

Mexico and the Globalization of Services: Outflanked Once Again?

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Abstract: The newest wave of globalization is the offshoring of information technology, administrative and technical services (ITAS) from developed to developing countries. This article examines Mexico's ability to take advantage of this opportunity, especially relative to India— the world's largest outsourcing beneficiary. It also discusses the current ITAS market in Mexico, including its firms and structure. The current Mexican industry's underdevelopment, the role of United States and Indian MNCs, the comparative strengths and weaknesses of Mexico in this environment, and Mexico's experience with globalization based on manufacturing are explored and will be of particular interest to policymakers and the business community.

Keywords: Mexico, offshoring, outsourcing, services, globalization.

Resumen: La ola más reciente de globalización es la subcontratación en el extranjero de servicios técnicos, administrativos y de tecnología de la información (ITAS, por sus siglas en inglés), de países desarrollados a países en desarrollo. En este documento se examina la habilidad de México para aprovechar esta oportunidad, especialmente en comparación con la India, el país que más se ha beneficiado con esta subcontratación en el ámbito internacional. También se discute el mercado actual de dichos servicios en México, incluyendo sus firmas y estructura. Se exploran el subdesarrollo actual de la industria mexicana, el papel de las empresas multinacionales de Estados Unidos y la India, las fortalezas y debilidades de México en este entorno, y la experiencia mexicana con la globalización basada en la manufactura. Se espera que este traba-

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jo sea de interés, especialmente para el mundo de los negocios y para los responsables de las políticas públicas.

Palabras clave: México, subcontratación en el extranjero, subcontratación nacional, servicios, globalización.

JEL Classification: F14, L84, O54.

Introduction

The offshoring of an increasing number of white-collar jobs from developed to developing countries presents a significant economic opportunity to any developing nation having a low-cost and educated workforce. In 2003, when *Business Week* published its first article on the offshoring of service work, Mexico was not even mentioned. However, by 2006 the assessment had changed, as *Business Week* (Smith, 2006b) published an article on the offshoring of engineering jobs focusing entirely upon Mexico. This article explores the offshoring to Mexico of information technology, administrative, and technical services (ITAS).¹ We contrast the case of Mexico with that of India, where a rich and diverse ITAS offshoring ecosystem has emerged. Within this context, we also explore the growing relationship between the Indian and Mexican ITAS industries. This has been of particular importance recently, as TCS, Infosys and Wipro, the top three Indian outsourcing companies, have begun to play an increasing role in the Mexican ITAS sector. TCS, for example, announced a large government contract with Mexico in November 2007, and major investments in Guadalajara. The ability of Mexico to leverage its proximity to the vast US ITAS market may be the most important development opportunity Mexico will face this decade, and should be of significant interest to Mexican policymakers and the business community. By analyzing the key actors in the Mexican environment, both corporate and governmental, we provide a nuanced assessment of the potential for Mexico to benefit from this new turn in globalization.

¹ ITAS includes both technology and business process services, which typically consist of: software, infrastructure, website development and hosting, customer relations, finance, accounting, human resources, supply chain management, transaction handling, telecommunications infrastructure management, and customer contact.

As a global industry, the sheer number of ITAS activities that might be offshored is remarkable. On the more conservative side, from a study of eight industries, the McKinsey Global Institute (2005) suggests that approximately 11 million jobs are potentially offshorable in the next five years, of which the US would, by their estimation, account for probably 60 per cent or 6.6 million. Alan Blinder (2007) has come to an even more dramatic conclusion, suggesting that “the total number of current US service-sector jobs that will be susceptible to offshoring in the electronic future is two to three times the total number of current manufacturing jobs (which is about 14 million)” (Blinder, 2007). It is impossible to predict the number of jobs at risk, but the number is large, and it is likely the relocation will be more rapid than the relatively slow offshoring of manufacturing. To illustrate, in 2000, 232,000 Indians were employed in offshore service provision. This grew to 1, 251, 000 in 2007, and was expected to continue growing at over 20 per cent per year (Nasscom, 2007).² ITAS offshoring will, in the next two decades, massively reorganize where Robert Reich’s (1991) symbolic analysts and non in-person service providers will be located. If Mexico could divert only a small percentage of these jobs from India, it would be an important benefit, particularly because ITAS employs educated persons, and could thereby increase the return to education in Mexico.

The establishment of a substantial ITAS export sector could provide employment to educated Mexicans in activities that offer considerable prospects for industrial upgrading and even entrepreneurship. Offering such services to global buyers would allow Mexican professionals to integrate more firmly into the global economy. It would contribute to the improvement of Mexico’s internal economic productivity through lear-

² Academics, US government policy bodies and the private sector use Nasscom data when discussing the IT services sector in India. It is derived from Science and Technology Parks of India data. Accurate reporting by firms to STPI is important because STPI is the source of tax relief on all profits derived from exports. Falsification of such reports is very dangerous because tax relief would be lost. There is no suggestion in the literature that Nasscom data is inferior to other data sources, and it is the standard reference on Indian business activities in offshoring. The US GAO (2005) concluded that US government data on services imports to the US is flawed. After examining the Nasscom methodology, the US GAO concluded that it may overestimate the value of services exports to the US. There was no disagreement regarding employment in the Indian offshore services provision sector. In this paper we cannot resolve these data validity issues regarding the value of Indian service exports to the US.

ning global state-of-the-art practices and techniques. As is evident, this new wave of globalization offers significant economic development opportunities.

I. Mexico and the Globalization of Manufacturing

To better understand the context in which the Mexican IT service sector emerged and Mexico's previous experience with globalization, it is important to review Mexico's experience as a manufacturing destination, with a specific focus on its relationship with the United States. For manufactured exports Mexico's breakthrough came in the late 1960s, when, in response to Asian competition, many US firms simultaneously relocated production to Mexican cities along the US border to take advantage of cheaper labor costs. In Mexico, this was encouraged by the Border Industrialization Program (BIP) established in the 1960s, which encouraged export firms to establish industries within a 12.5-mile border strip. The BIP, besides providing substantial tax holidays, also allowed for the import of machinery, equipment, and manufactured components duty-free for processing and assembly, provided that all imported products were re-exported (Sklair, 1989; Shaiken, 1990). As Mexico faced periodic economic crises, and as the maquiladoras were the most dynamic part of its economy, the government opened the entire country to foreign investment for export. In 1965 there were nearly 3,000 employees in the maquiladoras. Since 2000 employment has fluctuated between 1 and 1.3 million, finally settling at approximately 1.2 million in 2006 (Federal Reserve Bank of Dallas, 2007). This was approximately 2.6 per cent of the total 2007 labor force of 45.38 million (of which approximately 25 per cent are underemployed) (CIA, 2007).

