

APPENDIX THREE

Genesis and Growth of The ICT Industry in India

After independence, Indian economists and policy-makers emphasized the need for industrialization as an avenue for bringing development in the country. Given the requirement for setting up basic heavy industries and considering the large capital investment that was required for the same, it was decided to promote industrialization by establishing public sector companies. At the same time, emphasis was also laid on import substitution and export promotion, thinking that this would support the development of skill and competitiveness of domestic producers. With the same intention, restriction was imposed upon foreign investment. In order to support the small enterprises, the government had also restricted the development of monopoly by controlling the size of private firms and by offering protection and subsidies in various forms to small enterprises (Brunner, 1995; Heeks, 1996). Initial development of the ICT industry in India began under such protectionism. However, the phenomenal growth that the ICT industry has witnessed in recent years is primarily an outcome of the Government of India's policy liberalization since the 1990s (Lal, 2001).

III.I Rise of ICT Hardware Industry

Until the mid-1960s, India's electronics industry was very small and unsophisticated. Therefore, the requirements for computer in India was basically met by foreign suppliers like IBM and ICL. The Industrial Policy Resolution of 1956 had not included the then budding computer industry in the list of basic and strategically important sectors. However, since the mid-1960s, India recognized the strategic importance of electronics industry and did not want to leave it completely in the hands of multinationals. In 1965, Dr. Homi Bhabha Committee stated in its technical report on computers that India should become self-sufficient in computer technology within the next 10 years. However, considering India's technological capability at that point

of time, this was an over-expectation. Such an extreme position went through modification during the 1970s. The Department of Electronics was established in 1970. Shortly thereafter, the Electronics Commission was formed for regulating the activities of private and public companies in the electronics industry. Following the recommendation of Bhaba Committee, The Electronics Corporation of India (ECIL) began producing small and medium-sized computer systems in 1971 (Brunner, 1995).

In 1973, the government recognized the strategic importance of the computer industry and in its computer policy emphasis was laid on developing complete self-sufficiency in computers. Computer Mainframe Corporation (CMC), established in 1975, was given the monopoly right to service all foreign systems installed in the country. These steps towards developing self-sufficiency were further buttressed by governmental strategy of restricted import and tariff control for imported goods under the supervision of Department of Electronics, Directorate General of Technical Development and Chief Controller of Imports and Exports (*ibid.*).

III.II Rise of ICT Software Industry

Until the mid-1960s, software was also provided by multinational hardware-providing companies like IBM and ICL. In the West, software development outside multinational hardware providers began to flourish in the late 1970s, as it became increasingly difficult for hardware producing companies to provide the full range of software applications required to make efficient use of their hardware products. This was also facilitated by the standardization of job activities, programming languages, and hardware environments. However, initially such software development was primarily restricted to the effort of in-house developers writing programs for their own organizations. Software development began to be outsourced to external organizations as the number of commercial organizations using computers increased. This created a domestic market for software services. With the growth in India's hardware industry, indigenous hardware manufacturers began developing an increasing range of operating systems, compilers, and application packages. For some companies, software export was one avenue for securing governmental permission to import hardware (Heeks, 1996; Lateef, 1997).

The first firm which agreed to export software in return for permission to import hardware was Tata Consultancy Services (TCS); it was in 1974. This year, symbolically, marks the birth of Indian software industry. After TCS, a number of other companies which imported computer hardware began their half-hearted efforts in the realm of software export. However, some of them gave up once their export-obligations were fulfilled. At the same time, data-processing departments of some large companies and the software groups of some Indian hardware manufacturers started attempting to sell their in-house softwares. Initially, these companies were targeting the domestic market. However, after recognizing the revenue-potential of software, some of them made their software division more export-oriented, sometimes even hiving them off as a separate company within their overall business. The departure of IBM from India in 1978 gave the software industry an added impetus, with several of the 1200 ex-IBM employees setting up small software companies (Heeks, 1996).

III.III Policy Liberalization and ICT Entrepreneurship

Although the growth of the ICT industry was slow and inconsistent, exports particularly began to grow after 1981. Small and medium-sized domestic-oriented companies tried to get into export, looking into the opportunities for making higher profit. Between the mid-1970s and mid-1980s, Government of India re-evaluated its economic policies in order to find solutions to various problems faced by the economy. For this purpose, a number of expert panels were formed. These panels suggested the policy of liberalization as an avenue for improving the economic condition. These recommendations significantly influenced Government's decision to gradually move towards liberalization of economy by reducing its control over international trade, by encouraging foreign investment, and by opening up areas hitherto reserved for public sector (*ibid.*). The Government's move towards liberalization of international trade resulted in the rapid rise in the volume of imports since 1978 and particularly since 1982. This rise was partly due to the fast growth of the computer industry at that time (Brunner, 1995). Sign of change was visible in the Technology Policy Statement (1983), which stressed self-reliance but also emphasized on international competitiveness and on exports (Heeks, 1996).

