample two firms Telsima and Insilica also had European operations. Telsima, a startup established in 2004 to develop WiMAX-based broadband wireless access software for data-intensive and mobility applications, had its main development center in Bangalore, but also employed 35 persons in Trzin-Ljubljana, Slovenia. Insilica purchased a Flextronics semiconductor design group located in Slovenia for system on a chip expertise. The final example is Athena Semiconductors, which was recently purchased by Broadcom. Athena was headquartered in Fremont, California with a 40-engineer design team in Bangalore, India and another 23 engineers in Athens, Greece. At all of these firms, the Silicon Valley headquarters is responsible for overall coordination; however, the Indian operation interacts directly with the European branches. This suggests that, at least, for some startups the Indian operations are one node in a globalized organization.

When considering the three Quadrants together, it is possible to make the following tentative observations: First, there is a profusion of experimentation with business models. Second, returning NRIs are providing Indian startups and the Indian subsidiaries of U.S. startups seasoned professional managers. Third, it is possible to build near global-class or global-class startups in India.[4] Fourth, there is every reason to expect a continuing and accelerating pace of startup formation. Fifth, there have already been some good exits particularly through mergers. These are having a positive effect on the pace of startup formation. Considering that the pace of startup formation appears to be accelerating, the future for all types of VC-funded startups is positive.

The Indian Systems Integrators

The evolution of the Indian SIs typifies the maturation of the Indian service vendors more generally. In terms of size, depth in verticals, and breadth of offerings, the growth of the established firms has been remarkable. The former classification of the large Indian SIs as software service providers is increasingly imprecise. Today, they provide not only systems integration, as they have expanded their offerings to include other engineering services and business process service provision. A more appropriate term is system integrator, which captures both the range of their services and their ability to package these. The common thread here is that all engineering services are about using software be it in integrated circuit design, product engineering, or back office services provision.

The last five years have seen a quantum jump in the ability of the Indian software services firms to undertake large complicated projects. Only a decade ago, Indian firms were largely confined to low-level coding and programming (Dossani 2006). More recently, Indian firms have proven capable of undertaking larger projects and portions of the software services value chain that are higher value-added (see Figure 6 for a depiction of the movement of Indian firms to higher value-added functions in software services). The first dimension of undertaking larger projects is having sufficient numbers of employees. Whereas, at the end of fiscal year 1999, i.e., March 2000, the largest Indian service provider TCS had 17,000 employees and Infosys and Wipro had approximately 10,000 each, in March 2006 TCS had 63,000 while Wipro had 54,000 and Infosys had 45,000. As of September 2006, TCS had 78,000, Infosys had increased to 66,000 and Wipro had 61,000, and each of the firms had ambitious hiring plans.

[4] We use the term "near global-class" simply because we were unable to undertake a detailed evaluation of the technology these firms are developing, but we are certain that these firms are developing technology for the global

Though still smaller than IBM with its global employment of approximately 330,000 (of which approximately 140,000 are in IBM Global Services and approximately 60,000 are located in India) or Accenture with 140,000 employees (of which approximately 27,000 are located in India), today the Indian SIs are able to undertake all but the largest outsourcing contracts (Shah 2007).

Figure 6 about here

The large Indian service firms are evolving from IT services firms to engineering services firms. So, in addition to moving up the IT services value-added ladder, these Indian engineering firms are offering other services. For example, Wipro does contract semiconductor chip design (Citation). Only three years ago, Wipro was largely confined to the two lower value-added steps of Verification and Physical Design and Production and Silicon Production Engineering. Today, increasingly, customers have contracted with them to provide the higher value-added services in digital/analog design and even architecture. The benefit for the Indian vendor is that it can receive improved rates for the project AND it allows its Indian employees to develop new capabilities satisfying their desire to improve their skills. All of these service firms are striving for the same goal, namely moving up value-added ladders.

Finally, the large Indian firms are broadening their businesses by offering ever more services. For example, in 2006 TCS announced that it had contracted with Boeing to work closely with its customers to design the interiors of new aircraft they had purchased. This contract for $30-50 million led to TCS establishing a "laboratory" in Chennai for the design of aircraft interiors (Kurup 2006). Though just an example, it is illustrative of the ability of these firms to broaden their business bases and presumably to increase their value addition.

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market, and thus are in competition with firms in Silicon Valley and Israel.

The Indian firms have developed superb process skills. In many respects, this is due to the necessity they felt to prove themselves to foreign clients. One way to achieve proof was to meet independently developed foreign quality standards whether they were the CMM standards for software process maturity that placed enormous emphasis on creating standardized documentation or various ISO standards. The influence of the General Electric's six-sigma program is pervasive. Acceptance of these programs forced Indian vendors to carefully examine their service production processes and standardize them, but as important they were constantly experimenting with methodologies for improving them. The result of these standards exercises was a drive to create metrics for measuring efficiency and quality. This has an uncanny resemblance to the Japanese adoption of the Deming/Juran Total Quality Control ethic after World War Two. The emphasis on measurement and improvement led to Indian firms establishing new standards for software service and quality.

Indian SIs have a number of weaknesses, one of which is that they are Indian firms, and, in many respects, are not internationalized, in part due to their current competitive advantage that is based upon their Indian cost structure both at the employee level, but also at the management and executive levels. To become truly global corporations, one challenge will be to globalize their management thinking. This is not unachievable, however it will require migrating the firm's perspective from one seeing the world from an India-centric perspective to a global perspective. The benefits from such a transition are that they will be able to supply customers with globally-aware solutions. This may not be as smooth as the transition was for Japanese leaders that had one of the most sophisticated markets in the world from which to learn. This may be the most serious challenge Indian firms face in their drive to be ranked among the global leaders.

Not only the largest Indian systems integrators, but also the other larger non-software ATS firms are extremely metric oriented. To use Paul Adler's terms (1996), they resemble learning bureaucracies in that they are constantly benchmarking their processes, and examining them for potential efficiency gains. Anecdotally, there is the belief among some that the Indian vendors have, through their superior performance metrics, placed pressure on other firms to implement metrics (CTSH interview). And yet, even if Indian firms are able to demonstrate superiority on performance metrics in the fast-changing software and IT-enabled ATS space producing yesterday's solutions or just undertaking the production portion of ATS is not where the greatest value-added is created. A systems integrator must be both prepared and trusted sufficiently to become an advisor or in the vernacular of this world, an order maker. This is analogous to the transition Toyota and Honda made during the 1990s from being the purveyors of low-style, high-reliability automobiles to leaders in style, new auto categories (such as crossovers and hybrids) – a transition that has made them the auto industry leaders. There is anecdotal evidence from our interviews with Indian executives (Ramadorai ….) and individuals in firms that support the systems integrators that this is occurring. If the Indian software services and other ATS service firms can make this transition while retaining their cost advantage, then their MNC competitors will suffer not only price compression competition, but also new product competition.

