Transnational Migration and Entrepreneurialism: Indians in the U.S. Technology Sector

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Abstract
In the past, large multinational corporations led entrepreneurial activities in the technology sector, creating value and stimulating growth by bringing new ideas to market. Further, they were in charge of the growth internationally. In the last two decades, however, immigrants have increased their percentage in starting technology companies in the United States, as well as investing in technology companies, building business partnerships, allocating resources, exchanging information, and tapping technical expertise in their home countries. This paper presents a case study of Indian immigrants in the U.S. technology sector to demonstrate how entrepreneurialism is changing with transnational migration. Indian immigrants are actively contributing to an emergent global reality where the borders containing them in the field of technology are increasingly virtual, and beyond the control of any country.

Keywords
ethnic networking, Indian entrepreneurs, Indian immigrants, migration, transnationalism

Introduction
The United States has been increasingly relying on foreign-born1 individuals for its rising science and engineering (S&E) needs (National Science Board 2010). In 2003, of the 21.6 million scientists and engineers2 in the United

1 The terms “foreign-born” and “immigrant” are used interchangeably in this paper because, sometime, data are available for the foreign-born and some for immigrants. The U.S. Census Bureau defines the foreign-born as individuals who had no U.S. citizenship at birth. It includes, among others, naturalized citizens, lawful permanent residents, legal non-immigrants such as student and temporary workers, and persons residing in the country without authorization. The Immigration and Nationality Act defines immigrants as those aliens admitted to the United States for lawful permanent residence.

2 The National Science Foundation (2010) uses two indicators—education and occupation—to define scientists and engineers. The term “scientists and engineers” includes all people who
States, 16% were foreign-born (Kannankutty and Burrelli 2007). In the last two decades, immigrant scientists and engineers have emerged as entrepreneurs in the technology sector (Anderson and Platzer 2007; Wadhwa, Saxenian, Rissing, and Gereffi 2007). They are engaged in a process of converting their ideas into innovations without being limited by financial resources, immigrant status, and nationality. Starting up a technology company requires more than just a brilliant scientific idea that can be converted into a successful product. Immigrant entrepreneurs must acquire venture capital, managerial skills, qualified scientists and engineers, extensive networks, marketing capabilities, and details of starting up a technology company. Increasingly, these immigrants are becoming a part of transnational communities by linking the United States to the economies of their home countries (Saxenian 2006). They are investing in the emerging economies of their home countries, and thus providing jobs and generating wealth. In addition, they are bringing the broader U.S. business community technical, linguistic, and cultural knowledge about their home countries.

Foreign-born from India make up less than 1% of the total U.S. population (Schmidley 2001), but they are highly clustered in the U.S. S&E workforce. In 2003, out of 3.3 million foreign-born scientists and engineers, 15.4% (515,000) were from India, followed by 9.7% (326,000) from China, 9.1% (304,000) from the Philippines, and the remaining from a wide range of countries (Kannankutty and Burrelli 2007). Indian immigrant scientists and engineers have become one of the most successful immigrant communities in the creation of knowledge-intensive companies based around engineering, information technology, and finance (Biradavolu 2008). A case study of immigrant entrepreneurs found that Indian immigrants were, in 2005, responsible for 15.5% of all Silicon Valley start-ups, an increase from 7% in 1998. Nationwide, Indian immigrants founded 26% of the engineering and technology companies that were founded by foreign-born. Indian immigrants have founded more engineering and technology companies than immigrants from the United Kingdom, China, Taiwan, and Japan combined (Wadhwa et al. 2007). Another study found that India ranked first as the country of origin for immigrant-founded venture-backed public companies, which accounted for 32 companies (22%) in 2005 (Anderson and Platzer 2007). These studies also show that Indian immigrants are more likely to start businesses in the technology sectors than their U.S. native-born counterparts.

Despite their presence, there are remarkably few studies on the nature of entrepreneurship among Indian immigrants in the U.S. technology sector. have at least a bachelor's degree in a science or engineering field or an occupation in one of those fields.
The famous Duke University study is at the macro-level, showing new immigrants contributions to the U.S. economy (Wadhwa et al. 2007). Saxenian’s (1999, 2006) studies are at the micro-level on Indian and Chinese immigrant entrepreneurs in the Silicon Valley. Biradavolu’s (2008) study focuses on Indian immigrant entrepreneurs in the Silicon Valley and Bangalore. This paper builds on these studies, but focuses on the complexities, peculiarities, and nuances of the Indian immigrant entrepreneur experience.

