

**Uneven Globalization? Organizational Networks and India's Niche in the Global
Software Industry**

**Monica Rao Biradavolu
Department of Sociology
Duke University
(mbira@soc.duke.edu)**

**Paper presented at the Comparative and Historical Graduate Student Training Retreat,
UCLA, May 8-9, 1999**

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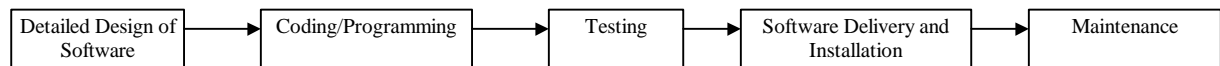
Much has been made of India's emergence as a software mecca. Is the software industry in India the key to its development success? By going hi-tech, has India skipped stages in its developmental trajectory? At first glance, the answer to this question seems obvious enough. After all, how wrong can one go in such a dynamic hi-tech industry? However, this contention bears closer scrutiny. In today's global economy, and in the quintessentially global software industry, it is crucial to see India's development prospects not as an isolated event in one country but as inextricably tied to the way the industry is organized cross-nationally. I argue that the niche India has carved for itself offers mixed results with regard to its development goals.

The Indian software industry is primarily geared towards the export market and over 70 percent of the exports are headed to the United States (Heeks 1996). Given this fact, I would like to understand (a) the different ways through which the industries in these two physically distant locales are linked and (b) the impact of these ongoing transnational ties on the development prospect of India. I shall use firms as my unit of analysis because they are the key players in this global industry. Such an analysis will lead to answering the original question I started out with - is this an "uneven" globalization - creating unequal categories of transnational actors?

Indian Firms in the Software Industry and Organizational Networks

In order to understand the global software industry, it is necessary to first define what I mean by software. The term software refers both to the instructions that direct the operation of computer equipment and the information content, or data, that computers manipulate (Schware 1995). As this definition shows, it is not just the computer industry that uses and needs software professionals; these days, almost every industry has an IT (information technology) department.

The process of developing a final software product involves a series of steps. Figure 1 endeavors to present these steps in a diagrammatic form, with the caveat that software production is more complicated and the actual steps are not so clearly defined.



Source: Lateef, 1997,p.4

The value addition in this process comes at the early stages in identifying the problem and the solution, and designing the system. Programming or coding, testing, installation and maintenance are at the lower end of the value chain (Heeks 1996, p.81-83). Furthermore, the processes that are involved at each stage need not occur in the same geographic location because of the different skill requirements for them as well as because of major breakthroughs in telecommunications technology.

Where do Indian firms fit into this scheme of things? Preliminary research suggests that not all Indian firms in the software industry can be classified into a single category. Although they all operate in a hi-tech industry, with skilled professionals as their employees, there are differences in the niche they occupy in the global software industry and the type of ethnic tie they utilize and this eventually affects the way they contribute to the development prospect of the Indian software sector. I identify four different types of Indian-owned or Indian-managed firms. But first, it is important to draw a distinction between two different segments of the global software industry, the “service providers” and the “product designers”.

The professional software services industry offers a range of services to clients, from providing one-time solutions like fixing Y2K problems to managing the entire IT needs of companies. Examples of such services include ERP (Enterprise Resource Planning) with such implementation packages as PeopleSoft, SAP, Oracle; creating and maintaining company web pages to set up e-commerce businesses and providing and maintaining data warehousing services. Therefore, the service providers make use of existing technology to provide business solutions to their clients. The product designers, on the other hand, *create* new technology. They generate new ideas and these software firms develop and market their own unique product.

The Service Providers

Within the software services industry, I identify two types of firms: bodyshopping firms and firms which perform value-added tasks.