MNCs in India

Nearly every Global 500 firm and many smaller firms now have either a direct presence in India through subsidiaries, through work that it has outsourced to an Indian services vendor, or a developed nation service vendor that delivers, at least, part of the service from India. The

largest firms, such as Citicorp have services delivered through a complicated global web of ATS providers that includes traditional providers such as IBM, EDS, and Accenture; nearly of which now have an Indian component in their delivery model and newer vendors particularly those from India. Finally, an increasing number of these firms have Indian subsidiaries tasked with providing services internally. For many non-ATS providers, their Indian operations are undertaking every more sophisticated work. For the ATS providers, India is, outside of their home countries, becoming their single largest overseas operation. In this section, examples of both non-ATS and ATS providers suggest a profound reorganization of the global geography of ATS work fulfillment.

A recent consultant's study by the Everest Research Group (Karthik et al. 2007) suggests that of the Forbes 2000 109 now have offshoring subsidiaries in India, and this may be an undercount. Due to the complicated skein of activities that Fortune 100 firms have it is possible that even headquarters does not fully understand the scale and depth of their Indian operations. When one includes the fact that these firms are acquiring and divesting operations constantly, their offshoring to India is even more complicated. This section does not address this problem, but does note that a lack of clarity in defining what should be outsourced and what should be retained internally could have numerous adverse effects including the loss of IP, institutional knowledge, and internal capabilities. It can also result in adverse effects on the firm's Indian operations. The focus of this paper is the technology sector; however, the activities of other MNCs in the financial, insurance, travel, automotive, and health care sector are extremely interesting.

ATS Subsidiaries

The rapid growth of MNC ATS subsidiaries operating in India in terms of numbers of employees, breadth of activities, and value-added is remarkable. The pace of employment growth has been remarkable. Today, in terms of size IBM India rivals the largest Indian SIs, and IBM has more employees in India than in any other nation with the exception of the U.S. IBM's pace has been matched by SIs from Europe such as CapGemini and Siemens Business Services. Given the short-term inelasticity of the labor market, the feverish pace of expansion has contributed to wage inflation.

For the MNC SIs, the growth has been organic through hiring and inorganic through the purchase of Indian firms (see Table One). The largest of these, IBM, only reestablished its operation in India in 1992, but the preponderance of the growth has been from 1999. At the end of 2006 IBMY had in excess of 60,000 Indian employees and expected this to grow to 100,000 by 2010. To speed its growth, in 1994 IBM acquired a leading business process firm, Daksh, with 6,000 employees. In 2004, it acquired the 1,400-employee Network Solutions, which specialized in IT infrastructure services. With IBM setting the pace, other outsourcing firms also began to rapidly expand their Indian operations. For example, EDS, which entered in India in 1996 as a GM subsidiary, began its expansion even later as of 2005 it had only 3,000 employees in India. In 2006, EDS management decided that it would have to rapidly build its offshore operations. So it acquired the 11,000 person Indian business process firm MphasiS in 2006, and then followed this in 2007 with the acquisition of the 700-person firm RelQ. Simultaneously, it rapidly increased hiring at its existing Indian facilities. To be sure, it is not only U.S. domiciled organizations that are having to respond, as Table One indicates, the largest European

outsourcing firms are also rapidly increasing their presence in India. All of them appear to be scouting for acquisitions, as they seek to expand their Indian presence.

Table One about here

The reason these MNC SIs are expanding their Indian presence is not surprising, competition with the Indian SIs that have a far lower cost basis is difficult. In the 2006 EDS Annual Report, its Chairman and CEO reporting improved results observed, "We continued to realign our work force with strong offshore capabilities, making us more price competitive and responsive to client needs. We more than doubled our presence in high-quality, lower cost locations to 32,000 employees. While India was the primary beneficiary, we also are migrating our work force to other regions such as Latin America, China, Hungary and Poland." Each of the major MNC SIs faces a similar difficulty, namely a high cost structure that is difficult to sustain in a global competitive environment. For this reason, there is little choice but to expand their offshore operations.

Given their rapidly increasing size, effectively managing Indian operations has become a management imperative. Since most of these firms are firmly rooted in their home nation environment, and many overseas managers see India, as significant largely for its ability to cut costs, integrating India into a global strategy may be problematic. Previous MNC globalization initiatives may have been easier to manage because, in general, they were smaller and less hurried. Their smaller size meant that the operations were not as costly, and lack of temporal pressure provided greater opportunity for experimentation and calculation. The MNC SIs must manage their Indian operations well because so many resources have been invested and botched service delivery can cripple their clients. A final question is whether the MNCs will adopt the service quality ethic in India or will bring their less rigorous methodologies from abroad. Put

differently, will they learn from the Indian ecosystem or just use it as a source of low-cost labor? Successfully managing their Indian operations maybe a determining factor for which SIs survive in global markets.

Non SI MNCs

In addition to the MNC outsourcing firms offshoring to India, a wide variety of firms in the developed nations are establishing subsidiaries in India to discharge their ATS internally. Within these subsidiaries, foreign firms can undertake activities that they are unwilling to outsource either domestically or abroad. Offshoring permits firms to lower their costs while retaining their proprietary and/or higher value added processes.

Firms offshoring to their own subsidiaries has grown dramatically from the pioneering operations that were established in the late 1980s and 1990s. These pioneers were concentrated in IT and finance. They were so successful that today nearly every large IT or finance firm has an Indian subsidiary. Firms from nearly every industry have joined these. For example, major retailers such as Target Corporation and Tesco have established large subsidiaries. According to Robert Kupbens the Vice President for Technology in Technology at Target Corporation (2007), in August 2006 Target Corporation opened its Bangalore subsidiary and in mid 2007 employed 500 persons, but expected the Indian operation to grow to 3,000 by 2009 persons. The types of work to be performed in India are indicative of the changing location of ATS work. By the end of 2007, operational responsibility for Target.com will be in India. The spectrum of work is indicative. There will be a finance team to do analysis, marketing projects using CAD systems. The India team even does photo retouching and newspaper circular layouts for the U.S.

