CHAPTER – 1
INTRODUCTION OF IT SECTOR OF INDIA
# INTRODUCTION OF INFORMATION TECHNOLOGY SECTOR OF INDIA

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Introduction</td>
</tr>
<tr>
<td>1.2</td>
<td>Information Technology</td>
</tr>
<tr>
<td>1.3</td>
<td>Different Sources Provide Different Definitions</td>
</tr>
<tr>
<td>1.4</td>
<td>History of Information Technology</td>
</tr>
<tr>
<td>1.5</td>
<td>Computer Science</td>
</tr>
<tr>
<td>1.6</td>
<td>Business Histories: Personal Computing</td>
</tr>
<tr>
<td>1.7</td>
<td>Networking Technologies and Applications</td>
</tr>
<tr>
<td>1.8</td>
<td>Role of IT in Business Success</td>
</tr>
<tr>
<td>1.9</td>
<td>Various Role of IT in the World</td>
</tr>
<tr>
<td>1.10</td>
<td>Importance of IT in Business</td>
</tr>
<tr>
<td>1.11</td>
<td>Advantages &amp; Disadvantages of IT</td>
</tr>
<tr>
<td>1.12</td>
<td>IT Industry in India</td>
</tr>
<tr>
<td>1.13</td>
<td>Impact of IT on Indian Economy</td>
</tr>
<tr>
<td>1.14</td>
<td>Growth of India’s IT Industry</td>
</tr>
<tr>
<td>1.15</td>
<td>Promotion of IT – Governmental Incentives</td>
</tr>
<tr>
<td>1.16</td>
<td>Latest Developments</td>
</tr>
</tbody>
</table>
Chapter 1 Introduction of Information Technology Sector of India

1.1 INTRODUCTION

The last decade in the global arena has witnessed tremendous growth in the area of information technology. Rapid advances in the technologies for communication media like television, computer, internet, printing and publishing have enabled us to get prompt access to required information. Information technology (IT) has become one of the most robust industries in the world. It, more than any other industry or economic facet, has increased productivity, particularly in the developed world, and therefore is a key driver of global economic growth. The IT sector has emerged as a major global source of both growth and employment. IT Industry in the country has played a major role in placing India on the international map. The Indian IT Industry mainly comprises of instance System Integration, Software experiments, Custom Application Development and Maintenance (CADM), network services and IT Solutions.

1.2 INFORMATION TECHNOLOGY

Information Technology is the acquisition, processing, storage and dissemination of vocal, pictorial, textual and numerical information by a micro-electronics-based combination of computing and telecommunications. Information Technology is the industry, which through the use of computers and other supporting, equipment helps in the spread of knowledge. Information Technology for some time was synonymous to computers. But with the rapid and advancement in various information delivery system such as Radio, TV, Telephone, Newspapers, Fax and of course computers and computer Networks, information technology refers to the entire gamut of Media and devices used to transmit and process information for use by various target groups in the society. IT has, therefore been rightly termed at information and communication Revolution.

1.3 DIFFERENT SOURCES PROVIDE DIFFERENT DEFINITIONS

A few of these definitions and their sources are included below:

1.3.1 The international foundation for information technology provides three definitions for information technology:

“The technology used for the study, understanding, planning, design, construction, testing, distribution, support and operations of software, computers and computer
related systems that exist for the purpose of data, information and knowledge processing.”

“The IT industry that has evolved to include the study, science and solution gets for all aspects of data, information and knowledge management and or processing.”

“The organization in an enterprise or business that is held responsible and accountable for the technology used for planning, design, construction, testing, distribution, support and operations of software, computers and computer related systems that exist for the purpose of data, information and knowledge management or processing.”

1.3.2 The Information Technology Associate of America (ITAM) defines information technology as:

“The study design, development, information, support or management of computer based information systems, particularly software applications and computer hardware”. IT deals with the use of electronic computers and computer software to convert, store protect, process, transmit and securely relative information.

“IT is the technology (Hardware & Software) requires for the processing of data and other information. IT is a term that encompasses all forms of used to store, exchange and use information in its various forms (business data, voice conversations, still images, motion pictures, multimedia presentations, and other forms including those not yet conceived). It is a convenient term for including both telephony and computer technology in the same word. It is the technology that is driving what has often been called “the information Revolution”.

1.4 HISTORY OF INFORMATION TECHNOLOGY

Information Technology is the application of computers to store, study, retrieve, transmit, and manipulate data, or information, often in the context of a business or other enterprise. IT is considered a subset of information and communications technology (ICT). In 2012, Zuppo proposed an ICT hierarchy where each hierarchy level "contains some degree of commonality in that they are related to technologies that facilitate the transfer of information and various types of electronically mediated communications." The term is commonly used as a synonym for computers and computer networks, but it also encompasses other information distribution technologies such as television and telephones. Several industries are associated with
information technology, including computer hardware, software, electronics, semiconductors, internet, telecom equipment, and e-commerce. Humans have been storing, retrieving, manipulating, and communicating information since the Sumerians in Mesopotamia developed writing in about 3000 BC, but the term information technology in its modern sense first appeared in a 1958 article published in the Harvard Business Review; authors Harold J. Leavitt and Thomas L. Whisler commented that "the new technology does not yet have a single established name. We shall call it information technology." Their definition consists of three categories: techniques for processing, the application of statistical and mathematical methods to decision-making, and the simulation of higher-order thinking through computer programs. Based on the storage and processing technologies employed, it is possible to distinguish four distinct phases of IT development: pre-mechanical (3000 BC – 1450 AD), mechanical (1450–1840), electromechanical (1840–1940), electronic (1940–present). This article focuses on the most recent period (electronic), which began in about 1940.

Information technology has been around for a long, long time. Basically as long as people have been around, information technology has been around because there were always ways of communicating through technology available at that point in time. There are 4 main ages that divide up the history of information technology. Only the latest age (electronic) and some of the electromechanical age really affects us today, but it is important to learn about how we got to the point we are at with technology today. Ages includes.

(1) Pre-Mechanical: - The pre-mechanical age is the earliest age of information technology. It can be defined as the time between 3000 B.C. and 1450 A.D. We are talking about a long time ago. When humans first started communicating they would try to use language or simple picture drawings known as petroglyphs which were usually carved in rock. Early alphabets were developed such as the Phoenician alphabet. As alphabets became more popular and more people were writing information down, pens and paper began to be developed. It started off as just marks in wet clay, but later paper was created out of papyrus plant. The most popular kind of paper made was probably by the Chinese who made paper from rags. Now that people were writing a lot of information down they needed ways to keep it all in permanent
Chapter 1 Introduction of Information Technology Sector of India

storage. This is where the first books and libraries are developed. You’ve probably heard of Egyptian scrolls which were popular ways of writing down information to save. Some groups of people were actually binding paper together into a book-like form. Also during this period were the first numbering systems.

(2) Mechanical: - The mechanical age is when we first start to see connections between our current technology and its ancestors. The mechanical age can be defined as the time between 1450 and 1840. A lot of new technologies are developed in this era as there is a large explosion in interest with this area. Technologies like the slide rule (an analog computer used for multiplying and dividing) were invented. Blaise Pascal invented the Pascaline which was a very popular mechanical computer. Charles Babbage developed the difference engine which tabulated polynomial equations using the method of finite differences.

(3) Electromechanical: - Now we are finally getting close to some technologies that resemble our modern-day technology. The electromechanical age can be defined as the time between 1840 and 1940. These are the beginnings of telecommunication. The telegraph was created in the early 1800s. Morse code was created by Samuel Morse in 1835. The telephone (one of the most popular forms of communication ever) was created by Alexander Graham Bell in 1876. The first radio developed by Guglielmo Marconi in 1894. All of these were extremely crucial emerging technologies that led to big advances in the information technology field. The first large-scale automatic digital computer in the United States was the Mark 1 created by Harvard University around 1940.