When Rajiv Gandhi became the prime minister of India, science and technology received a further boost. This significantly facilitated the development of the ICT industry (Heeks, 1996) through introduction of selective deregulation, relaxed controls, and lowered tariffs for the electronics industry as a whole consistent with the liberalized trade regime introduced in other sectors of the economy (Mahalingam, 1989). After the introduction of 1984 hardware policy, thousands of PCs came into India and this led to the creation of a large number of software companies, especially small ones, seeking to meet the service and product needs of the new computer owners (Heeks, *ibid.*). Companies like Wipro Infotech, which was started by Azim Premji in Bangalore in 1981, benefited from the new policy to establish production and marketing agreements with a variety of foreign computer companies. Wipro became the first of the ICT success stories in Bangalore. However, most of the domestic market for computer hardware relied heavily on imported components (Heitzman, 2004).

It was software which allowed India and particularly Bangalore to earn an international reputation in ICT (*ibid.*). Government's commitment to software development was stated in its policy document of November 1986 which sought to promote software industry by emphasizing on exports, simplifying the governmental procedure, and by increasing the use of computers in decision-making and enhancing efficiency (Lakha, 1990). Till the late 1970s, software export was primarily dominated by two companies, namely, Tata Consultancy Services and Tata Burroughs Limited (later changed to Tata Unisys). In the early 1980s, a number of other companies, such as Infosys, were established in Bangalore. The typical arrangements were variations on 'body shopping' agreements, where Indian programmers would travel to overseas locations and work for several weeks or months (Lakha, 1994; Heitzman, 2004). From the late 1980s, there was a considerable rise in local and multinational interest in exports along with a number of large Indian firms spinning off software divisions (Heeks, 1996).

From the late 1980s, the pattern of public deficits was increasing in India. As a result, growth in 1990-91 dropped to 1.2 per cent, the central fiscal deficit became 8.4 per cent of GDP, and foreign exchange reserves dropped to levels below one month of imports. All these coincided with the collapse of India's most powerful international ally, the Soviet Union. At the same time, the Gulf War began resulting in the increase

in cost of oil imports and fall in remittances received from Indian workers in the gulf. As a result of all these, the Government of India was compelled to borrow from International Monetary Fund (IMF). The Government was forced by IMF to bring in structural adjustment as a condition for advancing loans. The Government of India brought in structural adjustment by introducing what it called New Economic Policy in 1991. As a part of this policy, the government relaxed the then existing restrictions on import of foreign technology and on developing tie-ups with foreign corporations. All these facilitated the development of the ICT industry, particularly software industry in India (Heitzman, 2004). By the mid-1990s, even those firms, which had initially focused on hardware, were pushing into software exports (Heeks, 1996).

Initially, the ICT industry, like any other industry, began developing in the traditional business centres like Mumbai and to some extent in Chennai. Gradually over a period of time, due to the growth of various necessary infrastructure facilities, new centres started emerging in the ICT industry. Bangalore was the premiere among them. One factor which presumably facilitated the growth of the ICT entrepreneurship in Bangalore was the establishment of a new industrial estate called Electronics City (also called Electronic City) near Bangalore as early as in 1977. After 1987, the Department of Electronics developed the Software Technology Parks of India (STPI) scheme in order to attract offshore software production houses and 100 per cent export-oriented units by offering broadband communication networks, reliable infrastructure, tax relief, etc. The Department of Electronics decided to establish one of its initial six STPIs on the campus of Electronics City. The STPI's broadband communication system named SoftNET, first established in Bangalore, offered international lease lines, emails, videoconferencing, and shared internet service (Heitzman, 2004).

Electronics and computer industry being closely related, Bangalore was a natural location for the development of the ICT industry. Clustering of electronics-related industries and large public sector enterprises in Bangalore brought people from all over India, thereby energizing the city's already existing cosmopolitan character and culture. In addition, relatively low cost of living in Bangalore, when compared with Mumbai and Delhi, made it attractive from a cost point of view. Besides, the ICT industry is comprised of young, highly educated workforce. This bred a particular lifestyle, which could grow only in culturally open locations.

Bangalore was much less conservative in comparison to many other Indian cities. Furthermore, Bangalore was in an advantageous position in terms of having a strong technically skilled workforce due of the presence of academic community at institutions like the Indian Institute of Science and due to the existence of many high-tech industries (Lateef, 1997). Other factors which presumably promoted the growth of ICT industry in Bangalore included a fairly stable relationship between the state government and the private sector and an international promotional campaign on the part of the state government trying to project Bangalore as the 'Silicon Valley of India' (ibid.; Heitzman, 2004).

III.IV Recent Scenario

Bangalore's success in promoting the growth of ICT entrepreneurship has encouraged other states to think on similar lines. As a result, centres for the development of ICT industry have emerged in cities like Hyderabad, New Delhi/Gurgaon/Noida, and Pune, and started spreading even further. Leaving aside Bangalore, claiming 26.64 per cent of the ICT exports during the financial year (FY) 2000-2001, other locations claiming a share in export included New Delhi/Gurgaon/Noida (15.34 per cent), Chennai (10.42 per cent), Hyderabad (7.02 per cent), Mumbai/Navi Mumbai (5.68 per cent), Pune (3.39 per cent), Kolkata (0.88 per cent), Ahmedabad/Gandhinagar (0.36 per cent), Thiruvananthapuram (0.03 per cent), and Chandigarh/Mohali (0.01 per cent) (Parthasarathy, 2004).