This paper concentrates on certain industries, however all the studies show that offshoring will affect nearly every industry (McKinsey Global Institute 2006; Dossani and Kenney 2007b), and, very often, it will be both low and high value-added positions that will be relocated. For example, old line industrial firms such as General Motors, Caterpillar, and Delphi are rapidly expanding their R&D and design laboratories in India, not for the Indian market, but for the global market. Major travel and hospitality firms such as Sabre/Travelocity also have established Indian subsidiaries (Jones 2006). Given the increasing centrality of IT for every industry, and the digitization of their work processes, the savings by relocating core processes to an offshore subsidiary are likely to become even more compelling.

In the software Some MNCs of them are pioneers in understanding how to do high value-added work in India and in implementing the business models that make this possible. One firm we interviewed, a multinational software giant, SAP, is a typical example of such an effort. As noted above, in 2000, they discovered and developed their Indian subsidiary's capabilities in the programming function. By 2003, India was established as a global development center, meaning that it was eligible to take product ownership while possessing the skills to contribute to projects across the board. As of 2006, only Europe, U.S., and Middle East also had this status. India currently is the global center of excellence for oil and gas, steel, and telecommunications verticals.

The key to SAP's success has been relentless experimentation in order to discover the operating model that would enable value-added work to be done in India. Initially, the project managers were based in Europe while the engineers were based in India and other locations. This 'hub and spoke' approach did not work well due to the need for engineers within a project component to coordinate with engineers working on the same component but located elsewhere.

SAP then experimented with a model in which every engineering team in India having its manager located in India. That manager would coordinate with managers globally, but the engineers did not have to. This significantly reduced the number of coordination points and enabled more sophisticated work to be done out of India.

The case of Agilent Technologies India (AGI) illustrates the rapidity with which an Indian operation can mature. AGI was established in 2001 to undertake both back office and engineering services. Its initial engineering services work was simple data entry. However, the operation rapidly matured and began doing CAD support the next year. The next task it undertook was QA for product development. In 2003, Electronic Design Automation software development commenced in India. Success in these areas convinced management to add an ASIC design center in India, only the fourth one that Agilent operated globally (Dossani and Manwani, 2005). In April 2006, AGI announced that it had purchased 10 acres of land in the Delhi area to build its own campus. Employment growth was rapid, as it had no employees prior to November 2001, and by November 2004 had 1,200 employees with plans to increase to 2,000 by 2006. Agilent India is growing rapidly in three ways: First, its engineering capabilities are growing rapidly. Second, it is undertaking more of its global back office operations in India. Finally, the Indian market for its test and measurement equipment is expanding rapidly.

Yahoo! has rapidly expanded its Indian operation. In 2003 Yahoo! established its Indian Development Center (IDC) and hired 150 engineers (Seth 2006). It has grown to nearly 1,000 employees in December 2006. But, from our perspective, what is more interesting is how its work has evolved. Initially, the IDC operated entirely as a back office for Yahoo! Palo Alto. In general, the work transferred to India was low value-added and mundane. The result was high rates of attrition that were sapping the cost savings. To address this problem, in 2004 Yahoo!

moved first-level project management to India, a step that gave the IDC more ownership, but created conflicts with Palo Alto-based managers. The solution was the movement of complete responsibility for major activities such as datamining to India. Now the Indian functional manager reported directly to a SVP in Palo Alto. With the increasing success of the Indian operation, functional responsibility not only for datamining, but also for mobile applications and iPod broadcasting was moved to the IDC.

It is important to note where the Indian operations are yet to fully catch up. Not surprisingly, it is in the areas of market understanding and global project management that the problems lie. As the manager of a large MNC noted, in a statement that was repeatedly echoed in several firms, "It is easy to do cutting-edge work in India and to manage large projects. The difficulty is in launching products from India, especially the last stage between putting it all together and going live. There is also a gap in capability in conceptualizing projects from India." It takes time to build sophisticated capabilities in-house. As the graphs of Agilent, Yahoo and Company A show, it takes two to three years before higher-end work can be done in-house. This is probably due to a combination of building the firm's work ethic in a new environment, concerns about lack of control, and the changing maturity of Indian engineers. Despite these difficulties, the Indian MNC subsidiaries are evolving and growing to become among their most important overseas operation.

Discussion

Developing the proper models for managing internal global development teams has preoccupied managers and students of international business. Quite frankly, the research is undecided as to whether this works well. This section provides some indication of the types of

models that firms operating in India are using. Prior to this discussion, it is important to note that, with only few exceptions, the preponderance of the MNC work in India is for export, and not for exploiting the still small, though rapidly growing, Indian market. Further, the models are all drawn from the technology sector.

Invariably, the first model is of the Indian operation as a subsidiary undertaking routine and repetitive work. This is understandable from two perspectives: First, U.S. employees are often willing and even eager to shift such work. Second, the risks are usually low (as long as there are parallel operations in other locations). As in an experiment, if the work is of acceptable quality, then the firm should become more comfortable shifting other higher level tasks that require more discretion and capabilities. Anecdotally, there is evidence to suggest that the Indian managers and employees soon find such work uninteresting, and in the torrid Indian labor market attrition rates can soar. Whether an operation whose sole activity is such mundane work is sustainable is unclear, but such work occupies a preponderance of the work done in India. For many MNCs this allocation of global responsibilities is likely to remain dominant, though it is likely to limit there ability to take full advantage of the Indian labor force. The difficulty arises in terms of staffing in that the most capable Indian personnel will not be satisfied with such arrangements and turnover will be an issue.

As the subsidiary matures, managers often explore models that offer more than just cost savings. Each model has advantages and drawbacks. The most commonly discussed model is the follow-the-sun (FTS) model that takes advantage of the time differentials between the U.S. and India. Effectively using the FTS model is not as simple as it may sound. Initially, many believed that one site would work on the problem and then simply upload it to be worked upon at the other site. When everything operates smoothly the model appears flawless. However, when there

are problems with the other team's work that requires discussion, everything halts until the two teams can be gathered for a discussion – a logistical problem when the time zones are the exact opposite of each other. If difficulties persist, often each team blames the other, and the project can be so impeded that the FST model is actually slower and more expensive than simply doing the entire project in the high-cost environment.

One FST solution is to partition the project. For example, the programming is done in the U.S. and testing is done overnight in India. Or, in data entry or even datamining applications, the data is processed in India after the end of the U.S. working day, and it is then available for use in the U.S. the next morning. In this model there is a clear partition of work and responsibilities. In some cases, the Indian employees are doing low-end routine work such as data entry or software test and debugging. But, in other cases, such as the datamining area, the work can be quite sophisticated. Here, there is an obvious division of labor (DOL) and the FST model offers significant time and cost saving.