(4) Electronic: - The electronic age is what we currently live in. It can be defined as the time between 1940 and right now. The ENIAC was the first high-speed, digital computer capable of being reprogrammed to solve a full range of computing problems. This computer was designed to be used by the U.S. Army for artillery firing tables. This machine was even bigger than the Mark 1 taking up 680 square feet and weighing 30 tons - HUGE. It mainly used vacuum tubes to do its calculations. There are 4 main sections of digital computing. The first was the era of vacuum tubes and punch cards like the ENIAC and Mark 1. Rotating magnetic drums were used for internal storage. The second generation replaced vacuum tubes with transistors, punch cards were replaced with magnetic tape, and rotating magnetic drums were replaced
by magnetic cores for internal storage. Also during this time high-level programming languages were created such as FORTRAN and COBOL. The third generation replaced transistors with integrated circuits, magnetic tape was used throughout all computers, and magnetic core turned into metal oxide semiconductors. An actual operating system showed up around this time along with the advanced programming language BASIC. The fourth and latest generation brought in CPUs (central processing units) which contained memory, logic, and control circuits all on a single chip. The personal computer was developed (Apple II). The graphical user interface (GUI) was developed.

1.4.1 Information Technology vs. Computing:

In this chapter I consider digital computer technologies and their applications but neglect communication technologies (other than those used for computer communication) and all analog or non electronic information technologies. This distinction reflects current segmentation in the world of historical specialists. The history of communications technology is still written and read primarily by a different community from the history of computer technology and has evolved its own questions. The history of information science has been written almost entirely within the information science discipline. Likewise library history, media history, and history of the book are all well developed fields written in different academic niches and progressing in almost completes isolation from the history of computer technology.

In fact the great majority of references to “information technology” have always been concerned with computers, though the exact meaning has shifted over time. The phrase received its first prominent usage in a Harvard Business Review article to promote a technocratic vision for the future of business management. Its initial definition was as the conjunction of computers, operations research methods, and simulation techniques. Having failed initially to gain much traction (unlike related terms of a similar vintage such as information systems, information processing, and information science) it was revived in policy and economic circles in the 1970s with a new meaning. Information Technology now described the expected convergence of the computing, media, and telecommunications industries (and their technologies), understood within the broader context of a wave of enthusiasm for the computer revolution, post-industrial society, information society and other fashionable
expressions of the belief that new electronic technologies were brining a profound rupture with the past. As it spread broadly during the 1980s, IT increasingly lost its association with communications (and, alas, any vestigial connection to the idea of anybody actually being informed of anything) to become a new and more pretentious way of saying “computer.” The final step in this process is the recent surge in references to “information and communication technologies” or ICTs, a coinage which makes sense only if one assumes that a technology can inform without communicating.

In the history of information technology, as in other areas defined through reference to “information,” definitions are problematic and categories unstable. As Lionel Fairthorne observed more than forty years ago, the word’s appeal is often as “a linguistic convenience that saves you the trouble of thinking about what you are talking about.” Valiant attempts have been made to create definitions of information broad enough to bolster the territorial ambitions of information science and coherent enough to be useful, but as an historian I am impressed more by the enduring lack of consensus around its actual meaning. Information, like other concepts such as progress, freedom, or democracy has become ubiquitous because of, not despite, its impressive degree of interpretative flexibility. Information has been seized upon by many different social groups, each of which has produced hybridized notions such as “information science,” “information worker” and “information system.” Definitions of these terms attempt to demarcate boundaries for the authority of particular specialist groups, and so are frequently contested and have evolved haphazardly over time. Such phrases are rarely taken to mean what one would expect by looking up their constituent words in a dictionary.

1.4.2. Origins of the History of Information Technology:

The computer’s history has been told for as long as there have been computers. Historian Michael S. Mahoney observed, in this context, that “nothing is really unprecedented. Faced with a new situation, people liken it to familiar ones and shape their responses on the basis of the perceived similarities.” The search for precedent is also a search for a narrative. Humans make sense of the world by telling stories to themselves and each other, and so to understand and explain the first electronic computers it was necessary to package them inside a story.
Chapter 1 Introduction of Information Technology Sector of India

One sees this most strikingly in Edmund Callis Berkeley’s classic 1949 book Giant Brains, or Machines that Think. This was the first popular treatment of the new technology, providing an introduction to the hitherto obscure world of computing to a generation of impressionable youngsters. He described computers of the 1940s, such as the ENIAC, MIT’s differential analyzer, and the series of machines built by Harvard and Bell Labs in some detail. Berkeley made an unconventional choice in building his story. The most obvious understanding of the early computer was a calculating machine, literally as something performing computations. For decades to come these inventions were usually understood, for example as a natural evolution of earlier calculating devices such as the hand cranked calculators widely used in business.

1.4.3 Computer Technologies:

The abacus is several thousand years old. It was followed by a long series of increasingly complex technologies for counting, adding, and calculating. However I have neither the space nor to explore in any detail the literature on calculating devices before the electronic computer, a topic worthy of its own length review. These devices loomed large in early overviews of the computer, including the comprehensive and well illustrated, but as the field has developed their history has come to seem more distinct. This is probably because fewer people today think of the computer as primarily a device for calculation. As its range of applications has grown, so too has the diversity of its precursors. The primary literature on calculating machines is surveyed in a comprehensive and well illustrated catalog of publications issued before 1955. Major museums, including the Smithsonian, the Science Museum in London, and the Deutsches Museum have extensive collections of the machines themselves and have played an important part in documenting and preserving their history. I am aware of no comprehensive overview of the recent secondary literature on the topic.

The most famous early devices, and those most clearly related to programmable computers are Charles Babbage’s Difference Engine and Analytical Engine. Neither machine was constructed in his lifetime. Babbage’s was omitted entirely from Berkeley’s seminal popular discussion of computing his failed efforts to build calculating engines having long since slipped from public memory. Within a few
years, however, Babbage enjoyed a dramatic surge in his posthumous reputation and was pressed into service as the forgotten inventor of the programmable general purpose computer. The Difference Engine has since been built according to Babbage’s plans and can be seen at the Science Museum in London. Its story is told with some zest, along with that of Babbage himself, by the project’s leader in other difference engines were attempted in Sweden. The Analytical Engine was intended to store and run programs, but Babbage never finished its design, let alone its construction. Babbage has been the subject of several biographies, most notably. Ada Lovelace wrote a tutorial describing the analytical engine. She has thus been adopted as a rallying point for women in computing and herself received many biographies, of which the least overheated is the letters and papers of both have been published. Babbage is perhaps the only topic in the history of information technology one might plausibly describe as over studied.

1.5 COMPUTER SCIENCE

The first university departments of computer science and accompanying degree programs were created in the 1960s. Computing research had originally been an interdisciplinary venture, carried out by people from varied backgrounds who stumbled into computer projects or found work in computing centers. The push to establish study of the computer and its associated technologies as an autonomous scientific discipline passed a series of milestones, from the establishment of the Association for Computing Machinery in 1947 through the gradual growth of research and teaching in the field during the late 1950s and early 1960s to the chartering of the first department of computer science at Purdue in 1962 and the first awarding of a Ph.D. in computer science to Richard Wexelblat at the University of Pennsylvania in 1965. In 1986 the National Science Foundation established its Directorate for Computing & Information Science & Engineering, funding computing research on the basis of its contribution to computer science rather than, as in the 1960s and early 1970s, supporting computing facilities as means to the ends of other disciplines. Undergraduate enrollment rose rapidly, peaking with forty-two thousand graduating students in 1986. Computer science accounted for four percent of all bachelor’s degrees granted in the USA that year.
There are two main ways in which to approach this history. The first is to study the institutions of computer science. The major professional societies, leading academic departments, mightiest corporate research labs, and key funding bodies all deserve in-depth analysis. One might also hope for the creation of synthetic histories that weave together these different strands to show their interrelationship. So far we have only a few bits and pieces of the overall picture. William Aspray has published seminal articles on the history of early computing departments and the University of Pittsburgh’s information science program. The history of the Association for Computing Machinery appears as a subsidiary theme in the work of several scholars and has been sketched by several insiders. The recent transfer of the association’s records to the Charles Babbage Institute is likely to spur additional work in this area. Little has been written about the history of other associations such as the IEEE Computer Society and the Society for Industrial and Applied Mathematics. The history of computer science funding agencies is relatively well developed, mainly because government bodies sometimes commission their own histories. A lengthy article covers the early history of NSF funding for computer science and books on ARPA’s support for key computing technologies and the Strategic Computing initiative of the 1990s round out the picture. The latter began as an authorized history but was completed independently and gives a fascinating and well conceptualized account of the interplay of politics, empire-building administrators and grant-hungry researchers. Corporate labs have been much less well documented, with the exception of the Xerox PARC facility which looms large in histories of personal computing.