This paper discusses the changing role of Indian immigrant scientists and engineers who are using their own initiatives to emerge as future entrepreneurs. It illustrates why Indian immigrants—who came to and stayed in the United States to acquire and produce S&E knowledge—changed their goals to become entrepreneurs, how their entrepreneurialism helped them succeed, and what challenges they faced to achieve their new goals. In particular, the paper shows sources of creativity among Indian immigrant entrepreneurs in the U.S. technology sector. The paper is based on the following four factors: (1) the survey of literature on the subject; (2) in-depth interviews conducted with 120 Indian scientists and engineers; (3) in-depth interviews conducted with two Indian immigrant entrepreneurs; and (4) a detailed study of biographies of 50 successful Indian immigrant entrepreneurs in the United States posted on the website.

Transnationalism, Creativity, and Entrepreneurialism

The migration of scientists and engineers from developing to developed countries has been on the rise since the mid-1950s. In the past, this phenomenon was explained as the “brain drain,” as developing countries lost scientists and engineers (trained brains) and students in S&E (brains to be trained) to developed countries (Gaillard 1991). However, offsetting the brain drain phenomenon are indications of “transnational migration.” This process shows the processes by which migrants move, forge, and sustain social relations that link together their country of birth and their country of settlement. Transnational migration is understood as taking place within fluid social spaces that are constantly reworked through migrants’ simultaneous embeddedness in more than one society. Both migrants and nonmigrants occupy these spaces because the flow of people, money, ideas, norms, practices, and identities within them is so dense and widespread that nonmigrants’ lives are also transformed, even though they do not move (Levitt and Jaworsky 2007).

Transnational migration holds that even though the number of people who engage in migration is small, the impact of their movements is exaggerated by
their combined transnational activities (Basch, Glick, and Blanc-Szanton 1994). Taken together and over a period of time, the transnational activities of immigrants in cultural, economic, political, religious, and social spheres alter certain norms and practices, at least in the regions in the countries of settlement where they are concentrated. Migration is seen as a by-product of globalization, which results in the developed countries dependence on the cheap labor of developing countries. At the same time, economic benefits are accrued in developing countries with the remittances migrants send home (Portes 2001). Furthermore, migrants are assisted by social networks beyond national borders to get around structural shortcomings in the host countries (Zhou 2004). Cross-border social networking permeates people in developing and developed countries with valuable social capital (i.e., who you know) that facilitates their mobility and success in both countries. Yet, migrants and non-migrants occupy different positions in terms of access to information, distribution of resources, and work assignments (Pluss 2005). Migrants from developing countries are treated somewhat unfairly when compared to their peers in developed countries.

Nevertheless, there are very few transnational studies on migrants belonging to the scientific and technical labor force; most have focused on the manual working class. If transnational migration scholars have concentrated on scientists and engineers, the focus has rarely been on creativity and entrepreneurialism among immigrants.

Organizational scholars have studied creativity and entrepreneurialism among the general public. For instance, Teresa M. Amabile (1996) has proposed that creativity arises through the convergence of three elements: (1) knowledge, (2) creative thinking, and (3) motivation. Knowledge consists of all the relevant information that an individual brings to bear on a given problem. It refers to both depth and breadth of knowledge. In-depth experience in a given area allows an individual to build his/her expertise and foundation in that area. It is believed that 10 years is the approximate time required for an individual to build his/her in-depth knowledge to be creative. At the same time, a breadth of understanding beyond an individual’s own field allows him or her to combine previously unrelated elements in new ways. Creative thinking, the second element, relates to an individual’s personality, thinking style, and working manner. For an individual to generate creative ideas, he or she must be a critical thinker to judge the value of his or her own ideas. Also, the individual must be practical in relating his or her creative ideas to day-to-day life so they can be used. Finally, motivation is believed to be a key to creativity; an individual will be most creative when he or she feels motivated by intrinsic passion and interest in the work itself. A motivated individual is not
only curious, but is persistent to the extent of being obsessed, which separates him or her from the majority of people. If an individual is motivated by external pressures, however, he or she is unlikely to be most creative.