Prior to 2000 the bulk of Mexican economic growth during the last two decades was due to the expansion of the maquiladora sector (Gruben, 2001). And, by the late 1990s, some maquiladoras were participating in industrial upgrading, producing complex products and using advanced production processes (Carrillo and Hualde, 1998). Within these facilities there was greater focus on information technology, an increase in R&D capacity, and advanced manufacturing capabilities. The major avenue to upgrading manufacturing processes was an increase in the amount of R&D, product testing, design, and software development and use.

By 2000 a small Mexican software industry emerged in Guadalajara, where the (by then) largely closed computer assembly operations of IBM

and HP were located (Ruiz-Durán, 2003). This fledgling software industry emerged from the engineering activities undertaken in the MNC facilities. In addition, expanding auto production operations gradually attracted some production engineering and basic design work. However, the degree to which these advanced manufacturing processes contributed to Mexico's growth as a provider of knowledge-based technology services is debatable as, judging by Mexican patenting at the US. Patent and Trademark Office (2006), which has stagnated the last 25 years at approximately 100 per annum, the volume of research was minimal.³

With the passage of NAFTA it was possible that Mexico would become the offshore manufacturing supply center for the US. Though Mexican manufacturing exports continued to expand (particularly in goods for which transportation was expensive, where NAFTA local content rules were extant, or where short turnarounds were necessary), the focal point of offshore manufacturing moved inexorably towards China and East Asia. Today, few believe that maquiladora employment is likely to grow significantly (Federal Reserve Bank of Dallas, 2007). For the Mexican government, the realization that its growth potential in export-oriented manufacturing was limited came rather abruptly, with the recession beginning in 2000. This prompted a search for export industries within which Mexico might find employment opportunities. It was within this context that ITAS exports offered a new growth opportunity.

II. Mexico and the Globalization of ITAS

ITAS globalization refers to the relocation of work from high-cost developed nations to lower cost nations, and resembles the earlier relocation of manufacturing. To put it into the vernacular of economists, during the last two decades many ITAS have become increasingly tradable in two ways: First, they became tradable across firm boundaries, *i.e.* they could be outsourced. Second, they became tradable across national boundaries, *i.e.* they could be offshored to an offshore subsidiary the firm owns. When the services are delivered across national and firm boundaries, they are outsourced offshore (Dossani and Kenney, 2007).

³ To illustrate: in 2006 Chinese inventors received 970 patents, an increase from five in 1985. Indian inventors received 506, an increase from 36 in 1993.

Prior to digitization, nearly all ITAS work was carried out on physical media such as paper, which is bulky and relatively expensive to transport. With only a few exceptions such as call centers and data entry, the initial large-scale offshoring of service work was in software programming and coding (Heeks, 1996; Arora and Arthreye, 2002), and India was the major beneficiary. An important expansion in offshoring came in the late 1990s due to a shortage of software programmers during the Internet Bubble and Y2K scare (Dossani, 2004). It was also in the 1990s that other services began to be relocated, again with India as the leading destination (Dossani and Kenney, 2007).

Beyond the digitization of information, ITAS offshoring was further accelerated by the global telecommunications expansion during the Internet Bubble, which led to a dramatic drop in data transmission costs. This was accompanied by dramatic declines in the cost of computing and the increasing ubiquity of high-speed digital scanners, allowing the low-cost transmission of written materials. As a result, the Indian ITAS sector grew at a 24 per cent compounded annual growth rate (Nasscom, 2007) and expanded in number of employees, the value-added of the work, and types of activities (Dossani and Kenney, 2007).

There are four separate categories of ITAS offshoring: First, there are developed nation outsourcing firms, such as Accenture, CapGemini, EDS, HP, and IBM, which operate offshore facilities to provide contracted services to their customers in developed nations. In Mexico, there is a second category of foreign firms, namely Indian firms led by the giants, TCS, Infosys, and Wipro, which are expanding their global footprint to better compete with the developing nation service firms. A third category consists of independent Mexican ITAS firms such as Softtek, Neoris, and Hildebrando. The final category is firms establishing subsidiaries abroad to undertake services they want to relocate from their developed nation operations. Very often, these subsidiaries undertake higher value-added and other activities that the firm desires to retain internally, but wish to perform in a lower cost environment. In Mexico, this includes General Motors, General Electric, Delphi, and others.

The internal Mexican market for ITAS outsourcing is growing, as Mexican firms and government agencies outsource various functions. Services, as a whole, are becoming increasingly important in the Mexican domestic economy. In 2007 the Mexican ITAS market is expected to grow at 13.85 per cent (Select IDC, 2005). Despite the recent growth, the contribution of ITAS in terms of revenue and GDP is still small. Although

statistics are limited, it is estimated that in 2005 ITAS was responsible for \$3 to 4 billion dollars of revenue (Medina, 2007a). As a side note, in 2006 IT services generated \$2.6 billion dollars in revenue, and software, \$910 million (Select IDC, 2006).

Although Mexico has few large and internationally competitive ITAS firms, the country boasts a growing number of firms with international certification. The Ministry of Economy states that “Mexico has several companies assessed at CMM-SW (the Capability Maturity Model for Software), four at level five, one at CMMI-5 (Capability Maturity Model Integration), twenty-six with levels CMMI 3 and 4, and at least 125 other companies to be assessed” (Secretaría de Economía, 2006).⁴ Although Mexico does not promote any specific ITAS niches, most companies provide services to financial, manufacturing, and telecommunications companies and government agencies. Within the ITAS industry, the leading services, by total sales percentage, are: IT integration and development services (31.8 per cent), software support (16.2 per cent), and hardware support (14.9 per cent) (Secretaría de Economía, 2006).

The principal developing nation destinations for ITAS offshoring are large conurbations, where there are ample supplies of college-educated individuals. The areas with the most successful IT service clusters in Mexico are Mexico City (which, in 2001 had about 45 per cent of Mexico’s IT service and software firms), the states of Nuevo León, i.e., Monterrey (about 13 per cent of each) and Jalisco, i.e., Guadalajara (about 4 per cent of each) (Select IDC, 2000). It is important to note that the concentration of ITAS activities in Mexico City does not necessarily reflect any specific promotion strategies or synergistic clustering; rather it likely reflects the size and importance of the economic activity in Mexico City. In interviews, it was suggested that this was a result of Mexico City’s focus on traditional commerce and politics, and that there was little interest among either politicians or businesspersons in the city to promote technology-based industries.

The two cities with the most dynamic ITAS activities are Monterrey and Guadalajara, both of which have experienced significant investment and growth. Again, although statistics are limited, of the \$3 to 4 billion in Mexican ITAS revenues in 2005, it was estimated that Guadalajara earned roughly \$650 million and Monterrey, nearly \$220 million (Medina,

⁴ CMMI ratings are awarded by appraisers who are authorized by the Software Engineering Institute of Carnegie Mellon University, to assess organizations according to five ascending process maturity levels.