Another DOL variant on the FST model is modularizing a project into various components so that the work on the components can proceed with only limited interaction between the two (or more) work groups. When the linking of these parallel efforts occurs, as, for example, in chip design, it may be necessary to gather the members of the various teams at one location to undertake the final tuning and problem-solving. One possible difficulty with this approach is that certain functions that are common with each component such as testing and QA must now be replicated at each location.

A model that is increasingly being adopted by technology firms is what might be termed a Total Responsibility model (TR). The TR model transfers the entire responsibility for a business unit or functional activity to India. Initially, this is usually for a smaller peripheral

project. Invariably, at least, initially, the responsible manager is an NRI who has had overseas experience. Often, the NRI is hired overseas and transferred to India either on a long-term assignment or permanently. These persons have the credibility, contacts, and execution ethic of the home country firm or, at least, embody the ethos and have the ability to execute in ways that headquarters expects.

For many firms the TR model has become the dominant model for organizing the DOL between the Indian and overseas operations. In more mature subsidiaries, significant responsibility is being transferred. For example, Adobe India has full product responsibility for PageMaker and FrameMaker. At Broadcom, total responsibility for developing ASICs for certain products is vested in the Indian operation. At Yahoo! the IDC is the global center of excellence for datamining and thus has primary responsibility for this function.

Another sophisticated model being created is that of SAP that builds large software programs and has multiple development centers around the world. It might be termed the Matrix model (Ma). Company A developed a model wherein no product it developed could be done in less than two Centers, i. e., the product managers had to use more than one location, thereby forcing them to consider SAP as a whole and not simply aggrandize their local Center. However, since the product is modular, they had a second rule, which was that a component could only be done in two centers, thereby controlling the lower-level managers coordination problems. The idea was that managers could be burdened with complexity and the higher in the managerial hierarchy the more competent they would be to manage the complexity. Finally, for the individual programmer their immediate supervisor must be local and preferably, two levels of supervisors were local. The objective of this was to give the programmers immediate feedback

and supervision. Though quite complex, the Ma model is a method for overcoming localism and forces interaction and cooperation across the firm's global development centers.

These models may not differ greatly from those developed by MNCs to manage other mental labor in other countries. However, there is one enormous difference between the operations in India and other nations – namely the scale of the Indian operations. As Table One suggests, the Indian operations are often the largest operations that these MNCs have outside their home nation. Just their size means that properly managing them has direct impact upon firm success. Ineffective or incompetent integration is costly. Due to their sheer size, improvement in their operation and extracting more value from their Indian operation may be the most important managerial challenge these MNCs face.

Conclusion

The growth of service exports has been remarkable, and is by far the dominant phenomenon in the emerging Indian IT ecosystem. This paper showed that this growth has been along three dimensions. The first dimension is the rapid growth in numbers. Second, and more significant, dimension is the ability to undertake higher value-added work. Third, and most startling, dimension has been the expansion of industries and activities beyond the traditional domains of finance and ICT to areas previously not even considered such as IT-enabled physical product development, healthcare, and aerospace. It is particularly the changes in the last two dimensions that suggest to us that India is rewriting the rules for the location of work.

These different dimensions of advancement are enabled by the following changes in the environment: new management approaches that appear to be able to circumvent erstwhile barriers to interactivity; the recent surge in NRIs returning to provide advanced and creative

project conceptualization and implementation skills; a growing entrepreneurial impulse, the involvement of both sophisticated venture capital located in Silicon Valley (and elsewhere) and established firms in pioneering multi-country coordination from India; and the leveraging of a few dynamic local markets, particularly in wireless telecommunications.

In such a rapidly evolving environment conclusions must be tentative. And yet, extrapolating from the current trajectory, it is not too early to conclude that there is a high likelihood that the rise of India will have as profound effect on the global economy as has China. India may be even more significant, because its entrance on the basis of well-educated personnel capable of using computers is a lesson and beacon to how other nations can enter the world economy, not only on the basis of low-cost, uneducated personnel, but how education can pay-off with economic growth. Even a relatively undeveloped infrastructure, as India had and has, need not be an insurmountable barrier. In a capability-based economy businesses are searching for talent that can profitably be employed. For nations the task is to develop that talent, encourage global business to employ it, and then encourage local entrepreneurship to create new value propositions. India has shown that this is possible.

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Table One: Employment in India by Selected Large Non-Indian Systems Integration and Software Firms

Firm	Date of Entry	Nationality	Employment in India (date)	Global Employment 2006	Percent Employed in India	Acquisitions (Name, Date, # of employees
Systems Integrators						
Accenture (2)	1987	U.S.	35,000	129,000	27	
CapGemini	2003	France	12,000 (2006)	75,000	16	Kanbay, 2006, 5,000
CSC		U.S.				
EDS (3)	1996	U.S.	17,000 (2007)	117,000	15	MphasiS, 2006, 11,000 RelQ, 2007, 700
IBM (1)	1992	U.S.	60,000 (2006)	369,277	18	Daksh, 2004, 6,000 Network Sol., 2005, 1,400
Siemens IT Solutions and Services	1992	Germany	4,000 (2006)	43,000	9	
Software Products						
Adobe	1997	U.S.	500 (2005)	5,879	13	
Microsoft	1998	U.S.	4,000 (2006)	57,000	7	
Oracle	1994	U.S.	8,600 (2006)	55,000	16	I-Flex, 2006
SAP	1996	Germany	3,500 (2006)	38,400	9	
Yahoo!	2000	U.S.	1,000 (2007)	10,000	10	

1. Reentered India 1992 for domestic market and includes total employment not just IBM Global Services.
2. In 2007, Accenture employed more persons in India than anywhere else in the world.
3. In 1996 served GM India from India.

Source: Compiled by authors from various news reports and corporate Securities and Exchange Commission filings.