Over the years, the ICT industry, also referred as the IT industry, including hardware, software product, software services and related business services, has increased its contributions to India's GDP from 1.2 per cent in FY 1997-98 to 4.8 per cent in FY 2004-2005. This industry, with its strong export orientation, has emerged as a key contributor to India's foreign exchange earnings. In FY 2004-2005, only 36 per cent of the business for this industry came from the domestic market, whereas 64 per cent of the business came from international market. In the same financial year, the Indian ICT exports touched US \$ 18.2 billion, which is a significant increase over the corresponding figure for FY 2000-2001, that is, US \$ 6.2 billion. The United States, from the beginning, has remained the key export market for the Indian ICT industry. In FY 2004-2005, the destination for more than 68.4 per cent of the Indian

ICT exports was the USA. Next export destination is Europe, accounting for 23.1 per cent of the total exports. The industry verticals, which has accounted for the larger share in ICT export in FY 2004-2005, include financial services (39 per cent), telecommunications (13 per cent), and retail (9 per cent) (NASSCOM, 2006).

In parity with the previous years, the ICT services and softwares have continued to dominate this industry by contributing over 47 per cent of the total industry revenue in FY 2004-2005. In the same year, the hardware, the IT enabled services (ITES)-Business Process Outsourcing (BPO), and engineering and Research and Development (R&D) services segments accounted for 21 per cent, 18 per cent, and 14 per cent of the industry revenue respectively (ibid.). Reputation about quality has been an issue of important concern for companies in the Indian ICT industry (Banerjee and Duflo, 2000). As a result, many Indian companies have been active in securing quality certification offered by International Standards Organization (ISO) as well as Software Engineering Institute's five-level Capability Maturity Model (SEI-CMM) (Parthasarathy, 2004).

In the ICT industry, India has been specifically benefited because of suitable geographical position on the globe resulting in a large time-gap with the USA, the largest market, which makes it possible to keep office functioning for almost twenty-four hours in a day (Lateef, 1997). Development of the ICT industry in India has also been largely facilitated by the rise of Indian entrepreneurs in the Silicon Valley in the USA. These US-educated Indian-origin 'technopreneurs' have extended their business activities to India initially by tapping the low-cost skill, and over time by contributing to highly localized processes of entrepreneurial experimentation and upgrading, while maintaining close ties with the technology and markets in the Silicon Valley (Saxenian, 2005).

In addition to having a workforce of 1.3 million directly employed in the ICT industry, 3 million indirect and induced employment have been generated by this industry. Indirect employment includes expenditure on vendors related to telecom, power, construction, facility management, transportation, catering, and other services. Induced employment is driven by consumption expenditure of employees on food, clothing, utilities, recreation, health, and other services (NASSCOM, 2006). However, one concern is that the boom in the software industry may have negatively affected the growth of other industries.

The boom in the software export sector, on account of exogenous increase in world demand, results in an increase in the demand for labour in that sector. This would cause a rise in the wage rate in that sector. (Note that the wage rate in the software grew by ... 25-30 per cent during the 1990s). The higher wage rate would naturally attract labour, which is mobile, to the software export sector from the other sectors, which are competing with the software sector for technical manpower ... Either they [the other sectors] could pay salaries on par with the software firms, or be satisfied with the second best by paying lower wages (Joseph and Harilal, 2001).

At the same time, challenges have been observed within the structure of human resource in the ICT industry itself. Relatively low remuneration offered to employees in developing countries, to which the ICT jobs are being transferred from the industrialized countries, would prevent them from getting the benefits that workers in industrialized countries lose as a result of investment abroad (Prasad, 1998).

The disparity of growth across segments in the ICT industry, with the dominating role of low-revenue earning software services, has been pointed out as a crisis faced by the industry (Radhakrishnan, 2003). This is an outcome of the poor performance of pre-packaged software segment, which has the highest profit potential. Low development of this segment in India implies lower growth in industry revenue (Chakraborty and Jayachandran, 2001). Lack of initiative in the embedded software sector has resulted in a crippling effect on the Indian software industry. With the revenue of software service industry depending on high conversion value of the local currency against US Dollar/ Euro/Pound Sterling, orientation towards export has increased. Too much of dependence on the export market at the cost of domestic market has been identified as an issue worth consideration for ensuring sustainable development of the Industry (Kumar, 2001). However, as a result of export orientation, entry into this sector has become open to anyone who has developed contacts with overseas clients (especially in the US market). Easy entry into this industry has, therefore, created opportunity for small and tiny firms to enter this business, thus creating a long-tailed structure of the industry (Kumar, 2000; Nath and Hazra, 2002). This facilitates the rise of first-generation entrepreneurship, a focus of the current study.