Many characteristics of creative individuals resemble those of successful entrepreneurs. A study of new venture start-ups found several traits that embody entrepreneurial spirit (Timmons and Spinelli 2003). These traits are (1) drive, energy, commitment, and determination; (2) self-confidence and self-reliance; (3) high initiative, personal responsibility, and motivation to excel; (4) a desire for control and autonomy; (5) tolerance of ambiguity and uncertainty; (6) low fear of failure; (7) high tolerance for risk taking; (8) long-term involvement; (9) money as a measure not merely an end; (10) use of feedback; (11) continuous pragmatic problem solving; (12) efficient use of resources; (13) self-imposed high standards; and (14) setting clear goals and strategies to achieve them. Not all entrepreneurs are likely to possess all traits, but strengths in one are likely to compensate for weaknesses in others.

An emphasis on individual creativity, however, tends to neglect factors outside the individual, such as what drove him or her towards entrepreneurship and whether social context is conducive to entrepreneurship. Entrepreneurs, with all traits identified in the literature, are unlikely to be successful if their cultural values, social norms, business environment, and legal institutions are not conducive to entrepreneurship. This also means creativity and entrepreneurialism can take many forms depending on the context. Even if one believes that successful entrepreneurship is best carried out by those for whom creative traits come naturally, one can always enhance his or her entrepreneurialism through apprenticeship, courses, mentoring, networking, and training.

Yet, there is little scholarly work on creativity and entrepreneurialism among immigrants, especially Asian immigrants. Generally, Asian cultural values such as particularism, collectivism, ascribed status, and hierarchy are not viewed as conducive to creativity, innovation, and entrepreneurialism in the Western setting. When scholars have studied Asian immigrant enterprises, their focus has been on small businesses in retail and service sectors in low-income and ethnic neighborhoods. There are multiple explanations as to why Asian immigrants engage in entrepreneurship. Structural theorists have argued that whites and big companies avoid neighborhoods where people in the low strata of society are concentrated. Consequently, there is an opportunity for entrepreneurship within inner city neighborhoods that Asian immigrants can capitalize on (Waldinger 1986; Bailey and Waldinger 1991). Reactive cultural theorists, on the other hand, have proposed that Asian immigrants tend to pursue entrepreneurship in ethnic neighborhoods due to disadvantages, such as a lack of resources, insufficient language skills, and un-transferable skills
they encounter in their host labor market (Light and Bonacich 1988). Status inconsistency theorists have suggested that personal factors explain this phenomenon. Asian immigrants, they claim, get frustrated with having lower ranking jobs in their host countries than they had in their home countries, so they pursue entrepreneurship as an alternative occupation (Min 1996). Finally, network theorists have argued that social networks not only help Asian immigrants emigrate to a new country, but also assist them with capital, information, labor, and social support to encourage them in entrepreneurialism (Zimmer and Aldrich 1987). Social networks are seen as vital for entrepreneurship among Asian immigrants.

Increasingly, high rates of entrepreneurship among Asian immigrants in the U.S. technology sector show that they are not limited to retail and service sectors in ethnic neighborhoods that require low capital investment and skills. Unlike traditional entrepreneurs who stay detached in marginal low-wage industries in ethnic enclaves, new Asian immigrant entrepreneurs are highly educated and concentrated in high-technology industries in dynamic geographical areas (Saxenian 2006).

Indian Immigrant Entrepreneurialism

Indian entrepreneurialism in the United States has evolved from technical to business leadership. There are at least five distinct stages of Indian entrepreneurialism, namely, the selective U.S. immigration policies that allow a large number of qualified Indians to enter the country; high educational levels which train Indians to work within the American system; a combination of technical abilities with management skills which is essential in starting a company in the technical sector; networking with Indians and others which assists in starting up a technology company; and engaging in transnational activities to move beyond creating new products and make an impact across borders (Varma and Varma 2009). Each of these stages represents progression within the same Indian immigrant entrepreneur, but also among different generations of Indian immigrants.