(i) “**Bodyshopping**” - *The 1980s*. The term “bodyshopping” emerged in the early 1980s as a pejorative term to describe the activity of providing inexpensive labor on an hourly basis for low value-added

programming services at customer sites. The severe shortage in the supply of programmers and software developers in the American software industry created a need in firms in the United States to outsource software activities to cheaper locations around the globe where labor was plentiful. Starting in the early 1980s, India became a prime location for outsourcing. However, reluctant to relinquish creative control, several firms in the U.S. decided to contract out the relatively unproblematic tasks of coding and testing, and having the work carried out onsite. According to Lakha, in 1990, over 95 percent of Indian software companies were involved in bodyshopping activities and of the 3,000 programmers who were working in the software export sector, the majority of them were on assignment abroad (p. 54). The practice of “bodyshopping” is of questionable value because it does little to upgrade the skills of the computer professionals who are assigned tasks requiring relatively limited skills input.

Figure 2(a) below shows how both large and small firms, in India and the United States are involved in this activity and are influencing migration of professionals.

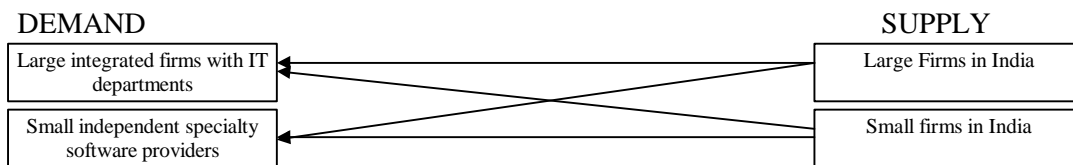


Figure 2(a) ← Flow of people

Bodyshopping firms of this type also existed within the United States. Making use of their ethnic ties, firms owned by immigrant Indians helped their clients in the U.S. find qualified personnel from India to work on projects onsite. Figure 2(b) below shows how Indian-owned firms in the United States catered to their clients.

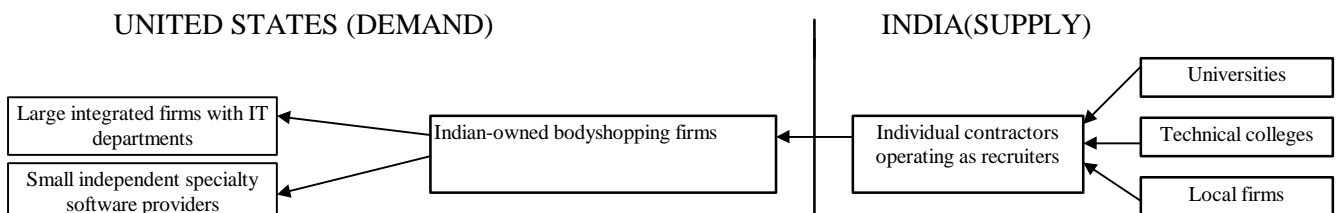


Figure 2(b) ← Flow of people

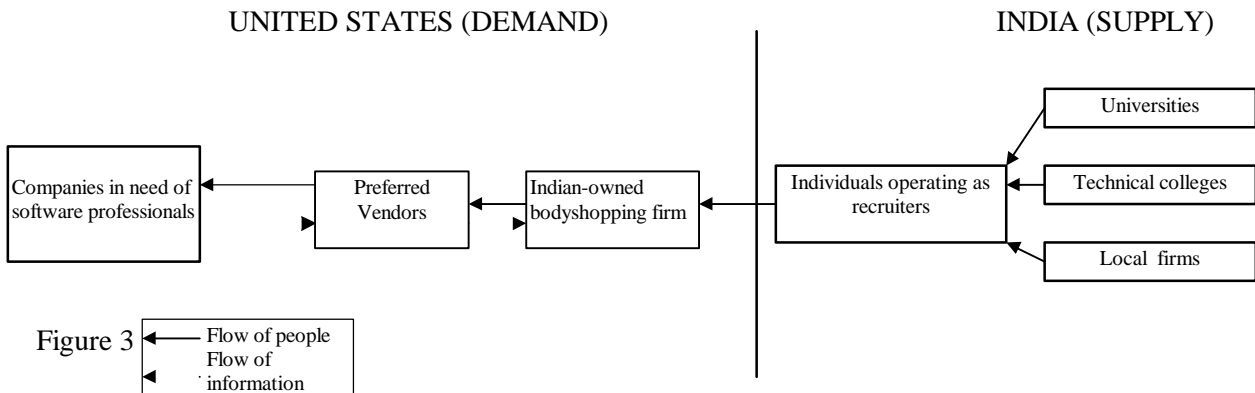
“Bodyshopping” - The 1990s. Beginning in the 1990s, the scenario has changed further and the term “bodyshopping” has also evolved to mean something different. The yawning gap in the supply and demand of software professionals has continued unabated and currently there are over 190,000 jobs waiting to be filled in the U.S. (Baker 1997). The U.S. government recently relaxed its visa regulations and firms have started to rely on the H1-B visa program which allows companies to bring in foreign professionals for a maximum of six years. In October 1998, the cap in the United States was raised from bringing in 65,000 software specialists each year to 95,000 in 1998 and up to 105,000 every year until 2002. This is a bugle call for software professionals across the globe, but Indians in particular because India is the top source country from which these professionals are being recruited (Mehta 1998). Companies in the United States do not directly deal with the possibilities of recruiting immigrants; therefore, this new regulation has also been a clarion call for small, immigrant Indian-owned firms in the United States which now specialize in providing H-1 visas to qualified personnel from India. These firms then act as brokers and send out their H-1 visa holders as consultants to firms which are facing a shortage of personnel.