2007b). Guadalajara is important because, as stated above, though it only accounts for a small percentage of the IT service firms in Mexico, it has much larger revenues than Monterrey, which has a greater number of firms. The large MNCs located there, such as IBM and HP, are responsible for a majority of Guadalajara's ITAS success. Interestingly, firms from Guadalajara have specialized in niches including semiconductor design, embedded software, and multimedia; all of which are the by-product of its history as the center of electronics manufacturing.

Monterrey has a strong entrepreneurial environment and a vibrant indigenous IT industry with a few firms, such as Softtek and Neoris, competing in international markets. Monterrey's high tech firms are also linked to the local industrial legacy. For example, Softtek was created by engineers formerly employed by Alfa, a large Monterrey MNC (Contreras and Rangel, 2007), and Neoris is a spin-off from Cemex's IT operations. Monterrey is attractive because it is the home of the Tecnológico de Monterrey, the finest technical university in Mexico. Also, due to proximity, Monterrey firms have connections with Texas-based technology companies.

Mexican states are the locus of significant industrial policy making. Nuevo León and Jalisco have had success in encouraging ITAS and, interestingly, the Secretaría de Economía (2006) found that nearly every state in Mexico has some level of ITAS activities (Contreras and P. Millán, 2006; Ruiz-Durán, 2003). Certain states have received attention regarding their business and ITAS promotion efforts. For example, in a 2006 World Bank report, Aguascalientes, which has a small but growing ITAS industry, was noted because of the state's efforts to improve the ease of doing business in general (World Bank, 2006). Ciudad Juárez in Chihuahua is also interesting, because it is the site of the large former GE subsidiary and now independent firm Genpact. Querétaro has been growing as well, especially in the areas of business process outsourcing (BPO) and call centers. Finally, Baja California has experienced success in attracting software activities and call centers. However, although all are growing, none have large concentrations of activity to date.

III. The Mexican ITAS Market and Industrial Structure

With a population of 103 million, Mexico has a significant internal demand for IT services, which is the focus of most indigenous firms. The Secretaría de Economía (2006) estimates that approximately 90 per cent of Mexico's demand for ITAS, which is currently valued at close to \$3 billion, is satis-

fied by domestic firms. Moreover, there is substantial room for growth. For example, Prosoft, the Mexican government entity charged with assisting the ITAS sector, believes that the potential domestic demand for IT services is over \$3.7 billion dollars (Secretaría de Economía, 2006).

On the other hand, exactly how much ITAS Mexico exports yearly is unknown. In 2005, Mexico exported nearly \$300 million dollars in software, while service export revenues were likely higher (Mexico Connect, 2006). In contrast to the domestic market, where small firms provide much of these services, large and medium size enterprises primarily supply the export market. The destinations of the ITAS exports are diverse, with 51 per cent going to the United States, 20 per cent to South America, 17 per cent to Central America, and the remainder split between Western and Eastern Europe and Asia (Secretaría de Economía, 2007).

As is evident, the Mexican ITAS industry is bifurcated between numerous small firms and a few larger firms. This pattern differs from India, where the ecosystem is variegated with large firms (>30,000), many medium-sized niche firms (29,999-5,000), and many more small firms (<5,000) (Dossani and Kenney, 2007). Gustavo García González, of CANIETI, reports that of the 2,095 IT service firms in Mexico, only 5 per cent are large (more than 100 employees), while 10 per cent are medium (51-100), 30 per cent small (11-50), and 55 per cent micro (0-10) (García González, 2007). Although numerical comparisons between these two countries may be questionable due to national population differences, the sheer enormity of the large Indian ITAS firms relative to the largest Mexican firms and the proliferation of small Mexican ITAS firms, indicate that the sector in Mexico is underdeveloped. For example, the largest of these Mexican firms, Softtek, employs 4,500 persons and the second largest, Neoris, employs 2,000. Although large in Mexico, these firms employ less than one-tenth the numbers of the Indian giants, such as TCS (100,000 employees), Infosys (80,000), or even the large Indian second-tier firms (10,000 to 50,000). In this sense, Mexican firms are not yet first-tier competitors.

The leading independent Mexican IT service company, Softtek, was established in 1982 by entrepreneur Carlos López. By 2000 it was the largest privately owned IT services company in Latin America, and the bulk of its revenues were generated by exports. In the last few years the company's growth has accelerated, with 2006 (est.) revenues reaching \$185 million (Marlin, 2007). In 2007 Softtek had more than 4,500 employees and was growing at 45 per cent per annum, thereby matching the growth rate of its

larger Indian rivals. Softtek's global footprint has expanded, with facilities in Mexico, Brazil, Spain, and a new facility in China (Camino, 2007). In 2005 the company achieved a CMMI level 5 rating at its most mature facility, and recently its newest operations have also become CMMI level 5 certified.

Softtek's success has come through positioning itself as a near-shore location for ITAS outsourcing, largely from the United States. The advantages of nearshoring include common time zones, relatively short transportation times, and lower costs for transportation and communication. Another advantage is the agreements Mexico has with the United States, which ease the costs of cross-border business. Softtek's goal is not to replace services provided from India, but rather to capture contracts from firms wishing to diversify risk (Aggarwal *et al.*, 2006). Softtek has experienced marked success as GE (partially a legacy of its earlier acquisition of its Global Delivery Center in Mexico), Citigroup, Onyx, HP and EMC are all customers.

Softtek also boasts one of the best trained and well-educated workforces in Mexico. Employees receive at least three semesters of CMMI and Six Sigma training, and also take English language courses. To recruit the best students, it has partnered with the Universidad Nacional Autónoma de México, Tecnológico de Monterrey, and Tech Millennium –three of the finest Mexican universities. To illustrate the closeness of this relationship, in Mexico City Softtek has offices located on the Tecnológico de Monterrey campus (Camino, 2007).

Though Softtek is the largest Mexican ITAS service firm, it is still much smaller than its US and Indian MNC counterparts. Due to their smaller size overall, most Mexican ITAS firms face limitations in going beyond their nearshore niche. Large size seems to be a requirement to become globally competitive. With increased size, ITAS firms can achieve economies of scale and scope. Larger firms can have a finer-grained division of labor and cultivate vertical industry specializations, decreasing costs and increasing price competitiveness.⁵ On a more optimistic note, the success of the Indian firms indicates how large the Mexican firms might become if they can sustain their growth. Certainly, Softtek demonstrates that ITAS firms from Mexico can grow rapidly.

⁵ Though it is true that these services firms essentially sell labor hours and thus grow by increasing their number of employees, larger firms are able to bid on larger contracts than smaller firms by virtue of their ability to manage these larger contracts.