Figure 1: India IT-Related Export Employment Growth, 99-00 to 06-07e in thousands

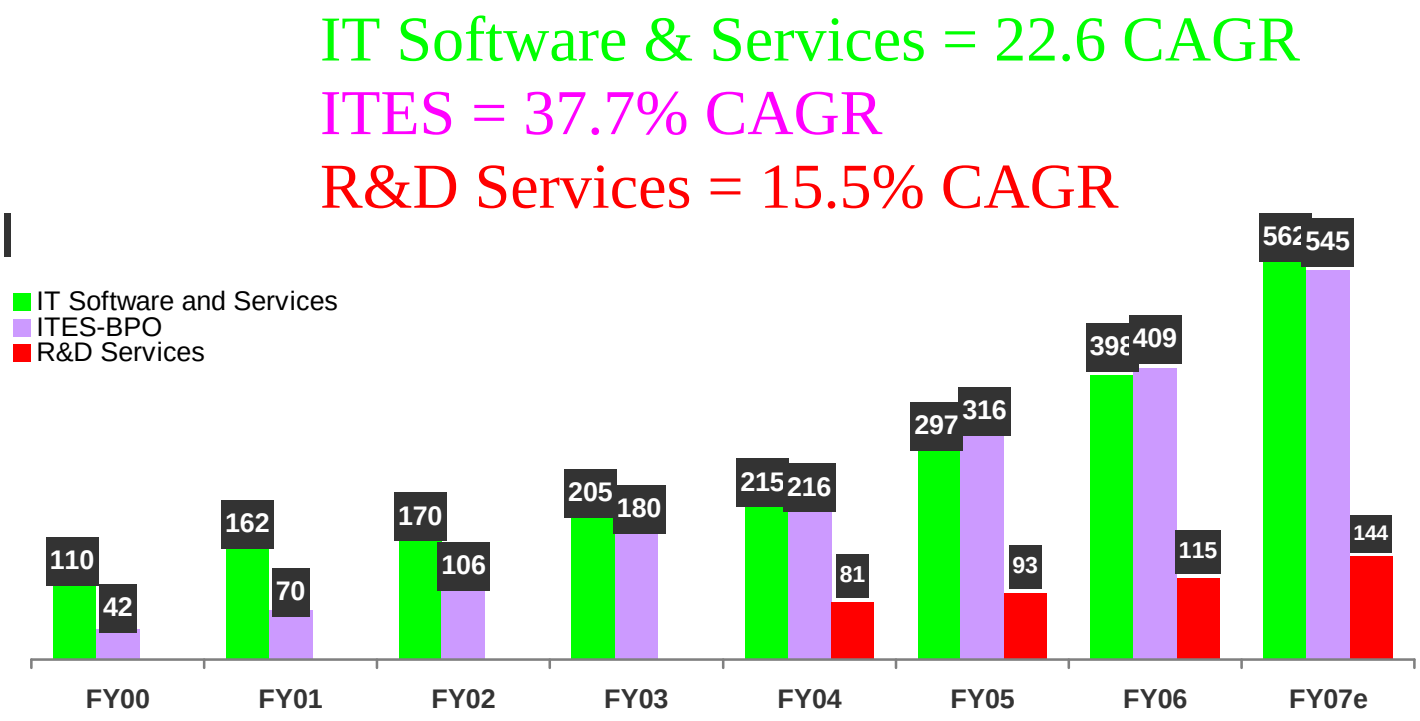


Figure 1: Stylized Representation of Indian Service Provision 1995

