THE OUTSOURCER: THE STORY OF INDIA'S IT REVOLUTION by Dinesh C. Sharma, The MIT Press, Cambridge, Massachusetts, USA (2015), Rs.1,750.00

The Indian IT Revolution

TODAY computers – and other forms of digital technology – are ubiquitous in India. It was not so about fifty years ago. In the mid-1960s Delhi University's only mainframe computer occupied a large hall in the Computer Centre. Data had to be fed by hundreds of post card-sized punched cards. Many researchers had to share time for using the machine. Passenger booking in railways and airlines, and transactions in banks were all done manually and people had to wait in long queues for hours to reach the counters. ATMs were non-existent, as were Internet and mobile phones.

There has been a sea change over the last four decades or so. Today, the computer or information technology touches lives of millions of Indians in ways many of them may not be even fully aware of. More than one million tickets are booked on the Indian Railways everyday using its extensive, computerised passenger-booking system. Half of these tickets are booked online by passengers without stepping out of their homes and offices although many do it from cyber cafes. Similar is the case with airline and hotel bookings.

One can also pay bills and taxes and do purchases from around the world online. It is now possible to withdraw money from ATMs anywhere, any day, any time using debit or credit card; one doesn't need to go to the bank any more. All this not only means more convenience for the people but also greater efficiency. The driving force behind this change is the emergence of India as a global player in information technology, made possible by several factors including development of skilled manpower, and pragmatic government policies.

Unfortunately, not many users of ICT in India are aware of the chequered history of the growth and development of the country's computer and IT industry. Dinesh C. Sharma's scholarly volume adequately fills the void. He describes the rise of the Indian information technology industry as "a remarkable economic success story". This is not an overstatement, as evidenced by the almost 1,000-fold increase in software and services exports from India from less than $100 million in 1990 to almost $100 billion at present. The "miracle" of Indian IT, says Sharma, is actually a story about the long work of converting skills and knowledge into capital and wealth.

The Outsourcer traces every twist and turn in the long story of India's IT revolution, beginning with the earliest ventures under the guidance of stalwarts like statistician Prasanta Chandra Mahalanobis in Calcutta (now Kolkata) in the 1930s and physicist Homi Jehangir Bhabha in Bombay (now Mumbai) in the 1940s. Mahalanobis wanted computers for analysing the vast pool of statistical data for the National Sample Survey and use it as a tool in national planning, while Bhabha needed one for nuclear power research. And both wanted to develop and fabricate computers locally. But, to begin with, Mahalanobis acquired two large first-

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generation computers from the UK and the USSR in the early 1960s.

India's first indigenous computer named TIFRAC (TIFR Automatic Calculator) was completed in 1959 at the Tata Institute of Fundamental Research, Mumbai under the leadership of Bhabha. It helped them gain experience in various fields of computer design, fabrication, testing, operation, maintenance and programming. The TIFRAC also helped spread computer consciousness among research scientists beyond TIFR. By 1964, the machine operated in two shifts and was used by scientists from government laboratories, educational institutions and even private organisations from all over India for various computational needs. But it was hardly adequate to meet the growing computational needs of the nation.

When the question of starting electronics manufacturing arose, the Atomic Energy Establishment (AEE) launched itself into the arena. In 1967, its electronics division evolved into the public sector production unit called the Electronics Corporation of India Limited (ECIL) in Hyderabad, which was projected as the 'national champion' in the field of computers and electronics. However, as Sharma points out, subsequent review of ECIL operations showed that its computers had "very few applications packages, making them unsuitable for business and even scientific applications".

In the mid-1970s, the failure of ECIL to produce adequate number of computers and the almost simultaneous curtailment of operations of the American computer giant IBM and the British company ICL led to a shortage of computing power in the country. To ease the shortage the Department of Electronics (DoE) decided to permit imports but wanted to control the process. The central government in August 1975 designated the DoE as "the primary agency of the government for evaluation and approval" of all data processing equipment and computers required within the government and for import into the country. Sharma describes the complex approval procedure as a nightmare as the importer had to follow an elaborate procedure for the select import of computers valued at more than Rs. 5 lakh, and the approval could take up to five years!

During the 1980s, several developments took place that paved the way for a more liberalised computer policy and the introduction of computers in the government, education and public sector units. They included the computerised railway passenger reservation system and the digital telephone exchange. The first computerised passenger reservation system started functioning in New Delhi in 1986. Today almost all cities and towns on the country's railway network enjoy this facility. The software developed for the reservation system had many unique features such as the facility to issue tickets from any station to any station, return journey, and multiple laps of reservation – all from a single window. This provided great relief to passengers, who had to spend less time in queues and the system allowed little chance of corruption.

By the late 1980s banks also followed suit and by 1989, about 4,500 advanced ledger posting machines had become operational in branches of nationalised banks. Subsequent developments included further automation in areas like national clearing of inter-city cheques, branch level computerisation and the setting up of a network of Automated Teller Machines (ATMs) that brought banking almost to the customer's doorstep. Today millions of Indians withdraw, deposit, or transfer money from their bank accounts across the length and breadth of the country irrespective of the bank or branch they patronize, courtesy the network of ATMs and the National Financial Switch connecting major banks.

The next big stride was the creation in 1984 of the Centre for Development of Telematics (C-DOT), which developed the first electronic switch for rural telephone exchange, tailor-made for Indian conditions that greatly helped in expanding the telephone network to rural areas. The condition of the telephone system in India at the beginning of the 1980s was pathetic. The government had decided to change from analog to digital telecom exchanges, but it was possible to do so only with imported equipment. Local production was not feasible because technology for digital switches was not available freely and very few countries possessed it. C-DOT's success paved the way for rapid transformation.

In the 1980s, the American government denied India access to supercomputing technology for fear of its use in nuclear weapon designing. To counter the embargo, a dedicated national agency, the Centre for Development of Advanced Computing (C-DAC), was set up. The new centre was allocated about $ 35 million to develop a prototype of a supercomputer based on parallel processing in two years. India's first supercomputer PARAM 8000 (PARAllelMachine) was delivered in 1990.

The book narrates many more success stories related to the rise of India's IT industry. In a nutshell, the book provides a detailed chronological history of the Indian IT industry that has evolved from the days of multinational monopoly, state control and import substitution to 'export-led growth leveraged on cheap labour'. It narrates the trials and tribulations that individuals and fledgling enterprises had to go through and the crucial role played by an enlightened political leadership. The significant point is that all the facts have been meticulously researched from official documents, publications, archival material and personal interviews by the author and painstakingly documented.

However, despite the staggering amount of information, most of it unknown or little known to the public, the presentation is eminently lucid and makes the book highly readable. It is a book that deserves to be read by every thinking Indian.

Incidentally, *The Outsourcer* is an updated and revised foreign edition of *The Long Revolution: The Birth and Growth of India's IT Industry* originally published in 2009 in India by Dinesh and published by HarperCollins.

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