How is bodyshopping in the 1990s different? Firstly, there are government restrictions on who can issue H-1 visas - these necessarily have to be American firms. As it turns out, immigrants Indians (either naturalized citizens or Green Card holders) have used this opportunity to set up firms in the U.S. and through contacts in India, shopped around for software professionals willing to emigrate. Thus, this type of bodyshopping restricts the “nationality” of the firm. Secondly, the nature of the work visa issued to the migrants are different. Bodyshopping firms from India send migrants on L-1 visas, which are temporary work visas(issued for a few months at a time) whereas H-1 visas are of a more permanent nature and with the help of a sponsor, can be converted into a Green Card. Thus, bodyshopping firms established in the U.S. by immigrants are creating permanent migration. Thirdly, if the bodyshopper wishes to “break loose” of the contract and find work elsewhere in the industry, it is easier to do so on an H-1 visa rather than an L-1 visa.

How do the bodyshopping firms operate? Most companies in the U.S. which need software professionals contact employment agencies or operate websites that post job openings, with the websites accessible only to a list of “preferred vendors”. These vendors are bodyshopping firms, many

of them owned by immigrant Indians. Therefore it is the desire of the bodyshopping firm to be the preferred vendor to as many companies as possible. When a job is listed, the bodyshopper looks amongst its current crop of consultants to find a match. Since these are small firms, usually consisting of 50 or so consultants, it is very likely that all their consultants are already on other assignments. If there is no match, they then contact another bodyshopper who happens to have someone on their team who is the appropriate person to contract out. This cycle of contracting is only possible due to the ethnic ties that underlie the business. The speed of delivery, in this case of personnel, is achieved through the network that these immigrant Indian bodyshopping outfits maintain with other similar firms.

Figure 3 shows how these bodyshopping firms of the 1990s operate.



In sum, bodyshopping addresses the problem of the acute shortage of software professionals faced by most American companies and in doing so, they utilize ethnic ties and create migration flows from India. While they provide a crucial service to a human-resource strapped industry, their revenues are dependent on this labor demand and their fortunes swing with the ebb and flow of the need for software professionals.

While it is clearly important to understand how the migration flow is occurring, it is also important to assess the *type* of migration this is creating. In the debates surrounding the issue of “brain drain” of the most highly qualified personnel from India to the U.S., it was always the case that the sending country was losing its best and brightest. The immigrants were from top-ranking technical universities from India and were considered the cream of engineering and scientific talent. What of the migration in the late 1990s? Who are these thousands of professionals entering the U.S.? They are all skilled, oftentimes

with at least a couple of years of experience working in the software industry in their home country, but they are a qualitatively different group of people. They have degrees/diplomas/certifications from second-tier institutes in India and often hail from small towns and cities. While immigration trends in the past left India devoid of its best talent, it still left behind a reserve army of technical personnel; however, with this new wave of migration, it seems that even the second layer of India's labor pool is being denuded. From India's perspective, therefore, bodyshopping is a no-win game. In the 1980s, temporary migrants from India to the U.S. created some revenues for small firms but did not result in any learning or upgrading of skills; in the 1990s, bodyshopping is only succeeding in creating a permanent outflow of its technically trained population.