The other main approach is to look at the evolving content of computer science research. This might be tackled as an exercise in intellectual history in the manner of traditional internalist history of science, looking at the rise and fall of schools of thought and the succession of key problems and areas of interest. This requires the researcher to develop a high degree of expertise in the discipline as understood during the time period in question, and so in many fields work of this kind is tackled more by members of the discipline in question rather than by Ph.D. historians. One might also imagine more externalist histories of computer science, in which shifts in the style or content of research are explained with reference to politics, funding priorities, or attempts to legitimate the discipline as academically respectable.
Chapter 1 Introduction of Information Technology Sector of India

Computer science has not, as a discipline, made a significant commitment to history and historical material is almost entirely absent from the curriculum. This contrasts with many professional fields such as business, medicine, and indeed librarianship where historical research and teaching has traditionally taken place within the discipline. While several computing researchers of the pioneer generation made significant early contributions to the history of computing, younger faculty members generally cannot afford to devote time to such a marginal topic. No Ph.D. historian has ever been hired to a computer science faculty in the United States. Michael Mahoney was the only historian to attempt a broad intellectual history of theoretical computer science, and while his effort yielded some suggestive and intellectually intimidating articles he did not produce a monograph on the topic.

1.6 BUSINESS HISTORIES: PERSONAL COMPUTING

The early history of the personal computer industry is another topic so far untouched by scholars. Fire in the Valley, in its first edition gave a fresh and immediate account of the industry’s idiosyncratic origins and the travails of briefly successful firms during the 1970s. A revised edition adds coverage of later events but the new material is patchy and dilutes the original’s charm. Events of the 1980s are covered best in Accidental Empires. Written by the gossip columnist of a computer newspaper, the book provides the expected scuttlebutt on the personalities of industry celebrities such as Bill Gates and Steve Jobs alongside the development of crucial products such as the Apple II, Lotus 1-2-3, PostScript, and IBM PC compatible BIOS. But it is also unexpectedly thoughtful, convincingly linking their foibles to the structural development of the hardware and software industries and providing some exceptionally clear analysis of the nature of platform-based competition. Its PBS television adaptation preserved some of these qualities.

The idea of computers as tools for some kind of personal liberation, nurtured by Licklider and Engelbart during the 1960s, was also channeled into the early development of the personal computer. A cluster of new technologies including RAM chips, microprocessors and floppy disk drives made it possible for electronics hobbyists to design and build cheap computers using readily available components. The more entrepreneurial of these hobbyists founded companies to sell peripherals, software, and preassembled computers to their fellow enthusiasts. The freshest and
Chapter 1 Introduction of Information Technology Sector of India

most influential account of this movement was given by technology journalist Steven Levy in his wonderfully observed book Hackers. John Markoff, also a journalist, retraced much of the same ground in his more recent. What the Dormouse Said but the book suffers in comparison from a meandering narrative and his failure to clearly conceptualize the counterculture.

One company founded by computing hobbyists, Apple Computer, had become the dominant force in the American personal computer industry by the end of the 1970s. Despite subsequent travails it endures today as one of the world’s most successful technology companies. As with Microsoft space does not permit anything like a full listing of the many books journalists have written about this company, its corporate culture, and its mercurial leader Steve Jobs. Some are more interesting and more reliable than others, but none are particularly ambitious intellectually or do much to frame the personalities, triumphs, and mishaps of the company in a broader context. Readers interested in its earlier history and the introduction of the Macintosh will find The Little Kingdom indispensable. Levy’s account of the development of the Macintosh, Insanely Great is not a patch on his earlier book Hackers but was informed by input from within the design team. One key member of that team offers his own recollections in blog-turned-book. Hatchet jobs are also plentiful, and the firm’s stumbles and oddities give their authors much material to work with. The best supported is a memoir by the ill-fated Gil Amelio, who briefly led the company during its mid-1990s nadir. This chronicle of disaster and frustration exerts a certain uneasy fascination. Apple’s corporate archives are now available for scholarly use at Stanford University, so one can at least hope that some brave historian will soon delve into this material in search of less familiar stories.

In 1981 IBM released its Personal Computer, rapidly establishing market dominance and setting a powerful de facto standard for the industry just as it had previously done for mainframe computers. But by the 1990s the personal computer industry has evolved to a quite different structure. It became a complex ecosystem in which Microsoft and Intel hold strategic power over two key components of the overall system, personal computer “manufacturers” did little more than screw together, market, and support commodity computers built from a dozen or so major components, and these components were designed by anonymous, specialized firms in places like Korea and Taiwan. There was a standard design, but it was neither
imposed by a single company nor defined by a formal process. This will surely make for a shelf full of fascinating histories, but so far we have only a provocative sketch. Firms like Dell did no actual engineering and so will need to be analyzed in rather different ways from earlier computer companies.

Those curious about the development of handheld computers will find that, a memoir of the ill-fated tablet computing pioneer GO Corporation, provides a fascinating picture of the Silicon Valley venture capital and startup company rituals of the early 1990s and of the challenges faced in competing directly with Microsoft in this era. The pen computing concept eventually took off with the Palm Pilot, a geek icon during the Internet boom years of the late 1990s. Its story is cleanly but blandly recounted. Cell phones have developed over the past decade into versatile computing platforms, but no history yet covers this.

How will the stories historians eventually get round to telling about the personal computer likely to differ from those already spun by journalists and enthusiasts? A look at the development of corresponding literatures in other fields suggests four important areas. First, historians are likely to broaden the narrative beyond Silicon Valley and the handful of other firms included in popular accounts. Personal computers, and home computers, spread around the US and around the world in a process that cannot be fully understood without a much bigger canvas. Second, historians will be interested in the users of personal computer technologies as well as their producers. In this case the two categories can be rather porous anyway, as enthusiasts built peripherals or wrote programs thus using one kind of technology to create another. Users created their own meanings and applications for standard technologies such as the Apple II, transforming it into an educational tool, piece of lab equipment, games console or financial workstation. Third, historians will be interested in the web of social groups and communities that sprang up around the new technologies: user groups, specialist dealers, newsletters, bulletin boards, and so on. These networks have been probed for other technologies of the era but not yet for the personal computer. Finally, historians will not be satisfied to explain the personal computer’s rise as the inevitable consequence of the geeky genius of its creators. They will look at the social and economic context of the late 1970s and early 1980s, particularly the power of notions such as the “post industrial society” and “microelectronic revolution” and the symbolic position of computer technology as
counterbalance to the crumbling of traditional industries in the face of Asian competition.

National and International Stories

American scholars tend to view the history of information technology as a fundamentally American narrative. The US is the only country with a sufficiently central role in most of areas of information technology that a coherent overall history of computing can, and often has, been written with minimal reference to the world outside its borders. There are a few Englishmen who force their way into the narrative: Charles Babbage, Alan Turing, the teams behind the Manchester Mark 1 and the EDSAC, the LEO group that pioneered administrative computing, and Tim Berners-Lee. Konrad Zuse flies the flag for Germany. Jacquard’s automatic loom earns France a paragraph somewhere in an early chapter. But these can be dismissed in passing as brilliant figures whose seminal technical accomplishments quickly passed into the hands of Americans for practical exploitation. The history of personal computing, in particular, is told by Americans entirely without reference to the existence of a world beyond the oceans, or in most cases beyond the Valley.

Scholars in other countries have tended to focus on national narratives, generally framed with perceived differences between local developments and those in America. To date the United Kingdom, Germany, France, Japan, Canada, the Netherlands, the USSR, and the Nordic countries have the best developed historical literatures. Histories of national computing, unfortunately for the monoglot, tend to be written in national languages. Historians have largely resisted the trend among scientists of publishing primarily in English, perhaps because of the richer vocabulary required. My discussion here is confined to English-language publication.