Beyond Softtek, Neoris is another significant Mexican ITAS service firm. Neoris has offices in Monterrey and Mexico City (as well as in the United States), and over 2,000 employees working in nine countries. It is estimated that 2006 revenue was in excess of \$200 million dollars (Stevens-Huffman, 2007). Neoris originated as a spin-off of Cemex's in-house technology consultancy. Cemex continues to be its largest customer, even though Neoris' international presence is expanding rapidly (*Cement Americas*, 2001). However, although large domestically, Neoris is also considered small in the global market.

IV. Explaining the Mexican Industry's Underdevelopment

The absence of many large ITAS firms and the large number of small firms suggests this is an underdeveloped industry in Mexico, particularly as there is a lack of evidence indicating that small firm size offers advantages in this sector. According to our interviews, a number of factors are responsible for this underdevelopment. One reason suggested was the lack of an aggressive business mentality on the part of many Mexican entrepreneurs. Other reasons involved a perceived lack of trust and teamwork among Mexicans in the business environment, and insufficient access to credit. Finally, some interviewees thought there was an endemic shortage of well-trained Mexican IT service engineers. What this suggests is that Mexico faces both infrastructural and cultural obstacles to successfully build a robust ITAS industry.

To explain the perceived non-aggressive business mentality, there is a general belief among observers that Mexican entrepreneurs are conservative, *i.e.*, they are more motivated by owning and controlling their own business than by expansion and growth. They are said to be emotionally attached to individual firms and usually unwilling to accept outside investors that would dilute their control. The reluctance to sell one's firm discourages growth through merger and investment by outsiders. This eliminates the possibility of selling the firm for the large capital gains that might act as a signal to encourage yet more entrepreneurs. The Global Entrepreneurship Monitor found that only 3.4 per cent of new and nascent entrepreneurs expected their firms to grow to 20 or more employees, which is well below the world average of 8.6 per cent (Autio, 2007). In other words, the entrepreneurs were not forming firms with the expectation of building a large firm. Without such demonstration effects, it is possible that others are not encouraged to venture and strive

to grow their firms to a substantial size. Interestingly, in the same report, India too, fell below the world average with only 1.9 per cent of new and nascent entrepreneurs who expected their firms to grow to 20 or more employees (Autio, 2007). It is important to mention, however, that the Global Entrepreneurship Monitor measures entrepreneurship in firms from a variety of industries, so it is unknown what percentage of these firms would be considered high-tech.

However, it appears that the emphasis on personal control over the firm is contradicted by the Indian example, especially in the high-tech sector. In India, there is a very active stock market with all the major Indian IT service firms listed, as well as myriad other software and BPO firms. Also, India has an Anglo-Saxon stock market based financial system, rather than the Mexican system which is based on banks and Napoleonic law. The active participation by firms in the Indian stock market indicates that Indian owners do not necessarily share the same personal control beliefs that many Mexican owners seem to have.

A second problem limiting the growth of Mexican firms is a generalized lack of trust and teamwork. Although it is likely that trust and teamwork issues could be cited as barriers to business the world over, a 2002 Inter-American Development Bank (IDB) study on entrepreneurship in Latin America singles out Mexico as particularly problematic. The IDB report found that "In all the (Latin American) countries, with the exception of Mexico, teams of entrepreneurs, particularly in Argentina and Brazil, founded most of the dynamic new enterprises. This is true for approximately 9 out of 10 companies in Argentina and Brazil, as compared to 8 out of 10 in Costa Rica, 6 of 10 in Peru, and only 4 of 10 in Mexico" (Kantis, Ishida and Komori, 2002, p. 40). While some believe that this can be interpreted as indicating a lack of trust within the Mexican business environment, others are more skeptical of the role social capital plays in firm size (for information on several factors that affect firm size in Latin America please see Lora, 2001).

The inability to obtain business venture financing relates to the unwillingness by Mexican entrepreneurs to share control. The previously mentioned IDB study found that a significant number of Mexican and Brazilian entrepreneurs, as compared to entrepreneurs in other Latin American nations involved in the study, did not want to accept debt to start their business because they did not want to deal with external financing sources. This was largely because they wanted to maintain control of their own business, were risk averse, or were not confident in their

financial institutions (Kantis, Ishida, and Komori, 2002, p. 44). Instead, in Mexico, most companies are started using an entrepreneur's personal savings, and a small percentage receive loans or financial support from banks (Kantis, Ishida and Komori, 2002). The authors of the IDB study state that the lack of access to finance "coincides with what many authors have emphasized as weak aspects of the Latin American environment for starting up enterprises, especially those based on technology" (Kantis, Ishida and Komori, 2002, p. 85). The authors find a comparative lack of venture capital and bank loans for Latin American businesses as compared to East Asia, and go further to say that "Latin American entrepreneurs mentioned the limited or total lack of access to external financing as a significant factor" (Kantis, Ishida and Komori, 2002, p. 85). They conclude that entrepreneurs in Latin America mainly use three different types of financing (in decreasing order of importance): personal savings, credit from suppliers and/or clients, and loans from family and friends. In Mexico, loans from family and friends played the most important role in business venture financing. Furthermore, less than 1 out of 5 Latin American entrepreneurs involved in the study used bank loans for start-up, with the lowest rates in Mexico and Brazil (Kantis, Ishida and Ko-mori, 2002).

Interestingly, for those entrepreneurs who wanted to use bank loans to start an ITAS firm, access to credit is found to be more restricted in these knowledge-based industries than in others (Kantis, Ishida and Komori, 2002). This makes sense, as small start-up firms in the IT sector rarely have the collateral necessary for a loan, and their assets are generally limited to software and personnel. This can make these firms appear risky to the banking sector, even though the growth opportunities can be great. It is also important to point out that even for those entrepreneurs/firms that do receive loans, borrowers have less legal rights in Mexico than is the Latin American average, further complicating this means of financing (World Bank, 2006).

With limited support from financial institutions, those seeking financing for their business ventures have few places to turn to. This has, in part, been attributed to a lack of transparency in Mexican corporate forms. For VC firms the situation is difficult because "(Mexican corporate forms) do not allow for an entity to serve as a tax pass-through, in which taxes are assessed only to the owners and not to the corporation. Thus, incorporation in Mexico potentially results in double taxation; that is, taxation of the fund and also of the investor" (Kappaz and McNeece,

2004, p. 1). Furthermore, Mexican corporate law prohibits a majority of practices related to minority shareholder rights, and there is a lack of investor exit opportunities (Kappaz and McNeece, 2004).

The structure of the Mexican IT industry, as a whole, combined with national political economic institutions, discourage IT-related entrepreneurship. As a result, Mexico has a large number of small firms that are below the minimum size to be globally competitive and, as important, to be able to upgrade their skills and increase the scope of their business. This plethora of small firms is furthered by an unwillingness to merge and create larger organizations. The result is that, while these firms survive, it is difficult for them to move up the value ladder to undertake bigger and more lucrative contracts.