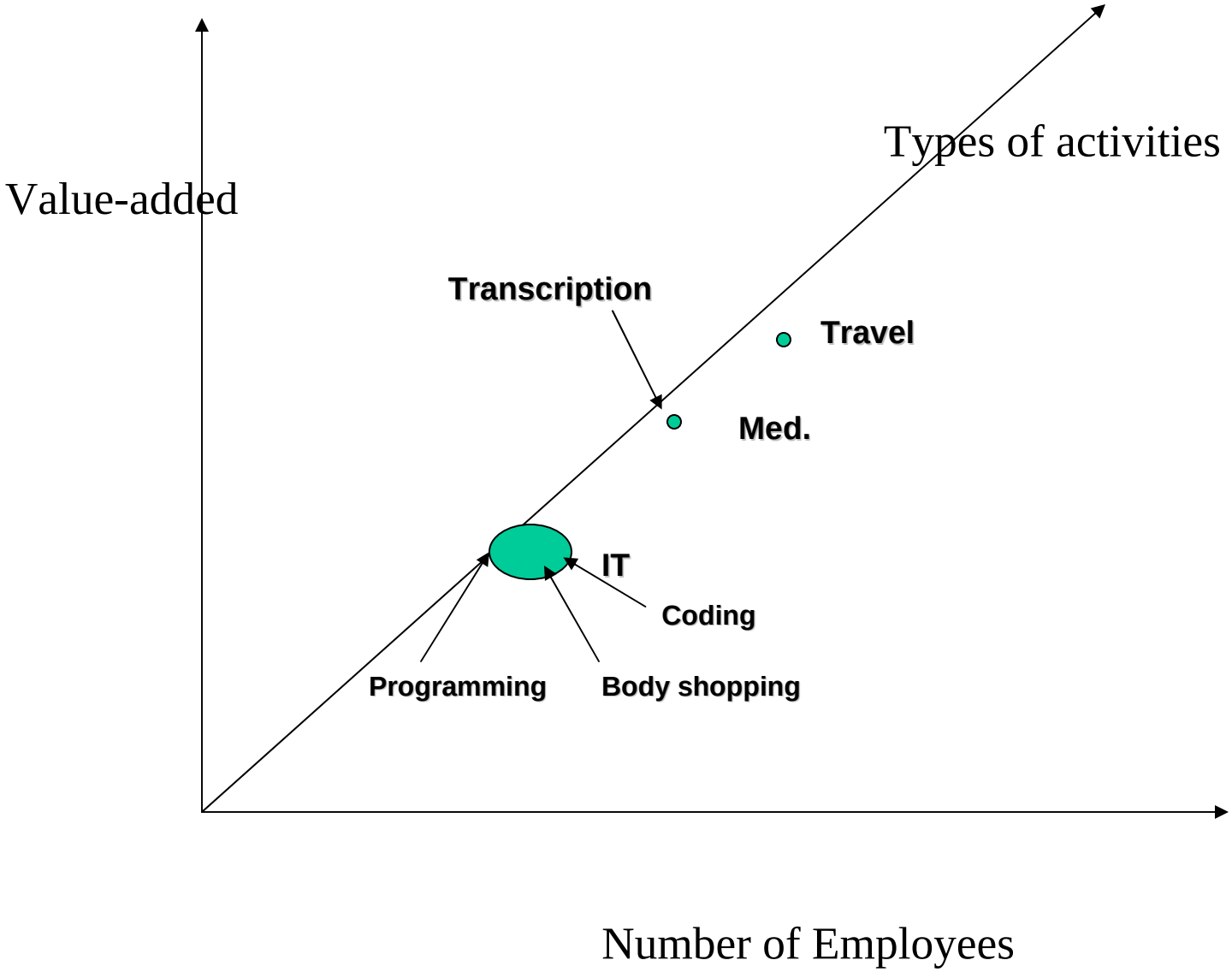


Figure 2: Stylized Representation of Indian Service Provision, 2000

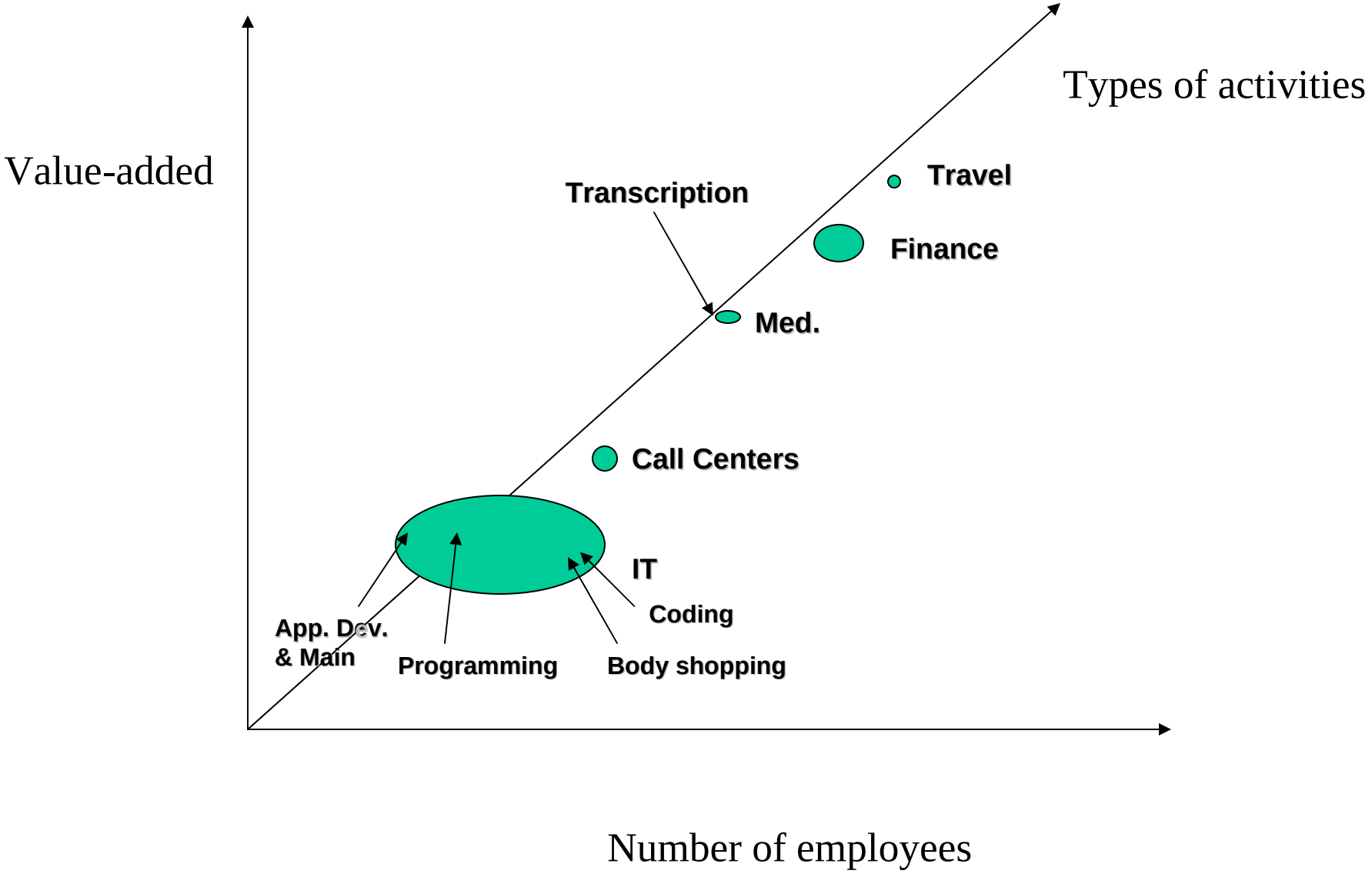


Figure 3: Stylized Representation of