As few companies had large enough national markets to support a fully developed indigenous computer industry national narratives tend to focus on quite short historical periods and follow a similar course whether the country in question is the UK, France, the Netherlands, Canada, the USSR, or Czechoslovakia. Resourceful teams working at national scientific institutes produce experimental computers. Local firms enjoy some success in producing machines based on indigenous designs, but at some point in the 1960s are either driven out of business, acquired by American companies, or merged into state sponsored national champions intended to enjoy...
economies of scale. Researchers in academic and corporate centers continue to do great work, but the benefits of their breakthroughs are largely appropriated by foreign firms. Yet local IT companies continue to thrive in particular niches, such as business software or embedded system design. National computing stories thus tend to have a rather melancholy tone, in which flurries of success are followed by a painful declines and squandered opportunities. IBM and other American firms have thus been seen as the enemy, a kind of wave that eventually sweeps away local capabilities. Recent work has begun to complicate this picture, looking at the place of local branches of American firms within national computing cultures and challenging the idea of IBM as a monolithic and alien force. Asian counties may, of course, have different national master narratives of computing in which they become involved later but, in many case, enjoy considerable success with the development of hardware and electronics. Many works on aspects of the British experience are discussed elsewhere in this chapter. Computer technology occupies a fairly prominent place in British collective memory, as an exemplar of national decline in which the spectacular innovations of the 1940s somehow entitled Britain to a dominant role in the international computer industry which was then squandered through the incompetence of business and government leaders. This idea receives its clearest examination. However this “declinist” tendency in British twentieth century historiography has itself been critiqued recently as a skewed perspective based on myths held during the period and the hangover of empire.

1.7 NETWORKING TECHNOLOGIES & APPLICATIONS

The rise of the computer networks and application, in particular the World Wide Web, inspired a hunt for historical precedents. A great deal has been written about engineer and science policy pioneer Vannevar Bush and his magazine article describing imaginary machine known as the Memex. This was to be a desk equipped with a screen, a camera, and an enormous microfilm storage capacity. Users could retrieve existing articles and construct “associative trails” linking related items. The Memex would never have been practical with the specific technologies proposed by Bush, but his vision of an extensible network of links tying together a huge data base of text and graphics was a major influence on later work. Unusually for a non-existent machine the Memex has spawned an intimidating large body of literature, including the unusual honor of its own ARIST chapter the existence of which relieves me of the
need to attempt a full reckoning here. The Memex, like Babbage, is one of those few topics in the history of information technology about which more research is not urgently needed. Other scholars have mooted similar grand projects as antecedents of the World Wide Web – Martin Campbell-Kelly is partial to the idea of a “world brain” proposed by H.G. Wells, a concept explored in more detail by Boyd Rayward. Rayward has also analyzed Paul Otlet’s efforts to catalog and cross reference the world’s knowledge as a precursor of hypertext.

The World Wide Web originated in the early 1990s as a simple application based on the existing infrastructure of the Internet’s applications and protocols. Like other developments of the 1980s and 1990s this falls into a kind of historiographic dead zone in which it is sufficiently remote for journalists and policy scholars to have moved on but not yet far enough removed to attract the attention of many historians. We do have two histories of the web, both based on insider accounts. Tim Berners-Lee, the web’s inventor, partnered with a journalist to produce Weaving the Web, a light but vivid memoir of its origins. Robert Cailliau, a former colleague of Berners-Lee at CERN and a key early supporter of the project, has presented a broader and deeper account of the web’s origins including a revealing summary of the lab’s internal functioning and a detailed history of the first few years of web browser and server development outside CERN. Other Internet applications and their associated protocols have received little historical analysis with exception of a single article on the short-lived Gopher system.

The commercialization of the web browser and its rapid development during the so-called browser wars between Netscape and Microsoft during the late 1990s received some thoughtful attention at the time, particularly in the context of the government’s antitrust action against Microsoft. The latter loomed large as an apparently epoch-defining event, as testified to by business journalist Ken Aluetta’s choice of the title World War 3, but slipped quickly from public awareness in the light of subsequent world events and the Bush administration’s decision to impose only token penalties on Microsoft. My own sets the commercialization of web browser, server, and email technology into a broader historical context, sketching connections between the shaping of Internet technologies in the academic environment and their unexpected commercial success. This appeared in the recent book The Internet and American Business. Authors, mostly historians of information technology, were charged with
examining different aspects of the rapid embrace of the Internet by business. Chapters focus on topics from the growth of online pornography to the rise of online travel agents. Tackling the history of such recent events carries undeniable risks, and the book’s exclusive focus on the United States has incurred criticism, but the volume is likely to provide a useful and sometimes provocative foundation for future work on these topics.

The .com businesses of the late 1990s inspired many dozens of hastily written books lauding their vision, the inexperience of their youthful founders, and their ability to raise and spend large quantities of venture capital. Some of these turned into cautionary tales of failure and excess even as they were being written. But volumes devoted short-lived to firms like CD Now and boo.com are not really contributions to the historical literature, and even enduring companies such as Amazon were profiled too hastily and too early in their history to provide much insight. The flavor of the age is preserved with charm, confusion, and hubris intact. More cynical perspectives, from the immediate aftermath of the crash, can be found. Meanwhile the success of Google has inspired several new journalistic histories of the search engine and portal industry and my own analytical overview. We do not yet have much historical distance on this era, and are too bound up in supporting or critiquing ideas advanced at the time to begin to put it into context. However work is underway to analyze more systematically the success and failure of early Internet firms.

1.7.1 Applications in Science:

The electronic computer was invented as a tool for scientific and engineering calculation. Although its main market shifted during the 1950s to business administration, computer technology went on to transform the practice of science in one discipline after another. Without computers it would be quite impossible to crunch the vast quantities of data captured in particle physics experiments, map genomes, or perform the statistical analysis expected in many fields of social science. David Alan Grier’s highly readable recent book looks at the human and institutional stories of large-scale mathematical calculation from the nineteenth century to the immediate aftermath of the Second World War. Its title, When Computers Were Human indicates that the term originally described a person who performed computations. Only later did people being to talk about “automatic computers” or
“electronic computers.” The institutional history of scientific calculation in Britain has also been explored, and an edited volume looked specifically at the history of mathematical tables, the preparation of which motivated funding for several important projects including Babbage’s work and the ENIAC. Jen Light has explored gendered labor in the ENIAC project, showing that many programming tasks were carried out by women whose work was erased from media reports. Electronic computers carried out calculations thousands of times faster than human computers with mechanical aids. A few institutional studies have been made of key users of computer technology for large scale calculation and simulation. These have focused on computer use in the national research labs of the Atomic Energy Commission, particularly Los Alamos and Argonne National Lab. The most ambitious book on early scientific computing is calculating a Natural World, covering the ENIAC project and computing efforts at the National Bureau of Standards, MIT, IBM and the University of Michigan. Akera mixes historical genres such as biography, business history and the institutional history of science to chart the interdisciplinary “ecology of knowledge” within which early computing practices sprang up. Computers needed to be programmed, which turned out to be a lot harder and more time consuming than anyone had expected. Most of the scientific and technical calculations to which computers were applied involved calculating numerical approximations rather than manipulating algebraic symbols to achieve an exact solution. Existing mathematical methods, however, had been designed within the constraints of human mathematical labor. Harnessing the growing power of the digital computer thus demanded the creation of whole new families of mathematical methods and the development of new kinds of theory and tacit knowledge. Numerical analysis emerged as an important and growing field of research, and a new community developed from the 1960s on around the production of high quality mathematical software. However the history of mathematical software was addressed in a recent series of oral history interviews by the Society for Industrial and Applied Mathematics and is a fertile topic for future work by historians of computing.