V. ITAS MNCs Operating in Mexico

Most MNCs operate in Mexico for two purposes. The first purpose is to service local customers. The second purpose is to service the rest of the world, which in Mexico's case is largely Latin America and the US. The two main groups of MNCs operating in Mexico are the US giants such as IBM, Accenture and EDS, and the Indian ITAS firms such as TCS, Infosys and Wipro.

The world's largest ITAS provider, IBM Global Services (IBM GS), is also the largest IT service provider in Mexico. IBM GS Mexico supplies other IBM divisions and customers in Mexico and abroad. IBM has largely shifted its operations from manufacturing to services and, according to the latest available statistics, in 2001 IBM Mexico's software revenue of \$160 million was about 25 per cent of market share (Chandrasekhar and Ghosh, 2006; Ruiz-Durán, 2003). In 2002 IBM Global Services employed 1,200 people at its Guadalajara and Mexico City Application Services division (Overby, 2006), and has recently signed outsourcing contracts with large Mexican firms, demonstrating that its strength in the Mexican market continues. For example, at the end of 2006 it signed two multi-million dollar agreements, one with ScotiaBank of Mexico (a wholly owned subsidiary of Bank of Nova Scotia in Canada) and the other with Grupo Modelo, the large Mexican brewing company, to revamp their IT systems (McDougall, 2006a; IBM, 2006). In 2007 IBM remains a major force in the Mexican IT industry and is the largest foreign ITAS vendor in Mexico; though in overall Mexican employment it is smaller than Softtek.

Hewlett Packard (HP) is another important MNC in the Mexican ITAS sector. It, too, is headquartered in Guadalajara, and its Mexican operations provide services including purchasing of parts for global manufacturing, internal BPO, all payroll for North America, order processing, compensation payments, legacy system engineering, some programming, code patching and repair operations for HP in the Americas. To illustrate the importance of this center's operations, HP Guadalajara provides 50 per cent of the total services processing for HP's financial and business operations (Business Monitor International, 2007). Interestingly, HP's Mexican ITAS operations are managed from Bangalore, India.

Other major US ITAS firms also operate in Mexico. Electronic Data Systems (EDS) has a significant presence in Mexico, and in 2004 had Mexican revenues of more than \$200 million. EDS supplies BPO services to many domestic Mexican firms, including Grupo Nacional Provincial and Grupo Bimbo (Manda, 2005). ACS (Affiliated Computer Services) has a smaller presence in Mexico (both in Monterrey and Ciudad Juárez) and most of its output is exported. Although experiencing success in its Mexican operations, a 2006 article stated that ACS would make major cuts in Mexico and relocate the jobs to a lower-cost location, presumably India (McDougall, 2006b). This demonstrates that the US MNCs have been actively building their Mexican operations, but these initiatives are in a global environment, where they must compete with other lower-cost locations.

For a number of non-ITAS firms, their in-house offshoring service function emerged from their manufacturing operations in Mexico. For example, Delphi, GE and GM all have service operations in Mexico handling their IT needs. As stated above, GM has its former subsidiary, EDS, doing service work in Mexico. GE also has its former Indian subsidiary, Genpact, operating in Mexico to do BPO work and certain manufacturing support services. To provide a measure of the global division of labor, only 6 per cent of GE's service needs is supplied from Mexico, while 90 per cent is supplied from India (Smith, 2006a). Recently, Delphi signed a deal with Genpact to relocate 650 finance jobs, suggesting Mexico may have a significant opportunity to encourage ITAS growth by providing manufacturing-related services to US firms already manufacturing in Mexico.

V. 1. Indian ITAS Firms

The role Indian ITAS firms play in Mexico has increased rapidly in 2007. Perhaps the greatest symbol of this interaction came when president

Felipe Calderón visited Bangalore, India in September 2007, with the hope of improving relations and encouraging investment from Indian ITAS companies (Ribeiro, 2007). This visit came after August announcements by Infosys and Wipro, two Indian outsourcing giants, that they were opening their first Latin American subsidiaries in Monterrey, Mexico, with the objective of providing “nearshore” services to their US customers (Infosys, 2007; Mahapatra, 2007). President Calderón was also present at the May 2007 inauguration of a new TCS global delivery center in Guadalajara. TCS has been making other headlines too, as in November 2007 when it announced a four-year, 200 million dollar government contract with the Social Security Institute of Mexico (IMSS), to provide its end-to-end IT services (AFX News Limited, 2007). The IMSS is one of the largest organizations of its kind in Latin America, and this is TCS’s first government contract in the region. This announcement is a significant sign that the Indian ITAS providers can penetrate the Mexican domestic market.

While there are many new Indian ITAS establishments emerging throughout Mexico, it is important to mention the well-established Indian operations in Mexico like Genpact, the former GE subsidiary specializing in BPO. Genpact operates a 2,500-person facility in Ciudad Juárez, and is expanding operations throughout the city. The presence and growth of both the new and more established Indian firms suggests that they are having sufficient success in Mexico to warrant expansion. Furthermore, the increasing presence of Indian firms indicates that the delivery of ITAS from Mexico is viable.

However, despite the optimism surrounding the ability of Indian firms to utilize the many agreements Mexico has with the US, the managers of the Indian firms we interviewed believed Mexico was reluctant to encourage Indian companies, and some were experiencing operational problems. From the perspective of the Indian firms, Mexico can be a relatively high cost and difficult environment within which to operate. Furthermore, the government and some firms in Mexico probably correctly believe that Indian firms are locating in Mexico to exploit agreements with the United States. Despite these drawbacks, in order to secure larger contracts with Fortune 500 firms, the Indian firms must provide their customers global support, and Mexico has been part of their global expansion plans.

As part of its expansion into Latin America, in 2003 Tata Consultancy Services (TCS) opened its first facility in Mexico. The company’s motivation for entering Mexico was to better serve US clients wanting nearshore support, and to combat the growing costs of doing business in India

(O'Connor, 2007). TCS has expanded globally and has partnerships with firms in the Andean and Caribbean regions, and offices in Argentina, Brazil and Chile. The current TCS Global Development Center in Uruguay has achieved level CMMI-5, and trains Mexican TCS service technicians and professionals. The company's headquarters are in Mexico City, operations are in Monterrey, and in May 2007 a new global development center in Guadalajara was opened. Currently, in the Guadalajara center the company projects short-term employment of over 500 persons, and expects to hire an estimated 4,500 more over the next five years (O'Connor, 2007).

Despite the optimism, TCS Mexico has encountered obstacles with its Mexican operations. First, the quality of engineers, particularly in terms of experience, is not as high as their Indian peers even though wages are higher. Second, the visa process for Indian employees is complicated, and can take up to three months –a problematic delay for projects having strict deadlines.