However, a second type of firm within the services industry has moved beyond bodyshopping and is creating ties with India that might be to the home country's advantage, balancing the issue of "brain drain" with a newer notion of "brain circulation". I now turn to assessing the "value-added services firm".

(ii) Value-added services firms. A second type of firm exists within the services industry - these firms have moved beyond the stage of contracting out people and have moved into providing IT business solutions to their clients. More and more companies in the U.S. that *use* information technology but do not *create* it are making the decision to outsource their IT needs to firms that specialize in providing software services. This is part of the companies' strategies to focus on their core competencies and let an outside vendor provide the support services required to keep the business technologically updated.

This type of service creates more value for the software firm than the bodyshopping business.

Bodyshopping is very volatile because (a) it is solely dependent on the current labor demand and the availability of suitable personnel who match the specific needs of the client and (b) they have a high turnover rate as there is no incentive for employees to continue with them if they can find a more permanent, better paying job elsewhere in the industry. In terms of the different elements within the software development process (refer to Figure 1), the value-added firms in the services industry do not design new software, but does this mean that they are relegated to the lower end of the value chain? And if not, how does value accrue to the firm? The answer to this question is to understand the niche these firms have carved for themselves.

The value-added firms provide different types of services under one umbrella company. Although they don't design software, they keep up-to-date with the latest technology and consolidate the different activities that are required to implement and maintain software applications. With software still a very craft-like, labor intensive process, relying on trial and error to achieve its goals (Gibbs 1994), it is these firms who are pushing ahead and developing industry-wide standards in how certain applications are carried out. For instance, Syntel Inc., an Indian-owned software services company, has developed and created a trademark for what it calls Method 2000, a comprehensive approach that assesses the size of the client's Year 2000 exposure, plans a solution and completes the necessary modifications, testing and implementation. Established in 1980 by an immigrant Indian, Syntel Inc. started out as a bodyshopping firm, however, by consolidating the different elements of the software development process under one roof and training and re-training its staff of permanent employees with the latest tools, firms like Syntel Inc. have already moved a step away and up from its bodyshopping past.

Even within the value-added services sector, there are clear global links between India and the United States. There are two types of Indian firms within this sector - those that are based in India and have branch offices in the United States (e.g. Tata Consultancy Services, TCS, the largest software consultancy company in the world in terms of its employee strength and number of offices around the globe) and those that are based in the United States (and owned by immigrant Indians) with offices in different cities in India (e.g. Syntel Inc., mentioned above, has its headquarters in Troy, Michigan with several branch offices all over the United States as well as two in India). In both cases, the comparative advantage of these firms is their "Indian connection". Three factors play an important role in making India an attractive outsourcing option for firms based in the U.S. - cheap labor, a large pool of technically-skilled, English-speaking population and the nearly twelve hour time difference between India and the U.S. which allows for a 24-hour workday. Firms like TCS and Syntel allow their clients the option of carrying out some or all of their software tasks offshore, thereby cutting on total costs.

Figure 4 below illustrates how these value-added services firms operate. As shown below, there is a movement of people as well as constant flow of information between three sites - the client's site, the vendor's U.S. location and the vendor's off-shore location in India.