Pulling the Cream of the Crop

Before World War II, immigration from India to the United States was either restricted or banned altogether, meaning only small numbers of mostly unskilled laborers emigrated. After India’s independence from British colonial rule in 1947 and the enactment of the 1952 U.S. Immigration and Nationality Act, which set the annual quota for India at 100, Indian scientists and
engineers began to migrate to the United States. Their immigration increased after the enactment of the 1965 U.S. Immigration Act, which capped immigration at 20,000 people per year/per country, based on a tiered preference system. The Act’s third preference was for “professionals, scientists, and artists of exceptional ability,” and the sixth preference was for “skilled and unskilled workers in occupations for which labor is in short supply” (Varma 2006). Despite some modifications, the framework established by the 1965 Act remains intact today.

In the 1990s, the supply of skilled immigrant labor was seen as inadequate in meeting the increasing demand of the U.S. economy. The 1990 U.S. Immigration Act placed an annual ceiling of 65,000 on admissions of temporary “specialty occupation” workers (aliens entering under the H-1B nonimmigrant visa to fill jobs requiring a baccalaureate degree or equivalent work experience). The American Competitiveness and Workforce Improvement Act of 1998 increased H-1B visa quotas to 115,000 for the fiscal year 1999; 115,000 for the fiscal year 2000; 107,500 for the fiscal year 2001; and 65,000 in each succeeding fiscal year. The American Competitiveness in the Twenty-first Century Act of 2000 increased H-1B visa quotas to 195,000 for each of the three fiscal years (2001, 2002, 2003), and then returned to original 65,000 per year thereafter. The H-1B visa further expanded the immigration of Indian scientists and engineers to the United States (Varma 2006). According to the U.S. Immigration and Naturalization Service (INS), Indians have been taking the largest share of H-1B visas since the program was implemented in 1990. For instance, 54% of the H-1B petitions approved in the fiscal year 2006 were granted to individuals born in India, followed by 9% for China, and 3% each for Canada, South Korea, and the Philippines (National Science Board 2010).

The majority of Indian scientists and engineers in the United States first come to the country for study. Generally, they attain a bachelor’s degree from top Indian universities, including the Indian Institutes of Technology (IITs) (Kapur 2010). The undergraduate curriculum at the IITs is considered to be one of the most rigorous in the world (Varma and Kapur 2010). In the United States, they tend to obtain masters and/or doctorate degrees from leading universities. After graduation, they find employment as faculty in academic institutions or as technical staff in industrial research and development (R&D) laboratories or national laboratories. With the sponsorship of their employing organizations, they convert their temporary status into permanent residency and sponsor their spouses and children. Michael Finn (2007) has calculated the stay rate—the proportion of foreign doctorate recipients from U.S. universities that stayed in the United States after graduation for any reason. The
five-year stay rate (2000-2005) for Indian doctorate recipients in S&E from U.S. universities was 86%.

A substantial number of Indian scientists and engineers come to the United States after receiving their university training in India (Kapur 2010). They arrive on H-1B visas to work mostly in the information technology (IT) sector as software engineers and programmers (Varma 2010a). Within six years after H-1B visas are issued, many Indian scientists and engineers get their temporary visas converted into a permanent card with the sponsorship of their employing companies, and soon after that they sponsor their spouses and children.

A steady flow of scientists and engineers between India and the United States in the post-1965 period of immigration reform has concentrated them in those areas that are the center of global technological innovations, such as the Silicon Valley and Route 128. These regions are leaders in fostering technology start-ups into big companies (Saxenian 2006). Further, a large majority of Indian scientists and engineers are hired to work in large global corporations that are engine of innovations.

**Bringing in Human Capital**

U.S. immigration selectivity has been bringing the cream of the crop from India. Consequently, Indian immigrants in the United States stand out for their educational/academic achievements compared with the U.S. population (Varma and Varma 2009). In 2006, 73.8% of the 1.3 million India-born adults age 25 and older had a bachelor’s or higher degree compared to 24% for the U.S. population as a whole. About 40.5% had an advanced degree compared with 6% for the U.S. population (U.S. Census Bureau 2000; Terrazas 2008). Among Indian immigrant scientists and engineers in 2003, 8.8% had a doctorate and 43.1% had a master’s as their highest degrees; comparative figures for U.S.-born scientists and engineers were 3.9% and 27.1%, respectively (Kannankutty and Burrelli 2007).