Indian Service Provision, 2003

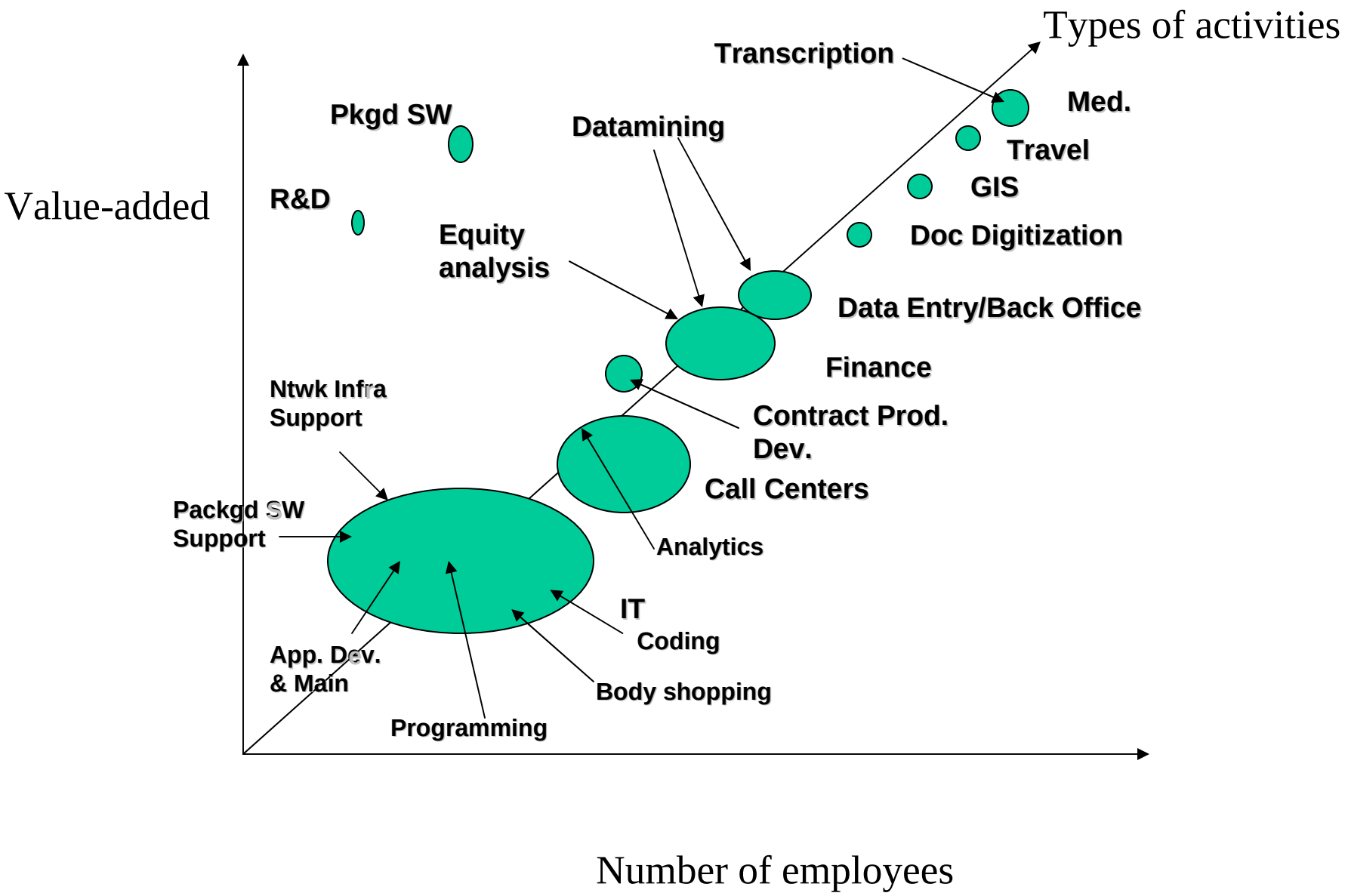


Figure 4: Stylized Representation of Indian Service Provision, 2006

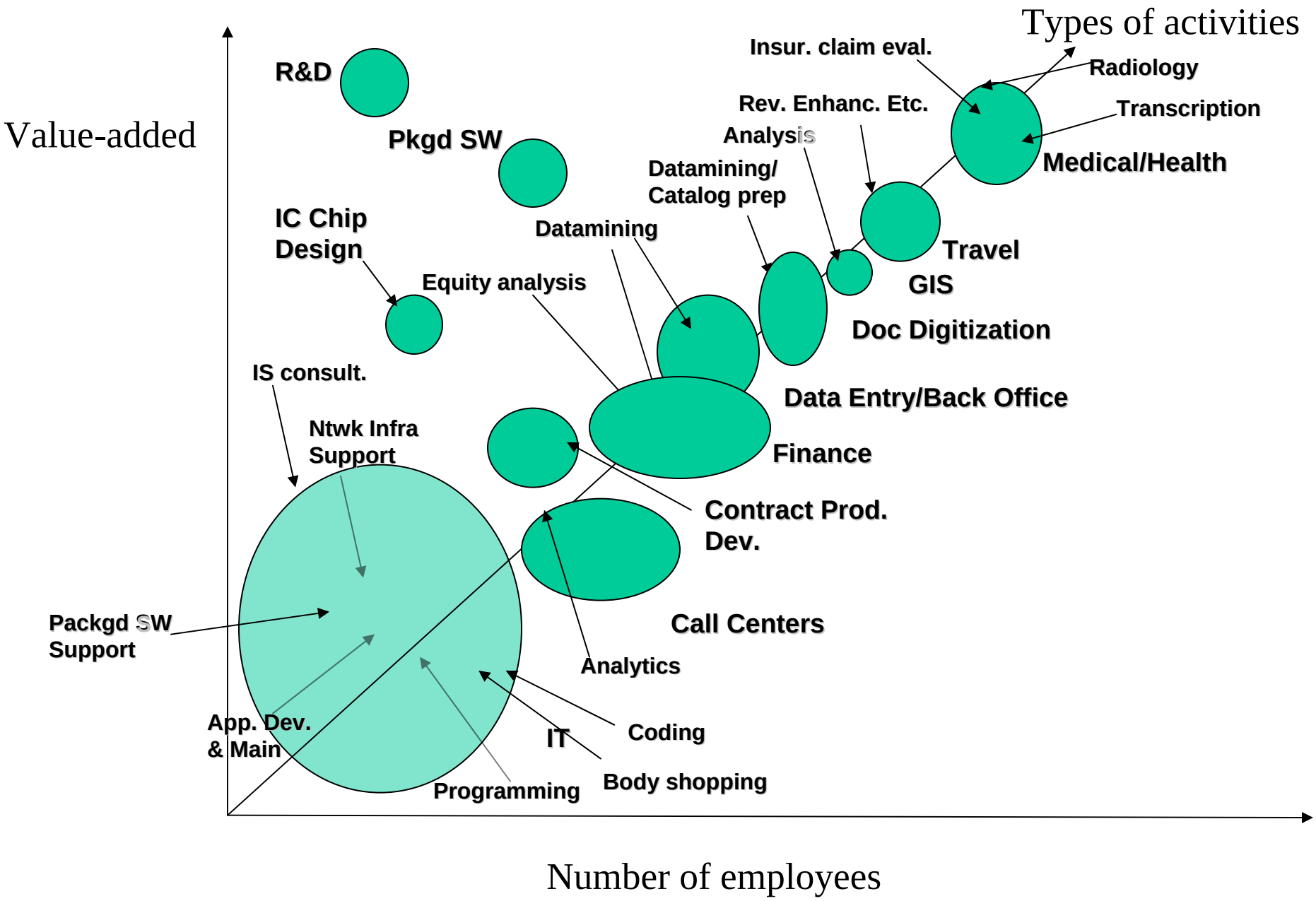