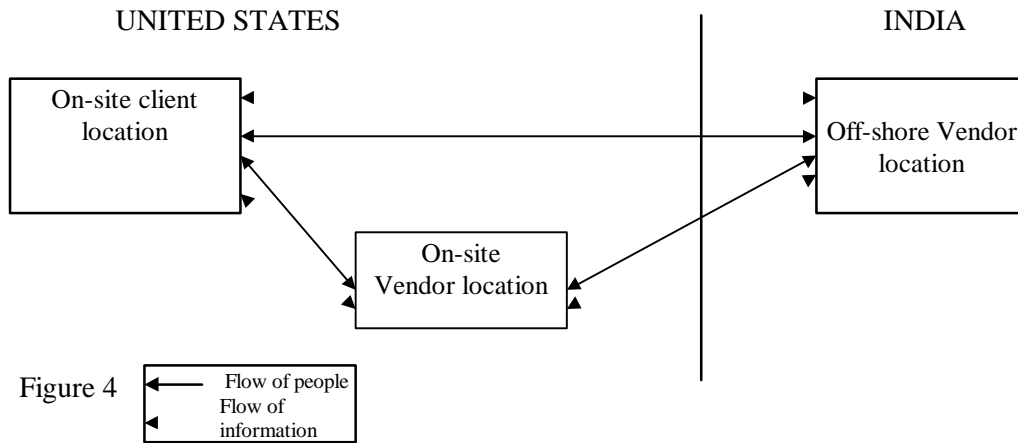


Figure 4

Compared to bodyshopping, the value-added services industry contributes to the development of the software sector in India through the transfer of managerial models and technological capabilities and by upgrading the skills of workers in India. However, it is important to remember that India is favored as an outsourcing option because of its cheap labor pool. And even as the question vexes developing countries involved in labor-intensive industries, so it should be a cause for concern for India's involvement in the hi-tech sector - how can the emphasis shift from a low-wage option to a high-skilled location?

One way to do this is to move up the value chain and control the creative end of the software development process - the designing of new products. How do Indian firms in both India and the United States fare at this level?

The Product Designers

By 1990, 30 percent of Silicon Valley's high technology workforce was foreign-born. Of those, 23% were of Indian origin (Saxenian 1999). While these high-skilled immigrants have achieved income and occupational parity with their native-born counterparts in professional jobs, "their opportunities for advancement to management occupations appear more limited, suggesting the possibility of a glass ceiling, or invisible barriers to career mobility" (Saxenian 1999:11). Many of these Indian engineers have responded by starting up their own businesses. What is peculiar about the Silicon Valley Indian entrepreneurs is their propensity to be more involved in the product rather

than the service segment of the software industry. The product firms are geographically concentrated in the Silicon Valley region unlike firms in the service sector which are spread out all across the U.S. and all the major cities in India. Many of the service firms set up branch offices of their companies in locations where they find a long-term client. E.g. Syntel Inc. won a five-year long contract with the government of New Mexico and as a result they established an office in Santa Fe. Thus, service providers go where the client is; contrarily, product designers go where the venture capitalist is.

As in the software services industry, Silicon Valley's product creators also rely on ethnic ties to help with their businesses. These ties, however, do not connect them to India per se, but to other immigrant Indians in the region. There are two associations, Silicon Valley Indian Professionals Association (SIPA) and The Indus Entrepreneurs (TiE), both in the Silicon Valley region, where the goal of mentoring and assisting entrepreneurship through monthly meetings, presentations and extensive informal networking is a central agenda for both associations. Interestingly, these groups are creating a common identity among an otherwise fragmented nationality, divided by regional, language and caste differences. Being Indian overrides being Bengali, Tamil or Gujarati. The immigrant Indians in the service sector, on the other hand, do not have associations based on ethnic identity.

On the other side of the ocean, most Indian software firms continue to be in the service industry, with exports headed primarily to the United States. However, there is some evidence of a change even in the Indian software market where some of the large service firms are slowly setting foot into the products market. An example of this is Mastek, which recently developed a software package called Strac, being used by stockbrokers in Malaysia and Elixir, for insurance companies in Singapore. Nine percent of its revenue in 1999 is expected to come from software products (Mitra 1999).

To summarize, India's ability to move into the product market has been limited. It is not tapping into the opportunities provided by the entrepreneurs in Silicon Valley and only a few large companies in India have the financial resources available at their disposal to invest into R&D and marketing, two key elements in success in the products segment of the industry.

Theoretical Framework: Global Commodity Chains, Development Theory and Immigrant Entrepreneurship

Two of the most prominent theories of development in the 1970s and 1980s have been world systems and dependency theories. Both brought modernization theories into disrepute by questioning its eurocentric assumption of an evolutionist path to development that all countries must necessarily pass through. The central concern of both dependency and world systems theory was to explain the uneven development of different parts of the globe. Dependency theory postulated that development in one part of the world and underdevelopment in another was a *relationship*, a single historical process such that one implied the other. The very nature of capitalism develops one region (the core) and underdevelops another (the periphery); and no middle ground was postulated. This theorization resulted in the failure of dependency theory to take account of industrialization that was occurring not only in the East Asian countries but also in countries that were creating indigenous manufacturing capability (e.g. Brazil).