The other large Indian firm operating in Mexico, Genpact, employs 2,500 persons in Ciudad Juárez. BPO is Genpact Mexico's main activity; it provides processes ranging from finance and accounting, data entry, data storage, and enterprise content management, to higher level processes including asset intelligence, health care services and customer service for manufactured goods. From Mexico, Genpact services Fortune 500 customers including FedEx, GE Money, Delphi, Wachovia, Penske and Nissan among others. Because the workforce in its call center function is, relative to India, less educated, Genpact Mexico can pay up to 50 per cent less than in India for some BPO work. This is possible because its facilities are located in Ciudad Juárez, where there are high school and even less educated persons that speak English and can be hired at Mexican wages. India, in contrast, has an advantage in its plethora of *college educated* English speakers.

The company is also able to draw upon the US infrastructure of El Paso, Texas. For example, Genpact uses a US Post Office box, taking advantage of the US Postal Service, rather than the more expensive private couriers. This also increases the confidence of US customers and clients. The problems Genpact Mexico confronts are common for call centers and other companies that perform BPO work, as the annual attrition rates for BPO employees, in general, are higher than for other types of ITAS activities. In the case of Genpact, these rates are comparable or slightly lower than those in the US and India. The attrition rates in Mexico for

this type of work are largely a result of the fact that BPO work can sometimes be used as seasonal employment, and employees may work in the agricultural or other sectors during different parts of the year. Another problem that Genpact faces stems from its location. Although its location is advantageous in many ways, as outlined above, the large cross-border flow of mail, people, information, and high-technology equipment can make management time consuming. For example, taxation issues are vexing because Genpact has assets in both Mexico and the United States, and customs and licensing issues are complex. Regardless, Genpact's Ciudad Juárez operations have been successful, as demonstrated by the fact that it is expanding operations throughout the city.

In terms of call centers and BPO, a number of other firms are following Genpact's path and establishing large call centers in Mexico. In fact, there is an increasing number of large call centers in Mexico. However, there is little available information on the Mexican call centers, and there are data discrepancies. According to one report, in 2003 there were 8,200 call centers in Mexico, an increase from 2,600 in 1993. Between 2005 and 2006 the number of call centers grew by 19 per cent. Mexico's significance in the sector can be seen by the fact that in 2004 Mexico had 188,700 call center workstations, which was 29.5 per cent of the total in Latin America. Although Mexico City is home to 51 per cent of call centers in Mexico, they are increasing most rapidly in the northeastern region of the country (Rojas, 2007). Ciudad Juárez and Tijuana are also locations with a significant number of larger call centers serving the US market.

VI. Mexican Government Initiatives

Only recently has the IT sector received attention from the Mexican government. Prior to the formation of ProSoft, incentives for promoting the IT services industry were minimal. Not surprisingly, government attention was focused on the much larger industries of oil, auto manufacturing and tourism. Although there have been governmental incentives for promoting R&D, these initiatives are not industry specific. For example, a 30 per cent R&D tax credit, which is offered through the Ministry of Finance and the National Council of Science and Technology (CONACYT), is applicable to any industry R&D, not just that of IT firms (Estrada de la O, 2007). Recognizing quite late the global and Mexican expansion of the ITAS sector and the increasing opportunities for ITAS exports, the Mexican government established ProSoft in 2003 under the Secretary of

Economy. ProSoft spearheads Mexico's shift in industrial promotion efforts, from manufacturing toward knowledge-based industries. In promotion of the IT services sector from 2004-2006, ProSoft invested nearly \$250 million dollars, and its goal is for the IT services sector to reach \$15 billion in yearly revenue by 2013 (of which \$5 billion should be in software). Its overarching goal is for Mexico to develop the leading IT industry in Latin America.

Prosoft's program focuses upon seven areas: increasing foreign investment, increasing human capital capabilities, improving the digital economy legal framework, developing the domestic IT market, strengthening the local IT industry, increasing process capabilities, and promoting IT cluster development (Secretaría de Economía, 2007). To encourage the deepening and upgrading of the Mexican software services sector, ProSoft has initiated a cash grant program equaling 50 per cent of total project cost, to be used for training and certification, software and equipment, standards implementation and certification, R&D, technology transfer and royalties, supplier development programs and tailor-made programs with universities (Secretaría de Economía, 2007; AMITI, 2004).

Although ProSoft is valued by large and small firms alike, it is the subject of some controversy because both small and large firms vie for the organization's monetary support. And, although the small companies interviewed appreciated ProSoft because it provided money for certification and standards implementation, since ProSoft supported 334 projects in 2006 and there are over 2,000 IT firms in Mexico, there are concerns about how many firms ProSoft is able to reach (Secretaría de Economía, 2006). Furthermore, although ProSoft is the most powerful IT service industry organization actor in Mexico, it is connected to the Ministry of Economy, and is not a powerful non-governmental business association (like the highly successful Nasscom in India, which is funded entirely by its corporate members). This means that it is part of the Mexican bureaucracy; not an independent lobbying organization.

Another issue of controversy is a new ProSoft certification program, MoProSoft. Realizing that many of Mexico's small firms could not compete in the global economy but had potential in the local market, the government initiated MoProSoft as a certification scheme along the same lines as the CMMI approach. However, it is a less rigorous version of international certification standards. For example, a firm can achieve level 5 MoProSoft (the equivalent of level 2 CMMI) and use this certification to prove its capabilities and standardization to a local buyer. Some

doubt that this will have a positive effect on the domestic economy; it is largely uncertain whether the local market is large enough to make such a non-standard certification training effort worthwhile.

In addition to the national efforts of ProSoft, there are other programs developed in order to ease business participation in the ITAS industry in Mexico. For example PyME (Small and Medium Enterprises), with support from the Secretary of Economy, has created a number of programs to assist small firms throughout Mexico. One example is a Business Acceleration Program, which is meant to assist small companies in their development to become competitive in the domestic and global economy. State governments vary in their support of their IT industries too. For example, some states offer water and electricity stipends to firms conducting R&D, others offer tax holidays or tax incentives.

Through ProSoft, the Mexican government is making a belated but concerted effort to strengthen its ITAS industries. Despite this support, the industry is almost overwhelmingly composed of small firms unable to compete in the global market. Government efforts aimed solely at upgrading these small domestic firms are unlikely to solve the industrial structure issues.