Indian scientists and engineers who come to the United States are usually brought up in middle-class family settings (Kapur 2010). Since India is a developing country, a large majority of middle class Indians do not enjoy the multiple opportunities that Americans do. For example, India’s per capita income is expected to grow to only $1,000 in 2010; in contrast, U.S. per capita income was $39,751 in 2008. It is, therefore, no surprise that middle-class Indian parents socialize their children, through education, from an early age to understand and overcome the many obstacles they may face (Biradavolu 2008). Parents ingrain in their children the belief that they cannot succeed in life without a strong education in mathematics and science. Because parents
want their children to become doctors, scientists, or engineers, the pressures put on students to excel in their education are tremendous; a career in S&E is associated with high monetary returns, plentiful job opportunities, job security, prestige, and status.

Most importantly, the Indian education system has very high standards, which provide students with a strong foundation in mathematics and science. The mathematics and science curriculum in India draws on modern science and scientific methods. Yet, the teaching style is unique. Indian teachers give students problems to work out on their own prior to giving direct instruction. Students learn mathematical concepts, how to solve problems and how to reason mathematically for themselves. The number of problem sets given to students is extensive and they include lots of drilling (Ahuja 2007). After school, students spend most of their time doing mathematics exercises and science homework. They are trained to digest and retain tremendous amounts of detailed information. Schools teach that hard work in mathematics and science is the only way to succeed. Whereas the centrality of pre-college mathematics for a career in S&E is being questioned in the United States (Seymour and Hewitt 1997; Campbell, Denes, and Morrison 2000; Committee on Public Understanding of Engineering Messages 2008), stronger mathematical skills are valued, taught, and rewarded in India (Varma 2010b, 2011). Indian universities’ S&E departments rely on Western curricula and standards, use Western textbooks, and even hire faculty trained in Europe and North America whenever possible. The medium of instruction in many city schools is either English or a combination of English and a regional language, and S&E education in most accredited universities is carried out in English.

Because of their upbringing and educational training in India, scientists and engineers develop a unique set of technical, personal, and social skills that they bring to the United States (Kapur 2010). Technically, Indian scientists and engineers are educated to be articulate, mathematically minded, analytical, good at diagnosing technical problems, and able to solve such problems very quickly. Personally, they are trained to work long hours under any conditions (Varma 2006, 2010a). Socially, they receive educational instructions in English and are thus fluent upon their arrival in the United States. In 2006, about 10.1% of the 1.5 million Indian immigrants age 5 and older reported speaking “English only,” while 63% reported speaking English “very well” (Terrazas 2008). Culturally, they grow up in a stable family, which increases their self-confidence and self-esteem and reduces their insecurities, depression, and psychological problems. One entrepreneur that was interviewed said, “We [in India] have tremendous emphasis on education. We have tremendous emphasis on family as a unit…. We have relatively a more stable family life.”
Due to their technical, personal, and social capital, many Indian immigrant scientists and engineers have characteristics similar to those of entrepreneurs. Since they grow up in a disorganized society, they know how to run their lives in a strange environment. Upon their arrival, information about the United States is incomplete, financial security is questionable, and the likelihood of making it here is uncertain. Yet, they do whatever it takes to succeed in the United States; failure is simply not an option for them.

**Becoming the Manager**

There is a saying that good scientists and engineers do not necessarily make good managers. This is mostly because the type of education scientists and engineers receive focuses entirely on technical subjects; little attention is given to preparing them for careers in management. Generally, scientists and engineers prefer to remain in full contact with research and/or teaching, and management has little attraction for them. Those who become managers choose the managerial ladder mostly because they see managing as the ultimate accomplishment of their career, or they just want to change their career. However, not all scientists and engineers who desire to become managers are promoted to the managerial ladder. Scientists and engineers who are assigned managerial positions have normally proven their technical accomplishments and demonstrated leadership quality in the past. They show an ability to lead a small group of scientists and engineers before being promoted to manage a large group.