Unlike the dichotomous model based on the core-periphery, world-systems theory postulates that states can be located along a three-fold axis - the core, the periphery and the semi-periphery. Furthermore, the analytic focus of world-systems theory moves it beyond the societal level with the basic assumption that the essential feature of the system, its mode of production, exists at the world level. The world-systems theory is therefore useful in that it takes account of the global nature of production by moving beyond the nation-state as an effective unit of analysis. However, it is at such a macro level that it is not possible to look at different development outcomes for the different segments of the industry I have outlined above.

Furthermore, in terms of the ability of the firms in different segments of the industry to incorporate themselves into the global economy, it is clear from our discussion above that the use ethnic networks is one mechanism through which to gain an advantage. There is ample literature on the use of ethnic networks in entrepreneurship. However, most of the literature on immigrant entrepreneurship analyzes the use of ethnic networks in industries marginal to the mainstream economy such as restaurants, retail and grocery stores (Light and Bonacich 1988; Waldinger et al 1990; Portes 1995; Granovetter 1996).

What we need is a theory that allows us to: (a) view different development outcomes for the different segments of the same industry (b) study entrepreneurship not just in niches marginal to the

mainstream economy but also in highly dynamic sectors such as software. I believe that the global commodity chains framework, coupled with network theories is a useful tool to facilitate such an analysis to link the flows of goods and services, people and organizational networks.

Global commodity chains (GCC) consists of a set of international networks clustered around a commodity, linking households, enterprises, and states to one another within the world economy (Hopkins and Wallerstein 1986; Gereffi and Korzeniewicz 1994). From the GCC framework is drawn the notion of organizational chains and organizational networks (Gereffi and Tam 1998). As modern economies become increasingly global and interdependent, the network of buyers and suppliers (in our case, of services) form an organizational chain where each node in the chain controls an aspect of the production process. Certain nodes in the chain therefore control the more higher-end activities and are therefore in a better position than those at the lower ends.

This power dimension in the GCC framework has been used to show that the development prospects of countries are conditioned by how they are incorporated into global industries (Gereffi 1995). In today's world, power rests not only on the ability to control resources; the new competition is one of access to information and partners. Theories on networks offer us vital clues as to which positions offer advantages and why.

Based on the finding that workers frequently locate jobs through acquaintances ("weak ties") rather than close friends and relatives ("strong ties"), Granovetter (1974) argued that weak ties play an important role in determining labor-market outcomes. Ron Burt (1992) further elucidated this strength-of-weak-ties hypothesis by moving beyond the *who* question - that is, which position in a network structure has privileged access to information - to the question of *how* certain structural arrangements generate benefits and opportunities. The players who succeed, Burt contends, are those whose immediate networks are dense and overlapping, and who are linked to more distant networks rich in non-redundant contacts. From the perspective of the firms in the software industry, this theory illuminates the usefulness of bridges that businesses use in their transnational arrangements.. A firm-centered analysis is therefore critical because it is the firms in the two locations that provide the bridges.

A further caveat is added by the social resources approach (e.g. Lin 1990) that emphasizes the need to assess the resourcefulness of the contacts in defining the network for a person. Certain networks

may be better than others because it may affect, for instance, the kinds of tasks the firm finds for itself, the credibility of the contact's referral of the firm, and the usefulness of assistance and support. In the global software industry, what determines which bridges access better resources?

Questions of interest that emerge from this are: (a) Do ethnic ties constitute weak ties that result in non-redundant, non-rewarding networks? (b) If both bodysourcing firms and firms that develop products rely on ethnic networks, what explains the ability of one type of tie to access better resources? In other words, what type of ethnic tie acts as better bridges?