1.7.2 Applications in Administrative Work and Business:

From the mid-1950s onward the main market for computers has been in the world of business and government administration. The same was true of their most direct technological ancestors, punched card machines. Punched card machines were
Chapter 1 Introduction of Information Technology Sector of India

originally invented for use in tabulating the United States census. Their creator, Herman Hollerith, founded the business that became IBM. The origins of the punched card business were thus reasonably well covered in the voluminous literature on IBM and its international counterparts. Until recently, however, we knew much less about the capabilities of the machines themselves or the applications for which they were used. Until the 1970s there was no significant market for prepackaged application software. Any company installing a computer also had to assemble a team of systems analysts and application programmers to create or extensively modify each of the programs it planned to run. This was true even of very common applications such as payroll, inventory management, or accounting. For this reason the history of administrative computer use is also, for its first few decades, largely congruent with the history of administrative application development. Each new computer installation was accompanied by a data processing department, home to teams of well paid specialists whose number and variety increased inexorably along with the department’s budget. Data processing evolved as a set of practices, a new institution whose place on the corporate organization chart remained in flux, and a cluster of new occupational identities. A careful overview of the history of system development practices, intertwining organizational and technological developments, is given. Very little has been published about the social history or labor practices of information technology, with the work of computer operators and data entry clerks shrouded in particular obscurity. A recent dissertation looks at data processing workers within the British government. Martin Campbell-Kelly produced a series of three very detailed technical studies of programming practices around the very first British computers, summarized, but nothing has been attempted for the later period. I have presented the genesis of the idea of the management information system as an episode in the social history of corporate America, driven by the aspirations of the self-proclaimed “systems men.” The rhetoric surrounding computer programming in the 1960s has received some historical attention and the experience of system development work has been vividly captured in memoir.

To call this coverage of administrative computing patchy would be to greatly exaggerate its comprehensiveness. A dearth of secondary accounts has not, however, been enough to deflect the boundless energies of James W. Cortada. A prolific author of works on the history and management of information technology in business,
Cortada is also an IBM executive. His three volume opus The Digital Hand chronicles the use of computers in manufacturing, transport and retail industries, service and communication industries and the public sector. Each section examines the introduction of successive waves of computer technology with a focus on the applications and technologies most distinctively associated with the industry in question. These chapters will provide valuable starting points for future historians and Cortada’s voluminous footnotes are an impressive resource.

1.7.3 Applications in Embedded and Control Systems:

Historical attention has been focused primarily on computers that look like computers. The computer has had several paradigmatic forms over time. In the 1940s and early 1950s this meant ramshackle looking complexes of wires, switches and electronic components arranged in metal frames. In the late 1950s and 1960s it means complexes of smooth metal boxes, elegantly arranged with wires hidden under raised flooring and an array of printers, disk drives, and particularly the iconic banks of spinning tape drives. The minicomputer, which came into its stride in the late 1960s, was a smaller box with a generous selection of switches and flashing lights. And the personal computer, with which historians are just starting to get involved, tended to look like a typewriter or piece of consumer electronics but remained a self contained box coupled with a screen and a selection of other, smaller, peripheral boxes. The microprocessor made embedded computer control systems cheap and tiny. But in fact they have a long history in applications with large budgets or specialized needs. Indeed the devices to be called computers were not free-standing boxes but the control mechanisms used to guide torpedoes, control antiaircraft guns and so on from the 1930s onward. David Mindell’s book Between Human and Machine explores the gradual development of automatic control technologies over the first half of the twentieth century. Subtly undermining the claims of cybernetics to have achieved a revolution during and just after the Second World War, he credits a variety specialised engineering communities with incremental advances based on local practices. The single most important project for the development of computer technology was the development of the SAGE air defense network in the 1950s. This began as an effort at MIT to develop a high speed digital computer, Whirlwind. Whirlwind and SAGE pioneered a number of key technologies, among them real-time computer operation, networking, graphics, core memory, complex systems software, and light guns. They
have been profiled in two detailed technical histories and given a lively portrait as artifacts of Cold War military thinking in The Closed World. The latter is one of the few books on the history of information technology to win wide recognition among members of the science studies community.

The computers built for SAGE were the most powerful of their day and physically largest ever constructed. Other military applications required smaller, portable computers. Computers guided missiles and were built into planes for navigation and weapons control. Applications such as the Minuteman I and II missiles drove fundamental advances in the use and packaging of electronics, creating a need for small, reliable and modularized components. In the 1960s the space program played an important role in boosting the development of rugged, miniaturized computer systems including the Apollo guidance computer used in its command module and landing craft. In his book on this topic, as in his earlier work, Mindell stresses the engineering of systems including both human and machine elements. NASA has a well developed program of high quality commissioned histories, meaning that many aspects of its technical and institutional history are well documented. Perhaps the most relevant, a history of NASA’s successful push to transfer computer control technologies to aircraft.

Studies of more recent embedded systems are conspicuous by their absence. There have been a couple of studies of the cell phone but these have paid little attention to the status of handsets as special purpose computers. Historians of recorded music, film, and popular culture have yet to get to grips with the influence of computer-based media such as DVDs, MP3 files and IPods. Nobody has yet told the story of the computerization of cars, and even the pocket calculator has failed to attract a scholarly history. However Greg Downey has recently looked at the evolution of television closed captioning from the perspective of labor and political history.

Videogames have attracted a thriving industry of scholars from cultural studies, economics, and anthropology but, despite a respectable industry producing coffee table books and memoirs devoted to classic video games, historical research on this topic is only just beginning to appear. The most notable book to date is Racing the Beam, which draws on concepts from the field of Science and Technology Studies to explore the influence of technological choices made in the design of the seminal and
Charmingly primitive Atari VCS game console on the subsequent evolution of game design and programming practice in the home videogame industry that grew up around it.

1.8 THE ROLE OF IT IN BUSINESS SUCCESS

Innovation is the great way to success in this digital age. The path of innovation in business means doing something different, smarter or better that will make a positive difference in terms of value, quality or productivity by using emerging or proved technologies of the world. The technology which has already proved itself in last two decades is of course the information technology. It has dramatically changed the lives of the individuals and organisations. Currently online shopping, digital marketing, social networking, digital communication and cloud computing etc are the best examples of change which came through the wave of information technology. Now accurate business planning, effective marketing, global sales, systematic management, real time monitoring, instant customer support and long term business growth cannot be achieved at the optimum level without IT.

1.9 VARIOUS ROLE OF IT IN THE WORLD

Even a single day without computers leaves us feeling paralytic. Information Technology has made us completely dependent for even the simplest day to day task. The recent incident of system failure at key Swiss government ministries has brought Geneva to a standstill. This proves how information Technology has drastically transformed the way we carry out day to day activities. It is dynamic and vast and its absence for a day leaves a severe effect on us. Internet being the simplest form of IT has a major role to play in our daily lives. It has become the backbone of every organization as well as house hold. It has entered almost all industry verticals for instance, railways, airways and sea networks are connected with the help of IT, as information plays a vital role in the smooth functioning in those sectors and lack of even for a second can create havoc.

- Banking is another sector that depends a lot on IT. From carrying out important transaction to storage of confidential data, IT has made several complicated and time consuming work a lot simpler and faster with considerable amount of safety. In fact e-commerce has made on line banking
Chapter 1 Introduction of Information Technology Sector of India

as well as online purchasing and selling of commodities and services much easier and faster adding to the convince of the common man. By simply searching on the internet one case orders anything with just a click of the mouse button.

- Similarly, the travel and tourism sector all over the world has benefited a lot from the development of IT industry. One can avoid the crowd and lengthy procedures of booking air or railway or bus tickets. One can choose from the best deals and book tickets online from the comfort of their living room.

- IT plays a major role in simplifying various organizational processes. Most business enterprises rely on the power of information technology for carrying out their daily tasks conveniently and faster. IT makes complex procedures easier, faster and also helps a lot in avoiding redundancy. It lets individuals’ access necessary data ensuring the safety of confidential ones.

- The field of education has also been blessed with the benefits of IT. Online application to universities, checking results study materials and much more has made the reach of education broad and easier.

1.10 THE IMPORTANCE OF IT IN BUSINESS

The success of every business depends on certain factors. Some of which are accurate analysis, choosing the right technology and the future vision. Research from the last two decade has proved that those organisations that do invest in technology and choose the path of innovation increase their market share, financial figures and overall competitiveness. Information technology is the only technology which provides you the opportunity to analyse specific data and plan your business journey accordingly. It also provides you many tools which can solve complex problems and plan the scalability of your business. In the modern age, it is proved that digital marketing is a great tool which let you promote your products or services to the global market while sitting in the comfort of your remote office or home. And thanks to the cloud computing and modern communication which enable you to form a global organisation, manage and monitor its virtual offices all over the world. Now I will briefly explain how information technology plays a vital role in different phases of business.
Chapter 1 Introduction of Information Technology Sector of India

Decision Making

Speed and accuracy are at the heart of making right decision for your business. Every successful organisation has to go through a comprehensive market research process which enables management to make the right decision. Market research can be done in many ways through online surveys, forums, blogs, and group discussions using World Wide Web and of course through in-person interviews as well. Currently Big data, Google Analytics and Microsoft CRM Dynamics are also great tools to extract useful information which can impact on decision making. These online tools not only provide real time responses from the potential audience but also ensure the accuracy of data by minimizing the risk of human errors.