Although Indian scientists and engineers do not encounter significant impediments to finding work in the United States, subtle issues do arise when they attempt to obtain upper-level or leadership roles within American companies. U.S. managers perceive Indian scientists and engineers as ill-equipped to become decision makers (Tang 2000). Due to apparent differences in leadership style, accent, communication skills, stereotypes, and appearance, managers rank Whites ahead of Indian scientists and engineers. The “silicon ceiling” for Indian scientists and engineers refers to the phenomenon that they are not entering the top ranks of management and administrative positions at a representative rate and have been disproportionally underrepresented in decision-making or policy-making positions (Varma 2006). As one entrepreneur interviewed said, “At [X], we always used to talk about how Indians can never be promoted to be the head of the company.”

Spurred on by frustrations of their inability to rise to the top tier of a given organization and having key insights in high-technology industries, some Indian scientists and engineers sought to overcome the silicon ceiling effect by initiating their own companies or businesses (Chang 2000; Varma and Varma
2009). This meant that they had to transition from being just a technical expert to starting a new company. As one entrepreneur interviewed narrated:

Now the cellular license process was already finished, but people were trying to justify why their applications were better than other people’s applications. So, I examined everybody’s applications and came up with all kinds of mathematics to really justify why some applications were better compared to others. . . . You have to have precision in your thinking process and in your calculations of how signals work so that different signals will not interfere with each other. . . . When my software was introduced into the industry, everybody wanted to use it. . . . We got invited to D.C. and [X] said, ‘Look, nobody can do these computations, and you did them in a couple of days, so we really want you to come here.’ Then the fundamental realization came. . . . You need to take your knowledge and harness that into coming up with software and processes which will design the real networks rather than just applying for licenses. . . . That is what we did.

Launching a new enterprise, however, was not a conclusion Indian that scientists and engineers came too lightly. Their primary motivation in coming to the United States was to gain and disseminate S&E knowledge rather than to start a company. Their uncertainty in business and management fields proved a major psychological obstacle to business ownership. One entrepreneur interviewed revealed, “Indians were confident about their technical knowledge. But there was a psychological dimension. . . . Could you succeed outside your field? Could you translate your knowledge into business? They had to overcome to go out outside their expertise and still do well.” After working for a number of years for prominent R&D laboratories or institutions of higher learning, Indian scientists and engineers acquired necessary management skills and learned how to be effective leaders (Varma and Varma 2009). They gained knowledge of commercialization of ideas, consumer choice, product demand, business strategy, financial market, and so forth.

Yet, the immigration status worked against Indian scientists and engineers when they sought necessary capital to start their companies. The difficulty in raising the necessary start-up capital was attributable to their foreign, middle-class status, and also because investors in Indian businesses were rare. Being outside the main stream, they mobilized capital from personal savings, personal loans from various sources, and bank loans. There are all sorts of stories regarding how the first generation of Indian entrepreneurs overcame financial hardship to start companies in the United States. Despite their difficulties raising start-up capital, the United States fosters the expansion of private enterprise (Weisman 2007). Other factors within the country, including political stability, national business policy, intellectual property rights, access to capital, and support systems for start-up have allowed the United States to lead the
world in creating an environment where innovation is emphasized and rewarded. As one entrepreneur interviewed stated, “this society is a very utilitarian country. If you can find a way to contribute to it, they will not stop you.” The result of these developments is that Indian immigrants have grown more ambitious to take advantage of the opportunities available to them in the United States.

Building Ethnic Networks

Experts agree that the ability to navigate social networks is an important tool for scientists and engineers to move forward in their professional career. Through social networking, scientists and engineers can learn career opportunities inside and outside of their own organizations, anticipate changes in strategic direction of their organizations, and identify sources of technical know-how that they can use. Such unique information is seldom available to those outside the social network. Advancing in S&E occupations depends on both “human capital” (what you know) and “social capital” (who you know) (Tang 2000). However, social networks tend to be personal, with their own boundaries based on similar social, gender, or racial/ethnic characteristics. Indian immigrant scientists and engineers tend to operate outside of mainstream social networks, due to their nationality, race/ethnicity, language, and culture. Consequently, they miss crucial opportunities to advance their careers (Varma 2006, 2010a). Most Indian scientists and engineers interviewed acknowledged the existence of an “old boys’ network” which needs to be broken. To overcome the silicon ceiling, a small group of Indian immigrant scientists and engineers have created their own professional ethnic networks to assemble the necessary information, technical expertise, managerial skill, and financial capital.