VII. Mexico's Advantages and Disadvantages in the ITAS Market

Mexico's overwhelming advantage over other nations in Asia and even Latin America is proximity to the US market. Although it is a common belief that information technology has eroded the cost advantage of proximity, as the costs of communication and coordination across distance have largely been leveled, there are many ways that proximity or distance can still be a factor in investment decisions for industries with different motivations in going abroad (Nachum and Zaheer, 2005). For example, Mexico can still compete in areas that affect a US company's ancillary costs because of proximity. This can be illustrated when in-person interaction is necessary within companies. By having operations in Mexico, businesses headquartered in the United States save time and money on travel (Moore, Ferrusi and Thresher, 2007). Furthermore, Latin America has operations that are on a similar time zone with the United States. The benefit here is that when interaction is necessary, it can occur during normal working hours. Of course, having similar time zones is not without drawbacks, because, for certain projects, time zone differences

can facilitate 24-hour work cycles (*i.e.*, “follow-the-sun” development or beginning of next day delivery).

Mexico’s proximity also indicates that it should have lower telecommunications costs than India. However, the importance of telecommunications costs differ by sector. They are important for call centers, which require significant bandwidth, while IT services do not require as much bandwidth. As a rough estimate of difference, in March 2007 we examined phone card rates per minute from the US to both India and Mexico. The lowest rates found were \$.034 US per minute to India, and \$.011 US per minute to Mexico. This ratio of approximately 3 to 1 appears to be relatively invariant, suggesting that comparative costs of telecommunications for both nations are decreasing at similar rates. The important point is that, though the Mexican advantage remains intact, continuing price declines demonstrate that telecommunications costs are becoming an ever-smaller portion of overall costs, thereby eroding the absolute advantage.

As an upper middle-income nation, Mexico has a superior infrastructure than that of India. It also has good financial, medical, transportation and lodging services. In fact, it has been noted that since the signing of NAFTA there has been a considerable improvement in the telecom, power and transportation infrastructure in the country. Furthermore, privatization and foreign investment in Mexico has also greatly increased the country’s physical infrastructure (Moore, Ferrusi and Thresher, 2007). On the other hand, India continues to have an enormous infrastructure deficit in terms of airports, public transit, hotels and transportation services, an obvious impediment to business (*The Economist*, 2006). For example, all Indian firms must provide, at the employers’ cost, transportation to workers –a burden that does not exist in Mexico. The most significant difference is the electrical power infrastructure. In contrast to India, in Mexico backup generators are rarely, if ever, used, though all operations do have an onsite generator set. In terms of broadband connectivity or mobile phone coverage, a decade ago this would have been an advantage for Mexico; however, this is no longer the case, as broadband is now common globally. Though the Indian government is straining to relieve these burdens, the pace of growth and fiscal difficulties mean that during the remainder of this decade needs will far outstrip the best efforts to meet them. Thus, Mexican infrastructure is at present clearly superior to that of India.

A final advantage is that a Mexican ITAS facility can serve not only English speakers, but also the second largest language group in the US,

Spanish speakers. This is of particular significance for voice-related services, but is also important for other consumer-facing business processes. This allows one center to service the two largest US language groups, and receive the advantages of scale, service sharing and improved ability to provide uniform services to both language groups, which having two different centers on different continents cannot capture.

VIII. Labor Force and Education

With the exception of the customer contact arena, ITAS offshoring is about access to college-educated labor. By one estimate (that seems excessive), there are 451,000 Mexican students enrolled in full-time, undergraduate engineering programs (Smith, 2006b). According to NSF (2006a), Mexico awarded 68,239 undergraduate mathematics, computer science, and engineering degrees in 2002. In 2002 the US graduated only 61,000 in mathematics and computer science, and another 60,000 in engineering (NSF, 2006b). India has a much larger labor pool, and though the actual statistics are debated (Gereffi and Wadwha, 2005), at least, by one estimate, India graduates 441,000 technical graduates, 2.3 million other graduates, and 300,000 postgraduates every year (*The Economist*, 2006). However, Mexico graduated only 186 Ph.D.s in these disciplines in 2002 (NSF, 2006b). Unfortunately, the accuracy of these numbers is difficult to assess.

The “quality” of the graduates is also difficult to assess. For most commentators, the US or European graduates, rightly or wrongly, are considered the “gold” standard. This is despite the obvious quality differences within the US. Not surprisingly, some question the quality of Mexican university graduates. This is also true in India. Kiran Karnik, the president of Nasscom, was quoted as saying: “the varying standards of tertiary education (are) concealed by these figures: one-fifth world class, one-fifth passable, and three-fifths lamentable” (*The Economist*, 2006, p. 8).

The Tecnológico de Monterrey is acknowledged as producing the highest quality engineering graduates throughout Mexico and Latin America, and is well-recognized internationally. This provides Monterrey with an advantage in attracting IT and engineering services firms. One Indian respondent stated that Tecnológico de Monterrey graduates were comparable to a good Indian university, but inferior to graduates of the Indian Institutes of Technology. Another interviewee suggested that outside Monterrey, high-quality engineers were found at a ratio of only one

out of ten. Though Monterrey has high-quality engineers, the national average is far lower.

Labor force quality is a concern because IT salaries in Mexico, although much lower than in the United States, are still higher than in India. Salary comparisons between the two nations are difficult because there are a variety of variables, including regional location and university quality. For instance in India, Bangalore and Mumbai have the highest wages, and third-tier cities have significantly lower wages. In India, the average starting salaries for fresh engineers of the class of 2008 (who begin work in August 2008) will be about Rs.320,000 or about \$7,500 per annum at current rates (Dossani, 2008). On the other hand, Business Week, in 2006, found that a fresh Mexican engineer received around \$15,000 per annum (Smith, 2006b). This cost differential is a significant challenge.

Attrition rates are also a problem in Mexico; our interviewees with experience in both India and Mexico found that attrition rates were comparable in both countries. In Mexico, although sector-wide attrition rates for IT work are unknown, firm-level attrition rates varied by activity. Through interviews, we found that for firms whose main activities centered on BPO work, attrition could be as high as 53 per cent. On the other hand, higher-end IT service work attrition rates were found to be about 15 per cent per annum. Attrition in the higher-end jobs was due to a lack of challenging work and/or a favorable job market that permitted persons to resign and find other positions with better pay and benefits.

Despite neighboring the US, there are only a limited number of engineers and other professionals that speak English well. Remarkably, in Mexico there is no mandate by the central government for English language training, so each state sets its own standards. Not surprisingly, the standards vary widely. English language capabilities are acceptable in the Northern border regions and among the more highly educated. The large population of English speakers in the border region gives firms located there a competitive advantage in hiring English language speakers. However, the universities and technical institutes there are not as good, so the skill levels are lower. Public universities do not have English-language requirements either, and only a few universities encourage strong English language skills. Some firms interviewed stated that they had trouble finding candidates for senior technical positions with sufficient English language capabilities, despite their excellent technical expertise. This contrasts unfavorably with India and most of the other nations with

which Mexico competes, where there is an abundance of engineers and postgraduates who nearly all speak English (Entwistle, 2005).