Marketing and Business Growth

The heart of the business success lies in its marketing which enables the management to identify its target audience first and then observe their trends and needs. The overall marketing covers public relation, advertising, promotion and sales which subsequently impact on business growth. Many types of marketing can help you reach your potential customers. But I will briefly explain digital marketing here which was the dream in the past without Internet technology. Digital Marketing is a modern phenomenon which let you promote your products or services all over the world. It is a broad term which includes many concepts like search engine optimization (SEO), pay per click (PPC), blogging, discussion forum, email shot, SMS, MMS, social media marketing and Smartphone app advertisement etc. Currently web market is booming at a very fast pace because most of the entrepreneurs have understood that the long term success in business is not possible without digital presence on the internet. Millions of new websites are being added on the internet every year.

Customer Support and Satisfaction

Higher level of customer satisfaction is the key to success which cannot be achieved without a real time customer support process. Business success depends on knowing its customers needs, trends, behaviours and satisfaction level. Effective communication is the best tool to understand the customer demands, problems and their solutions. Thanks to the Internet Technology that has enabled us to communicate with millions of potential or existing customer in the real time. IT
provides many channels to communicate with the customer without going out in snow or rain. Some of these channels are email, webinar, social media, member portals, online newsletters and text or multimedia messaging through the smart phone. Enterprise organisations normally use customer relationship management systems (CRM) to hold valuable data for understanding customer behaviours and future needs.

**Resource Management and Globalisation**

Resource management plays a crucial role in business success. When it comes to medium or large organisation, it is very hard for the top management to manage all the resources manually. These resources may include tangible, financial or human resources etc. Information technology has played a vital role in automating such complex problems by introducing user friendly solutions. A decade ago, most of the resource management solutions were desktop based. Thanks to the internet and cloud technology which enables software engineers to introduce cloud based ERP (Enterprise Resource Planning) solutions. Now, the managers can manage or monitor their organisational resources virtually anywhere in the world by using their personal computer, laptops, tablets or Smartphone. This concept has introduced the idea of globalization. Most of multinational companies (Microsoft, Google, Amazon, McDonalds etc) in the world use these cloud based solutions to manage their virtual or physical offices and staff worldwide.

**1.11 ADVANTAGES & DISADVANTAGES OF IT**

Information technology has helped in shaping both the business world and our society in general. Many fields have been impacted by information technology and these include; education, health, entertainment, communication just to mention but a few. The impacts of information technology are profound. As the world develops, more technology will emerge and this technology will have both positive and negative impacts. Below I have detailed points showing you how information technology has impacted our lives.

**1.11.1 Advantages & Disadvantages of IT in Business:**

**Advantages:-**

**Increases Production and Saves Time:** Business use technology to automate tasks. A good example is a bakery which uses automated temperature censors to detect any
drop or increase in room temperature in a bakery. These censors will send information directly to the operator and report any temperature change. This saves the bakery time and it also results into quality products.

**Improves Communication through Communication Technology:** With the help of communication technology tools like phones, video conferencing, electronic mail, databases just to mention but a few. Movement of information within an organization or business has become easy and first. Employees can easily move information across departments without having any interruptions. Tools like electronic mail, e-fax, mobile phones and text messaging enhance the movement of information among employees, customers and business partners or suppliers.

**Improves Data Storage and File Management:** Businesses use cloud hosting services to store and backup business data. Also it saves on paper work and makes transfer and access of data remote. With services like “Dropbox.com”, business owners can access their data any time any where. Information and data are very important tools for a business, so it is very essential to store them safely and also access them at any time of need.

**Improves Financial Management:** Accounting software like Quick Books, Bookkeeper, Sage 50, and Account Edge can be used in performing various accounting tasks in a business. Business owners can easily balance their books with less experience in accounting because these software’s are well equipped with every tool needed in accounting and they also have a help section which can be referred to in case a user is stuck.

**Cuts Costs of Operation and Increases on RIO:** Communication technology and social technology have made business promotion and product launch affordable. Many small businesses have found ways to use social technology to increase on their brand awareness and get more clients at a minimal cost. In business, factors like cost of operation play a big role in the development and growth of that business. So when businesses use information technology to cut down on costs of operation, then their ROI will increase which will result into business growth.

**Improves Business to Consumer Relationship:** Businesses have embraced the social technology to interact with their consumers and fans. This creates a strong
Chapter 1 Introduction of Information Technology Sector of India

business to consumer relationship and it results into business growth and expansion. Information technology can be used to improve customer service in so many ways. For example, businesses can use internet to inform their customers about great deals and discounts, this makes customers feel special and it can drive their desire to buy. A good customer service can be used as a great tool by any small business to gain competitive advantage.

**Improves on Business Competitive Advantage:** Companies have used technology to gain competitive advantage over their competitors. A business will improve on its Information technology can be used to improve customer service in so many ways. For example, businesses can use internet to inform their customers about great deals and discounts, this makes customers feel special and it can drive their desire to buy. A good customer service can be used as a great tool by any small business to gain competitive advantage.

**Disadvantages:**

**Implementation Expenses:** Small businesses fail to afford this expensive technology so they end up losing their clients to a business which has improved its technology and provides a better service or product.

**Job Elimination:** Technology has replaced most positions which humans used to occupy. Accounting is now being done by software, so accountants run out of opportunities.

**Security Breaches:** Since businesses store their data on remote cloud servers which can be accessed with a user name and password, they risk losing that data to wrong minded knowledge works, hackers or viruses, which can harm him business.

1.1.1.2 Advantages & Disadvantages of IT in Purchasing

**Advantages:**

**Credit Cards and Smart Cards:** Buying and selling of goods and services has become simple because of these smart cards. A user can go to a merchant’s website and make an order using their smart card or credit card. Money will be transferred from the consumers account to the merchants account in seconds, and then the
merchant will deliver the item to the consumers address. This saves time for both parties.

**Electronic Bill Presentation and Payment:** (EBPP) systems send us bills over the internet and they give us an easy way to pay them if the amount looks correct. In this there is need for billing companies to send our bills in mail. It saves time for both parties.

**Disadvantages:-**

**Internet Security Issues:** For the merchant to process an order online, a consumer has to provide their financial details. Experienced hackers can use this loophole to channel this information and use it for their own needs.

**Faulty Products and Duplication:** In most cases auction websites have products that are not real. So a user can bid on a shoe thinking it is original, upon delivery, they discover that the shoe is fake and it does not resemble the picture on auction.

**Privacy:** ecommerce websites collect personal data using cookies to know more about us and suggest products basing on that information. This data is collected without any notice, but with selfish intent.

1.11.3 Advantages & Disadvantages of IT in Society:

**Advantages:-**

**Improved Innovation:** Technology has played a big role in job creation and emerging of technology based companies. With access to a computer and internet, any one can start a business while at home. Most successful technology based ventures like Google/Amazon/ Facebook, to mention but a few started from home but now they employ thousands or people.

**Improved Entertainment:** Technology has changed the entertainment industry, now days we have many options to choose from, you can have a play-list of 10,000 songs in your palms with an ipod, you can watch movies on the go with an ipad, and the list is endless.

**Improved Social Discovery:** Finding both old and new friends has become very simple. With social networks like facebook and twitter, you can easily keep up with all your old friends and also make new ones.
Chapter 1 Introduction of Information Technology Sector of India

Globalization of Knowledge: Today you can use the internet to get the latest news from any country on the globe. Services like ‘Twitter’ have enabled people to become journalist so they report news on instant by twitting. Services like Wikipedia.org are well equipped with data on about anything.

Disadvantages:-

Cyber - Sickness: With the increased addiction to social networks and internet games, people are spending more time on computers and give up on their normal offline life. This has resulted into relation breakups and increases loneliness.

Social Implications: access to harmful information which corrupts people’s minds and drives them to commit crime. People use search engines to find information on how to create harmful weapons and how to commit wrong acts in society.