The presence of ethnic, social, cultural, and religious organizations is nothing new to Indian immigrants in the United States. But organizations that are focused around business have only been seen recently. The Silicon Valley Indian Professionals Association, or SIPA (http://www.sipa.org), was founded in 1987 as part of an initiative to strengthen Indian ties across a corporate and global setting. Similarly, the Indus Entrepreneur or TiE (http://www.tie.org/) came about in 1992 to encourage Indians and other South Asians to begin their own businesses by offering them the knowledge and the means. TiE is known to many as the Indian Mafia. These organizations offer first-generation immigrants professional contacts and networks within the local S&E community. They sponsor regular speakers and conferences whose subjects range from specialized technical and market information to how to write a business
plan or manage a business (Saxenian 1999). Although Indian immigrants socialize largely within their ethnic networks, they consistently work with American scientists, engineers, and companies. They recognize that although a start-up might be spawned with the support of the ethnic networks, it must become part of the mainstream to grow (Saxenian 2006). The most successful Indian immigrant entrepreneurs tend to be those who have drawn on ethnic networks, but at the same time they have sought integration into the mainstream S&E community and companies.

The leadership role played by these organizations to assist Indian immigrants with their entrepreneurial goals has led to major changes in the atmosphere of Indian entrepreneurism in the United States. Through these organizations, interested Indian immigrant entrepreneurs are able to find investors and acquire resources that otherwise are not available to them. Within these ethnic networks, “angel investors” often contribute financially to promising new ventures (Saxenian 2006). A few of TiE’s successful start-ups include Exodus Communications, Cerent, and Juniper Networks. Part of the trend toward higher levels of technology company ownership by Indian immigrants is the emergence of new community ties through the formation of ethnic business organizations.

**Engaging in Transnational Activities**

Indian immigrant entrepreneurs are what Asa Kalavade, co-founder of Tatara Systems, call “serial entrepreneurs” (Anderson and Platzer 2007: 31). They focus on founding one company after another to solve significant market problems and then selling each one before they become too large. After being successful in the United States, many of them have moved to build transnational relations in India. The transnationalism of Indian entrepreneurs has been possible by two major changes occurring in India and worldwide. First, the Indian government has been implementing a series of economic liberalization policies since 1991 to facilitate foreign investments in India. Before 1990, detailed licenses and regulations were required to set up international businesses in India. In fact, Indians were expected to obtain a government license just to meet with foreign business representatives. Entrepreneurs faced government red tape and an unfavorable business atmosphere. Since the 1990s, the Indian economy has boomed. Second, there have been tremendous advances in transportation and communication technologies. In the last decade, India has experienced an exponential growth in electronic networks, so those outside the country can easily connect with those inside. The electronic network has opened new spaces for Indian immigrants to communicate and collaborate with people remaining in India.
Indian immigrant scientists and engineers have a long history of collaborating with their peers in India: having face-to-face contact through conferences and workshops sponsored by professional associations and providing consultative services to Indian administrators (Kapur 2010). In an increasingly competitive global economy, American companies find Indian immigrant scientists and engineers extremely valuable, as they know the political system, economic environment, sociocultural details and languages in the United States and India. It is common for American companies to have Indian immigrants arrange business contracts, share information about technology and business opportunities, hold people to American standards, advise on regulatory conditions, and start R&D laboratories in India (Varma 2007). In the last decade, however, a new stage of transnational activities has emerged.

Indian immigrant entrepreneurs have started locating their businesses in India as well as helping entrepreneurs in India. Using computer and communications technologies, any activity that can be digitized can be performed easily outside the United States. Indian entrepreneurs in the United States are concentrated into two service areas: software\(^3\) (46\%) and innovation/manufacturing related services\(^4\) (44\%); they are minimally represented in hardware-oriented sectors (Wadhwa et al. 2007). To take advantage of their easy access to India and the availability of low-cost technical skills there, Indian entrepreneurs are starting their own companies at an increasing rate (e.g., Cognizant, Techspan, Mphasis). They have organized their business relationships as fully/partially owned subsidiaries, subcontractors, or joint ventures of partnerships in India (Aggarwal 2008). In addition, they have become “angel investors” by investing their time and money into new high-technology companies. This trend has boosted the pace at which new start-ups are being established in India. For instance, venture capital firms and private investors poured $2.2 billion into 146 start-ups in 2005, compared with $1.7 billion invested in 71 deals in 2004 in India. Sabeer Bhatia, co-founder of the e-mail service Hotmail, is building a model “Nano City,” which will feature R&D, educational centers, and corporate offices. These will be used for technology, bioscience, and other knowledge industries (Iwata 2006). Investing in start-ups or venture funds involves a greater commitment than consulting and arranging contracts.