Tied to the issue of labor force quality and education, are transnational labor flows. One reason why Mexico may not have the same global-class software engineering capacity as India may be related to the large number of highly educated Indian visa holders who have migrated to, or, at a minimum, lived or studied in the United States. In contrast, far fewer highly educated Mexicans migrate to or study in the US. Skilled Indian immigrants have worked in the US and learned from their US customers. They boost the perception of India as having a capable work force –an “advertisement” that Mexico lacks.

For decades, Indian immigrants to the US have been employed in the IT sector. Changes in US immigration policies, starting in the mid-1960s, instituted a selection process that facilitated the immigration of well-educated Indians. This continues, as the US government has given H-1B visas to specialty migrant workers (largely from India and China), and this visa particularly targets the high-technology sectors (Money and Falstrom, 2006). As an illustration of the differences, in 1994, 87 per cent of Indian immigrants to the United States had a high school degree, and 65 per cent a college degree (Alarcón, 2000). In contrast, only 24 per cent of Mexican immigrants had a high school diploma, and only 3.5 per cent had college degrees (Alarcón, 2000, p. 10). The most recent data is from 1994 and thus is dated, but shows that out of 105,899 H-1B visas granted, Mexicans received only 3.1 per cent of the total, or 3,256, while Indians received 16,948, or 16 per cent of the total (Alarcón, 2000).

In addition, Indian immigrants in the US are employed in managerial and professional positions in large numbers, while Mexican immigrants are more likely to be employed in the fabrication, labor, and service sectors. Rafael Alarcón concludes: “Mexican immigrants constitute the largest group of unskilled workers, especially in the agricultural sector, because geographical propinquity has lessened the selection process by lowering the economic and social costs of immigration. In addition, specific US immigration policies, direct recruitment, and the development of social networks have encouraged the immigration of unskilled workers” (Alarcón, 2000, p. 15). Further, in terms of positioning itself in the global economy, while India was advancing its export services sector, Mexico was promoting itself as a manufacturing center. These historical legacies inhibit Mexican efforts to position itself as an ITAS export leader.

IX. Conclusion

This paper sets the stage for dialogue regarding the potential of the Mexican IT service sector relative to its global competition. Mexico can significantly increase its share of the global ITAS economy, both through foreign investment and the continuing growth of domestic firms. Mexico is endowed with geographical advantages, a ready workforce, an increasing interest in diversification of service locations for business continuity reasons, and a gradually narrowing wage gap with India. Despite these advantages, it is competing with many other nations for investment. Strategically, Mexico cannot compete directly with India; rather, it must develop niches based on its comparative advantages, and focus on an industry approach that is complementary to developments in India. This is especially relevant as India has begun to invest more heavily in the Mexican ITAS market. Mexico should improve the quality and quantity of education in high-technology fields, improve access to capital for entrepreneurs, increase training in English, and promote industry through technical and business management skill upgrading.

Given that Indian firms and the Indian operations of many MNCs are becoming the global headquarters for internal or external service provision, this means that many Mexican operations will be managed from India. To facilitate Mexico's growth in services offshoring, strong relationships with India will be important. Mexico could study the Indian policy successes in this industry and, where relevant, implement them in Mexico. Continued research trips by policymakers to India, as already undertaken by president Calderón, are important. For both Mexico and India there would be much to gain from strengthening interactions.

The plethora of small Mexican ITAS firms is an obstacle because few of them have either the size or deep domain knowledge to compete effectively in global markets. The problem of so many small local firms will be difficult to solve, but encouraging rationalization of these firms is probably wise. Rather than picking winners, the government should work to promote foreign investment from US and Indian firms, while also encouraging the growth of indigenous firms. Mexican policy makers and officials in the IT sector should keep in mind that India has successfully managed foreign and domestic firms by not over-regulating.

The government also has a role in a general campaign to promote Mexico as an IT service destination. All of our interviewees, Mexicans, US citizens, and Indians believed that decision makers in the US and

Europe do not fully understand Mexico's capabilities. Some interviewees suggested that current monetary incentives should be scaleable and not capped. Of course, this would favor the larger firms – a policy decision that might be difficult.

ITAS offshoring will continue to expand, and with it there will be more opportunities. To better make policy, Prosoft should receive an expanded mandate to cover all of the ITAS and be charged with even closer monitoring of developments in the global economy. State governments should be encouraged to become even more proactive in attracting offshore firms, and in encouraging entrepreneurs to discover new business opportunities (both nationally and globally) that draw upon Mexico's unique advantages.

Although not addressed in this paper, there are many ITAS opportunities in Latin America that should be the focus of increased study. The creation of a more integrated Latin American market could help not only foreign MNCs, but also the stronger national players to achieve scale economies. For example, it might be possible for countries or firms throughout Latin America to cooperate or even merge to improve their international competitiveness. Regardless, Mexico must act promptly and efficiently in order to benefit from the comparative strengths it now has, and to develop further advantages and competencies.

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Appendix A

Interviews

Interviews conducted by Jessica Mullan

Telecommunications specialist, Global Information and Communications Technologies, World Bank, telephone interview, January 22, 2007.

CEO and Co-Founder of JackBe, telephone interview, January 24, 2007.

Chief Financial Officer of Genpact Mexico, personal interview, Ciudad Juárez, Mexico, February 6, 2007.

CEO of Genpact Mexico, personal interview, Ciudad Juárez, Mexico, February 6, 2007.

Director of Engineering and Internal Operations of Mexico, ACS, personal interview, Monterrey, Mexico, February 7, 2007.

Northern Regional Director, TCS, personal interview, Monterrey, Mexico, February 8, 2007.

Director de Impulso al Software, MTYCIC, personal interview, Monterrey, Mexico, February 8, 2007.

Director of Business Development, MexWare, personal interview, Monterrey, Mexico, February 8, 2007.

Project Manager, TCS, personal interview, Monterrey, Mexico, February 8, 2007.

Researcher, Center for North American Studies, Tecnológico de Monterrey, personal interview, Monterrey, Mexico, February 8, 2007.

Director CANIETI Sede Noreste, personal interview, Monterrey, Mexico, February 9, 2007.

Coordinator of the SNITI Project, Ministry of Economy, personal interview, Mexico City, Mexico, February 12, 2007.

Executive Director of COEYCT and member of the Secretary for Economic Development of the Government of Jalisco, personal interview, Mexico City, February 13, 2007.

Government Affairs Manager of HP Mexico, personal interview, Mexico City, February 13, 2007.

Border Tech / CENI2T, telephone interview, Division of Innovation, Development and Strategy, February 24, 2007.

E-Business Director, Softtek, telephone interview, March 1, 2007.

Director General of Sigma Tao, telephone interview, March 6, 2007.

Interview conducted by Martin Kenney

CEO of Nearshore Services, Softtek US, personal interview, Stanford, CA, December 12, 2006.