Methodology: Research Sites, Data Collection and Language Facility

Research Sites. Academic work on the information technology industry is scarce but the regions that have received attention in the U.S. and in India are Silicon Valley (Saxenian 1994, 1998) and Bangalore (Lateef 1997, Parthasarathy 1998), respectively. However, none of these studies have conducted an industry analysis with a focus on organizational networks. Therefore, my choice of research sites will build on existing studies as well as complement them by providing fresher insights. As an article in Newsweek (Levy, November 9, 1998) indicates, Silicon Valley has several contenders. Similarly, while the region is the preferred choice for immigrant engineers from Asia with more than one-third (36%) reporting an intention to live in the San Francisco Bay Area (Kunjanapan, 1995), there are other competing sites for Indian settlement. Therefore, I intend to conduct 2-3 months of research in the New York-New Jersey area followed by 2-3 months in the San Jose-Santa Clara area. This geographical spread of regions will provide me with a representative sample of software firms in the different segments of the industry I have outlined.

On the other side of the ocean, half-way around the globe, the south Indian city of Bangalore has emerged as an unlikely mirror opposite of Silicon Valley. Silicon City(as it is now called) has been listed in the aforementioned Newsweek article as one of the contenders to its namesake and is host to over 250 IT (Information Technology) companies. Some of these are large multinational firms (among several others, Microsoft, IBM, Oracle and Silicon Graphics), large Indian-owned software firms (TCS, Infosys, Wipro), firms run by Indians who live in the United States (Aspect Development, Information Management Resources, Complete Business Solutions and Mastech; all listed in the si tech 20 US Index) as well as a concentration of small and medium-sized Indian firms (Parthasarathy 1998). Since I propose to understand development by using a firm-centered networks analysis, Bangalore is an ideal research site

in India. There are, however, contenders to Bangalore as well. Hyderabad and Chennai are neighboring south Indian cities and are different from Bangalore in that they are definitely newer cyber cities, and they are different from one another in that state policies in Andhra Pradesh are actively involved in promoting Hyderabad as the new software center whereas the state government in Tamil Nadu is hailing Chennai more as an auto industry hub rather than a futuristic IT city. They will serve as interesting comparative cases to Bangalore.

Data Collection. In the United States, I intend to:

- (1) Identify a sample of firms which will enable me to tap into both segments of the industry.
- (2) Conduct semi-structured interviews with firms that are run by entrepreneurs of Indian origin. The interviews will capture the type of networks which enabled them to access important resources to start up on their own. I will also assess how they link up to the Indian software sector. In a system of global production, where each node in the chain assumes differential levels of resources, it is critical to delineate which node in the chain these firms occupy. It is also important to ask: Do these networks change over time, and if so, how?
- (3) I will also interview other industry representatives of the technical community including software professionals, venture capitalists, managers and owners of firms who employ Indians or work with them. This to assess how outsourcing tasks are allocated to the firms I am interested in.

While in India, I intend to spend a total of eight months dividing my time between Bangalore, Hyderabad and Chennai.

- (1) I will assess how both small and large firms are nestling themselves in the global economy, albeit via different strategies, and through different networks. My interest is to see what node they occupy in this global industry. I will conduct semi-structured interviews with owners of firms who send out temporary workers on a short-term basis as well as entrepreneurs who rely on overseas contacts to do business.
- (2) I also intend to use public documents to gather relevant data on export earnings of firms by size, growth patterns of large versus small and foreign-owned versus Indian-owned firms. This will give a clearer picture of the positions of the different firms in the industry as a whole and enable me to assess the development of India's software industry through quantitative measures. One such source will be NASSCOM (National Association of Software and Software Companies of India), the local industry organization that collects data on an annual basis.

Language Facility. I am fluent in English and two Indian languages, Hindi and Telugu. Hindi is spoken predominantly in North India but also in urban cities in the South. Telugu is the native tongue of Andhra

Pradesh, where Hyderabad is located. However, my population of study will be predominantly English-speaking, so I do not perceive language to be a barrier.

Thus, my multifaceted theoretical framework can help us understand not only the movement of goods and commodities but give us fresh insights into the flow of people as well. By analyzing the networks between firms, in India and the United States, and what position (nodes) they occupy within a larger production and organizational system will help us understand how the shape of firm-centered networks in turn shapes the nature of the global industry which in turn shapes the niche a country occupies and creates an “unequal globalization”, as it were.

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