Figure 5: Categorization of Startup Operations in India

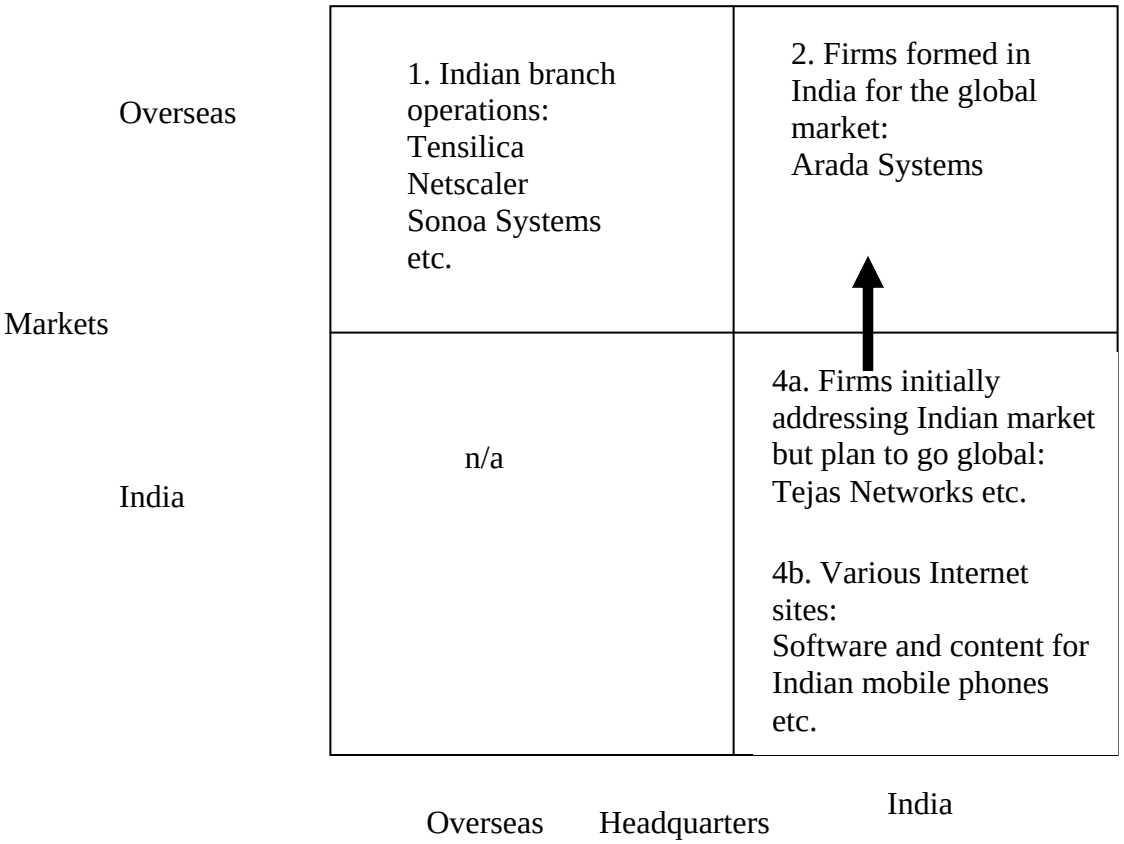
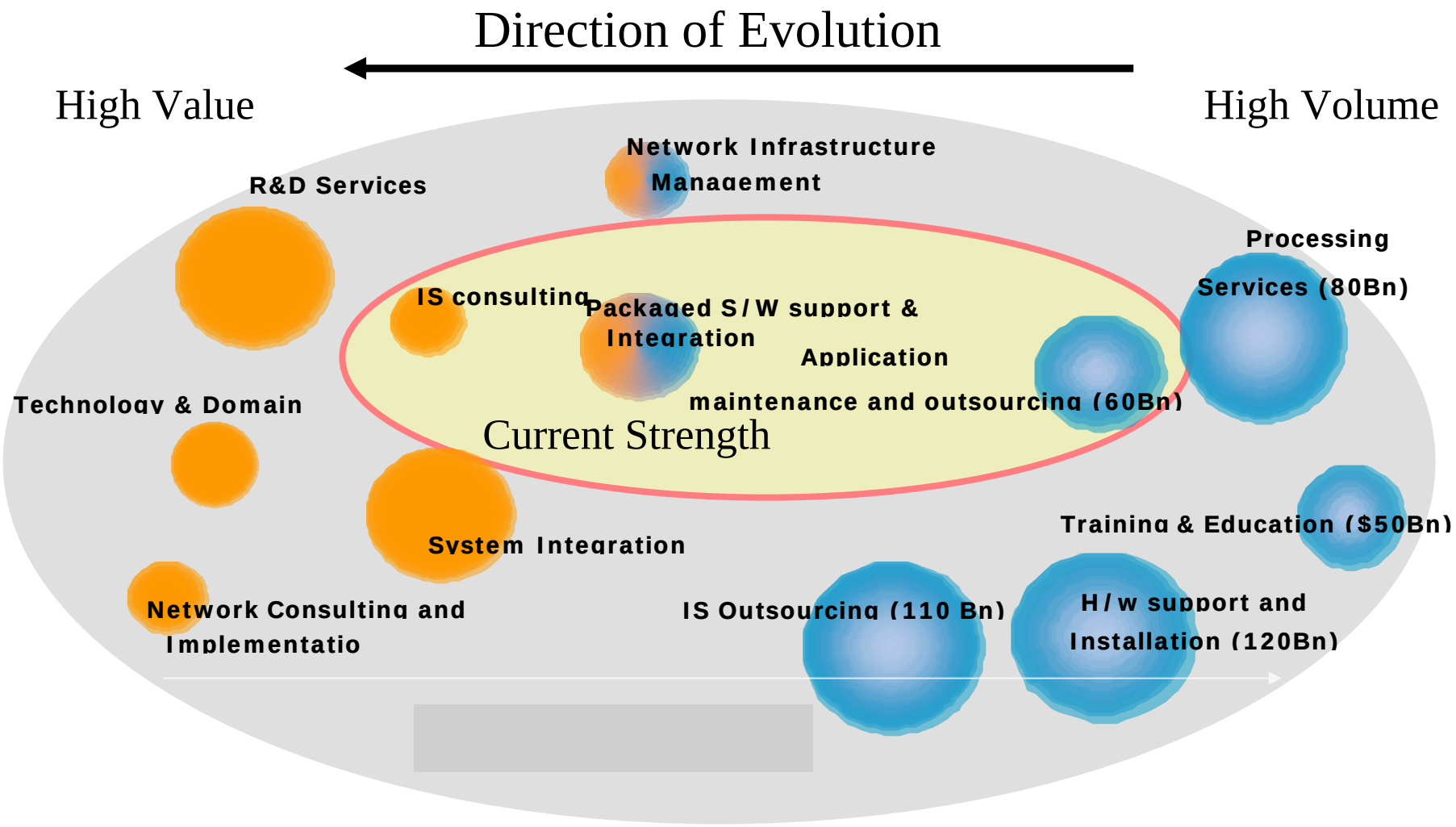


Figure 6: The Indian IT Services Landscape



Source: TCS 2006