1.11.4 Advantages & Disadvantages of IT in Education:

Advantages:-

Online Education: It has made educational material and data accessible anywhere. The use of internet technology has opened educational boundaries, this has benefited students from developing countries have a chance to study relevant courses which increases on their chance of getting high paying jobs international.

New Methods of Education have been Created: Use of educational video games and puzzles has increased students interest in learning. Basing on research, students enjoy learning with technology, many schools have started providing free internet on school campus, this helps students make research and learn as individuals without getting any help from their teachers.

Disadvantages:-

Over Dependence on Information Technology: It makes students less active and innovative. Students no longer take time to solve equation and tasks, all they do is query that task in a search engine and a solution will be provided.

Poor Publications Online: This exposes student’s t wrong information which results into failure of exams. Many online publishers post content for monetary purposes, so
Chapter 1 Introduction of Information Technology Sector of India

you find that most the content published online is not well detailed to help students and researchers.

1.11.5 Advantages & Disadvantages of IT in Banking:

Advantages:

**Online Banking:** Many banks have integrated advanced information technology systems to improve on their customer service. Today, it is very easy to withdraw money using an ATM card or smart money card, this saves customers from wasting time lining up in banks.

**Fast Credit:** Technology used in banks helps in gathering of financial details and credit scores about each customer, the information gathered can be used when a customer applies for credit in that bank.

Disadvantages:

**Money Laundering:** Cases of online money laundering are on the rise and this has exposed many online users to the predators.

1.12 INFORMATION TECHNOLOGY INDUSTRIES IN INDIA

India's much-vaunted Information Technology sector is composed of two parts: the software sector, and the IT- enabled sector (ITES). In both cases, work that was earlier done in the developed world, particularly the US, has been 'outsourced', or contracted out, to locations in India. In the case of the ITES, the activities outsourced include call centers, medical transcription, data entry, ticket-reconciliation, claims processing, credit card administration, and such other routine office work as can be performed at remote locations. While this work requires knowledge of English, it does not require superior education or skills.

In IT, India has built up valuable brand equity over the years. In IT enabled services (ITES), India is emerging as one of the most preferred destinations for business process outsourcing. The importance of IT industry in the Indian economy can be gauged from the fact that its contribution to the national gross domestic product has increased by seven fold in a span of just one decade from 0.6% in 1994-95 to 4.3% in 2004-05. Although industry figures are not directly comparable with GDP as they are based on revenues rather than value added, they provide an indicator of growing
importance of the IT sector in the country. Assuming that the Indian economy and IT sector will replicate the past six years performance during the next six years and value added in IT sector is two third of its sales revenue, the contribution of IT sector to national GDP will be around 8.5% during the year 2010-11, quite similar to that in the United States (US) today. The IT sector revenue is expected to increase from Rs. 1276 billion in 2004-05 to Rs. 6435 billion in 2010-11. The Indian IT industry is broadly categorized into IT services and software, ITES-BPO, and Hardware segments. Although IT services and software continues to remain the key contributor to the IT sector's revenues, ITES- BPO is emerging as the fastest growing segment of the sector. Between the year 2000-01 and 2004-05, contribution of ITES-BPO to the IT sector's total revenue increased from 7.4% to 20.2% whereas the corresponding figure for IT services and software fell from 64.5% to 58.5%. Presently, ITES-BPO segment of the industry is almost as big as the hardware segment.

1.13 IMPACT OF INFORMATION TECHNOLOGY ON INDIAN ECONOMY

A particular industry that has been instrumental in the growth of the Indian economy is the IT sector. The design, development, implementation or management of information systems is referred to as information technology. It describes the production, storage, manipulation and dissemination of information. IT industries account for 6% of the GDP of India and provide employment directly or indirectly for over 2.3 million people. It also contributes very significantly to India’s exports: accounting for around 18% in 2001. India produces roughly 150,000 technically and socially adept engineers every year. Most of them migrate to developed countries and form an integral part of the workforce there, thus becoming India’s most beloved export. In the 21st century, India has risen to the position of one of the largest IT capitals of the world. As of 2006, technologically inclined services sector in India accounted for 40% of the country’s GDP and 30% of export earnings.

The IT industry has helped the growth of modern India in many ways. Indian engineers and technicians are sought world over for their competency and diligence and strong fundamentals in their field of work and study. India’s technology boom has also helped her shed her “Hollywood” image of being the land of mystics, snake charmers and beggars and has put her on the world map for being a global information hub. Each of the above mentioned industries have grown at massive
Chapter 1 Introduction of Information Technology Sector of India

rates, providing jobs and products to Indians. For example HCL Enterprise is electronics, computing an IT company based in India, has become a leading provider of IT service and technological solutions worldwide. In fact, the IT boom of the 90’s and the 2000’s in India was also accompanied with the growth of BPOs in the nation. India has come under fire from certain groups of people worldwide for “stealing their jobs”, but the fact stands that foreign corporations love India for its abundant availability of skilled labour that can master foreign languages and are satisfied at comparatively low salaries. But with most recent graduates these days being absorbed into IT companies and BPOs and then getting their ticket to America and Europe, India is losing a large chunk of its brains which will perhaps be detrimental to the growth of innovative, indigenous technology and inventions in India.

The IT industry in India has seen massive change, growth and development over the years. The future of this industry seems bright with more growth being predicted. Financial analysts are optimistically predicting strides in software technology development in India. Additionally, the growth of the IT sector is expected to bring about a corresponding growth in other sectors like employment, exports and Foreign Direct Investments. IT sector is also intimately linked to other relevant sectors like biomedical technology, defense and infrastructure. Thus the future of the IT sector will directly impact the growth of the nation.

1.14 GROWTH OF INDIA’S INFORMATION TECHNOLOGY INDUSTRY

India's IT industry has recorded phenomenal growth over the last decade. During the period from 1992-2001, the compounded annual growth rate of the Indian IT services industry has been over 50%. The software sector in India has grown at almost double the rate of the US software Sector. The statistics of the India’s IT industry substantiates the huge momentum acquired by the IT sector in the recent past. During the financial year 2000-2001, the software industry in India accounted for $8.26 billion. The corresponding figure was $100 million 10 years back. As per the report of a study undertaken by NASSCOM-McKinsey, the software export from Indian IT industry is likely to reach 50 billion US dollars in the year 2008. This growth rate of the software sector for the year 2008 has been projected on the basis of the 35% per year growth rate achieved in the last couple of years.
Chapter 1 Introduction of Information Technology Sector of India

Export of software and services from India is expected to add almost 41 billion US dollars to the annual revenue of the Indian government in the current year. The share of technology industry in India's GDP is expected to reach 5.5% in 2008; while the corresponding figure in 1998 was as small as 1.2%. The study of NASSCOM has revealed that the growth of India's IT industry has prompted the growth of Indian exports by almost 36%. Another favourable effect of India's IT boom is the expansion of opportunities of employment. By the end of fiscal year 2008, the IT sector of India is expected to employ around 2 million skilled Indian youths. The growth of India's IT sector has brought about many other positive changes in the Indian economy. The purchasing power of a large section of Indian population has increased dramatically. This has resulted in an increase in the average standard of living of the majority of population of the country. The increase in purchasing power of the common people has propelled the growth rate of the other sectors of the economy as well. There has been considerable increase in the amount of fund available for venture capitalism and equity financing.

The ITES sector has also come up to complement the growth of Indian IT sector. Domestic IT market has shown a 24 per cent growth in the last fiscal as against 17 per cent in software exports, according to Dataquest Top 20 survey. However in terms of size of the market, domestic sector at Rs 33,374 cr. in 2003-04 is way behind the export revenue of Rs 40,870 cr. The overall Indian IT industry is estimated at Rs 92,924 cr. If BPO and hardware exports are added to overall IT exports from India then the figure for growth in exports comes to 24 per cent. The growth of domestic IT market in 2003-04 compares favorably with the previous year growth of nine per cent while the pace of increase in software exports slowed down to 17 per cent in last fiscal from 26 per cent in 2002-03. In the domestic market, services grew by 26 per cent and hardware by 23 per cent.