\(^3\) The software field consists of computer programming services; prepackaged software; computer integrated systems design; computer processing and data preparation and processing services; and information retrieval services.

\(^4\) The innovation/manufacturing related services field includes computers and computer peripheral equipment and software; electronics parts and equipment; computer facilities management services; computer rental and leasing; computer maintenance and repair; computer-related services; engineering services; and research testing services.
The government of India has been devising policies to attract Indians back to their birth country from the United States on either a short-term or permanent basis by creating newer economic opportunities for their returnees and the nation (Saxenian 2002). Since the 1990s, the Indian government has implemented economic reforms and lowered trade barriers to attract foreign investment. Since 2000s, they have been opening new Indian Institutes of Technology to educate more engineers (Varma and Kapur 2010) to boost India’s economy. The Indian government is giving India is one of the fastest growing knowledge economies in the world. The Indian government established the Ministry of Overseas Indian Affairs (MOIA) in 2004. The main mission of the MOIA is to promote, nurture, and sustain a mutuality beneficial and symbolic relationship between India and its Diaspora. It has established an institutional framework to benefit from networks with and among Overseas Indians based on three value propositions: (i) developing an inclusive agenda for the Diaspora to benefit from India’s development; (ii) seeding the idea of Indian Diaspora networks and drawing up a road map for establishing them, and (iii) making the home and Diaspora institutions active stakeholder partners in the networks. Indian entrepreneurs are increasingly looking at India as a land of economic opportunity. India is becoming a land of technology, innovation, and international companies. In December 2009, TiE organized a grand summit for entrepreneurs called “Enterprising India,” which was attended by key Indian government officials; Indian industrialists, including Ratan Tata (Chairman of Tata Industries) and Narayan Murthy (Founder of Infosys); and many others.

Conclusion

Since 1965, Indian scientists and engineers have been immigrating to the United States. Until the last decade, their immigration went almost unnoticed. Since then, they have increased their presence in the S&E workforce. Most importantly, a significant number of Indian scientists and engineers are engaged in innovation by founding high-technology companies in the United States. Further, they are increasingly contributing to India’s technological development through their transnational business activities. Yet, there are few studies on the sources of success of Indian immigrant entrepreneurs in the United States and their transnational role in India.

This paper has shown the development of a clear entrepreneurial culture among Indian immigrant scientists and engineers in the United States. The new model that has developed witnesses a larger percentage of Indian immigrant scientists and engineers participating in the ownership or co-ownership
of tech-based companies. Associated with this swing in Indian immigrants’ ability and willingness to take up leadership roles in the business end of the scientific community, they also now operate as important role models to future generations of Indian immigrant entrepreneurs.

Indian immigrant entrepreneurship shows that there is no single factor that is responsible for their success, as implied by structural, reactive cultural, status consistency, and network theories on Asian immigrants. Their success is also not limited to Indian immigrant personality factors, as assumed by the creativity theories. Rather, Indian immigrant entrepreneurialism is a result of multiple factors that show an evolution from technical to business leadership. This paper shows at least five distinct stages of Indian entrepreneurialism, namely, the selective U.S. immigration policies, high educational levels, a combination of technical abilities with management skills, networking with Indians and others, and engagement in transnational activities. Each of these stages represents a progression within the same Indian immigrant entrepreneur, but also among different generations of Indian immigrants.

In the era of an information-led and service-based economy, countries have become vigorously dependent on creative scientific/technical labor and entrepreneurs who can successfully integrate creativity into production. Indian immigrant entrepreneurs are converting scientific/technical inventions into innovations. They are taking risks, generating ideas, and exploring the possibilities of converting them into innovations by combining labor and capital.

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References