For the 2012 financial year, annual business crossed US$ 100 billion in sales revenue, with IT contributing to 7.5 per cent of India’s GDP. Furthermore, India had 58 percent of the “global IT services” outsourcing revenue, Indian IT services account for 25 percent of its exports. Most Fortune 500 companies outsource some of their work to Indian IT companies, and many operate either directly or indirectly in India. The IT Company Tata Consultancy Services reached $ 10 billion in annual revenue by March 2012, with a healthy bottom line. Another company, Infosys, created the
Chapter 1 Introduction of Information Technology Sector of India

“ACM Infosys Foundation Award for Computing Science” in 2007 to celebrate 25 years of service. Fortune magazine recently named Infosys founder NR Narayana Murthy, who is known for his unique way of combining capitalism and socialism, as one of the 12 greatest entrepreneurs of our time.

India’s IT industry is growing steadily. Indian IT companies have reached the global stage and are undertaking interesting IT projects. The IT sector has created jobs for 2.8 million IT professionals and has indirectly employed an additional 8.9 million. The rapid growth or engineering education, with more than 500,000 ungraduate IT engineers graduating per year, feeds into this steadily growing IT industry.

1.15 PROMOTION OF IT – GOVERNMENTAL INCENTIVES

With the formation of a new ministry for IT, Government of India has taken a major step towards promoting the domestic industry and achieving the full potential of the Indian IT entrepreneurs. Recently, IT committee was set up by the Ministry of Information Technology, Government of India, comprising Non Resident Indian (NRI) professionals from the United States to seek expertise and advice and also to step up U.S. investments in India's IT sector. The committee is chaired by Minister of Information Technology, Government of India, and the members include Secretary, Ministry of Information Technology and a large number of important Indian American IT entrepreneurs.

The group will:

- Monitor global IT developments and refine Indian IT policy to meet global requirements. Specifically, this will help angel investors, venture creators and incubation;
- Promote the growth of human resource development in the IT sector with the aim of creating quality-based education;
- Promote R&D in the sector by identifying thrust areas and drawing up a blueprint for action.

India’s most prized resource in today’s knowledge economy is its readily available technical work force. India has the second largest English-speaking scientific professionals in the world, second only to the U.S. It is estimated that India has over 4 million technical workers, over 1,832 educational institutions and polytechnics, which
train more than 67,785 computer software professionals every year. Government of India is stepping up the number and quality of training facilities in the country to capitalize on this extraordinary human resource. It is the knowledge industry that will help take the Indian economy to a sustained higher rate of growth and the policy makers are fully aware of this.

1.16 LATEST DEVELOPMENTS

As per a Confederation of Indian Industry (CII) report, the Indian IT industry is growing at an annual rate of 35%.

**National e-Governance Plan (NeGP):** The Government of India plans to give high priority to improve the quality to the citizens by providing basic services at their doorstep for which it has formulated a NeGP covering 27 mission mode projects.

**State Wide Area Networks (SWANs):** The Government has started a scheme for establishing SWANs across the country in 29 states with a total estimation of US$ 682.27 million over a period of five years.

**State Data Centres (SDCs):** SDCs have been identified important for the core infrastructure of supporting e-Governance initiatives under NeGP.

**Common Service Centres (CSCs):** The main objective of CSCs is to develop a platform that can enable Government, private and social sector organizations to cater their social and commercial goals for the benefit of the rural population in the country with a combination of IT-based as well as non-IT-based services.

**Community Information Centres (CIC):** Government has initiated the CIC's in the hilly and far-flung rural areas of the country with main objective to bring the benefits of ICT to the people for the purpose of socio-economic development.

**Nanotechnology:** Department of Information Technology started nanotechnology development programme during the 10th plan with the aim of creating infrastructure for research in nano electronics and nano metrology at the national level.

Information technology is amongst the fastest growing sectors in the country. Its contribution to GDP rose from 1.2 per cent in 1999-2000 to 5.2 per cent in 2006-07 and to an estimated 5.5 per cent in 2007-08. Growth of Indian IT industry has been driven by the IT software and services (IT services) and IT enabled services (ITES).
The software and services (IT services) industry of India has been moving up the value chain, giving India formidable brand equity in the global markets. The Indian software and services exports including ITES-BPO are estimated at US$ 40.3 billion in 2007-08 as compared to US$ 31.4 billion in 2006-07, showing an increase of 28.3 per cent in dollar terms and 15.6 per cent in rupee terms.

Department of Electronics and Information Technology (DIT) is the nodal organisation in the country, responsible for formulation, implementation and review of national policies in the field of information technology. All policy matters relating to silicon facility; internet; computer based information technology and processing including hardware and software; standardization of procedures and matters relating to international bodies; promotion of knowledge based enterprises; e-commerce; information technology education; etc are addressed by it. The department has been making continuous efforts towards making India a front-runner in the age of information revolution. Some of the major initiatives undertaken by it include:-

A 'National Taskforce on Information Technology and Software Development' was formed with the objective of framing a long term 'National IT policy' for the country and also for removing the impediments to growth of the InfoTech industry. The taskforce suggested various measures towards building India's IT industry and prolife rating the use of IT in the country. It submitted its recommendations in the form of three key reports to the Government.

Enactment of the Information Technology Act, which provides a legal framework to facilitate electronic commerce and electronic transactions; prevent computer crimes; promote electronic filing or documentation and digital signature. It aims to create an enabling environment for e-Governance and to boost e-Commerce in the country.

Community Information Centres (CICs) have been set up in the seven North East States and Sikkim for socio economic development of the region. These CICs provide internet connectivity, e-mail facilities, interface between citizens and government, distance learning programs, information on national programmers’, disaster management system, public health awareness, etc to the public.

E-Governance is one of the areas in which Information and Communication Technology (ICT) is having a profound impact on the way governments function and
the manner in which government services are made available to the citizens. The e-governance projects are expected to increase efficiency, enhance effectiveness and improve quality of the government services. Hence, National e-Governance Plan (NeGP) has been announced with the vision of making all government services accessible to the common man in his or her locality, through common service delivery outlets and ensures efficiency, transparency and reliability of such services at affordable costs. Besides, various IT activities such as development of software applications packages, creation of e-governance infrastructure, National ID, citizen databases, smart card, etc are being taken up on pilot scale basis.

**State Wide Area Network (SWAN)** is a scheme for establishing state wide area networks across the country in 29 States and 6 Union Territories over a period of five years. The scheme envisages providing central assistance to States and Union Territories (UTs) for establishing SWANs from State and UTs headquarters up to the block level with a minimum bandwidth capacity of 2 Mbps. State Data Centres have been identified as one of the important elements of the core infrastructure for supporting e-Governance initiatives under NeGP. It is proposed to create data repositories or data centres in various States so that common secured data storage could be maintained to serve host of e-Governance applications.

Common Service Centres (CSCs) are one of the three infrastructure pillars of NeGP and are deemed to serve as the physical front end for delivering government and private services at the doorstep of a citizen. The government has approved a scheme for facilitating establishment of 100,000 broadband internet enabled CSCs in rural areas of the country, to be implemented in public private partnership.

Unique ID for BPL families is a project launched with the objective of creating a core database of all residents of the country and assigns unique ID number to all such residents over 18 years, in order to facilitate better targeting of government social welfare schemes and poverty alleviation initiatives.

**E-District projects** have been launched with the objective of computerising the backend workflows at the district level with appropriate business process reengineering (BPR); reduce the work load at the district level; ensure fast processing of cases or grievances; and enable better monitoring of various government schemes. It aims at bringing a number of services online, in a web-based mode, including
applications under the Right to Information Act; applications for house sites, ration cards, transfers of teachers, inclusion in the electoral roll, filing of police complaint, issue of birth/death certificates and copies of land records. Most of these services are provided at the district level and they serve as the primary interface between the government and the citizens.

National Informatics Centre (NIC) has been instrumental in steering Information and Communication Technology (ICT) applications in Government departments at Central, State and District levels. It is facilitating improvement in government services; wider transparency in its functions; and improvement in decentralised planning and management. Some of the major projects undertaken by it include budget computerization; central excise computerization; commercial tax computerization; courts computerization project for supreme court, high courts and district courts; agricultural census and marketing; parliamentary elections data transmission and analysis; land records computerisation; and utility mapping project; etc.