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REVIEW ARTICLE

ICT DEVELOPMENT IN INDIA: CURRENT SCENARIO

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ABSTRACT

The revolution in the information and communication sector is making the world united. In today's world information and communication technology (ICT) is a key parameter for economic development. Presently India is 121st position in ICT Development Rankings out of total 157 countries. Though the value of the index increased from 2.13 in 2011 to 2.21 in 2012 India's overall ranking slashed down from 120 to 121 during this period. Hence India has to improve its status regarding ICT if it wants catch up its development goal. Present study tries to analyse the trend and pattern of ICT in India and its impact on Indian economy. The study found that though the state of development of ICT in India is increasing in past few years, but still it is far from being satisfactory. Suitable policy prescriptions by the government are necessary for ICT to become one of the key engines of economic development in India.

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INTRODUCTION

The revolution in the information and communication sector is making the world united. With the invention of new technologies there is enormous scope of development in almost all the sectors, provided there is proper utilization of technologies with the appropriate human resource. With the advent of new technologies and up gradation of technology and revolution in the information and communication sector the world has now become a mere small village. Again with the concept of globalization the cross country transfer of technology with respect to equipment and even manpower has now days become much easier. Technological change is always accompanied by realignments of markets. With the advent of information and communication technology (ICT) revolution such alignments has undergone exceptional changes. ICT enhances productivity and finds way for developing the economic structure of a country. Thus it can be said that technological up gradation has an obvious impact on the economic development of the country. Hence the government of India has made significant investments in this sector. It is also assumed that ICT increases the amount of timeliness of information available to the economic agents and improves the production process to organize, store and retrieve information and thus have major implication for the developing countries like India. This paper has tried to analyze that how the adoption of new technology has spread in India from 1980-81 to 2000-01 and ICT industry is contributing towards the economic growth of the country. The study has tried to give a brief picture of present ICT growth in India. For this trend of ICT growth depending on various aspect have been analyzed. The different aspects of ICT and its impact on the economy as a whole has also been analysed. It has also tried to give a brief picture on how the ICT is actually influencing the economy.

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Literature Review

It is fact the there is a lot of role that ICT should play in a country's economic development. On this account there is a spurt of literatures. The study tried to address some of the vital studies regarding ICT growth. Archana *et al*. (2007) found that in India there has been a shift in the flow of FDI and this has lead to higher investment into low cost, high tech research and development. Poor infrastructure is a constraint in attracting major FDI. This reduces the comparative advantage of industries that are more intensive in the use of such infrastructure. Analyzing the FDI data in India the study found that most of the FDI arriving in India is heading towards power and telecom sector, electrical and electronic equipment, and transportation sector. According to Kozma (2005) global economic and social trends over the past several decades have profound implications for educational reform and the use of technology in the schools. The convergence of these trends has created significant economic and social opportunities. These converging trends have put tremendous stress on educational and other social systems responsible for preparing society for the future and moderating the adverse impact of social change. Under these circumstances countries are confronted with the need to rethink their educational systems in order to prepare students for the global economy. It is fact that the roles of entrepreneurs are crucial in developing the ICT in any country.

According to Schaltegger and Wagner (2006) the entrepreneurs are considered to be the main players with regard to creating environmental and social problems and thus to be the source of a lack of sustainability in the society. For many years and increasing visibility, management of leading companies has been core drivers of sustainable development. With their innovations, sustainable entrepreneurs and sustainability managers are shaping markets and society substantially. According to the final report of the Digital Opportunity Initiative (2001) ICT can make a valuable contribution to sustainable environment management by improving monitoring and response system, facilitating environmental activism and enable the resources to be used efficiently. The study found that ICT is extensively used to monitor and respond to adversity in environment in developing countries. Regarding the scope of ICT the study emphasized that the use of ICT can be extended to diminish the energy consumption, consumption of water and other essential natural resources by efficiently using agriculture and industrial practices. Saith and Vijayabaskar (2005) described that there is an enormous potential of ICTs to fundamentally transform the nature of economic growth and development of a country. This has induced both wide-ranging hopes and apprehensions regarding the roles of ICT. They commented that while debates on these issues in the context of advanced market economies are relatively old, their significance for low-income economies, like India and China, is only beginning to be appreciated now.

Singh (2002) defined information technology as "the digital processing, storage and communication of information of all kinds". It implies every sector of the economy can be benefited from IT. The study emphasizes that in present days it is a fact that IT sector played a dynamic role in many countries. But India, being a developing country has been able to achieve IT sector growth which is even comparable to those developed nation. Though India has recently gave importance on import-substituting industrialization still, according to the study, India "has not developed a robust, world-class manufacturing industry, and this includes IT hardware" Singh (2003). But as the study found, compare to hardware sector, software industry of India is, of course more robust.

India in the Way to Develop ICT

In the past two decades we have seen a tremendous growth of ICT (Information and Communication Technology) and ITES (IT enabled services) industry worldwide and India has an impressive mark in the world trade of ICT and ITES. Indian ICT industry is a fast growing industry in terms of its annual growth in production, domestic market share, exports, offshore outsourcing and investment. Indian electronics hardware and computer software/service industry is now a very fast growing industry both in terms of production and exports. The share of ICT industry in India's GDP (Gross Domestic Product) is continuously increasing since 1999-2000. To mention, ICT registered 8.2 percent of India's GDP in the year 2003-04 and Indian ICT sector constitutes an estimated value of 16 percent in the overall export basket of India. India's export of electronic hardware products maintains the average annual growth rate of 21.6 per cent during 1991-92 to 2004-05 whereas India's export of computer software and services maintains the average annual growth rate of 48.6 percent during 1991-92 to 2004-05. The development of India's ICT Industry is shown in the table 1.1 where the production of electronic hardware and computer software has been displayed.

Table-1.1. Trend of Production of Electronic Hardware and Computer Software in India

Year	Electronic Hardware(Rs/Cr)	Computer Software/Services(Rs/Cr)
1996-97	20340	6713
1997-98	22100	10270
1998-99	25500	18300
1999-2000	28100	24500
2000-01	31100	36900
2001-02	32750	47374
2002-03	37500	59900
2003-04	43800	73350
2004-05	49750	96930
2006	64400	167175
2007	79800	203060
2008	92130	258000

Source: Annual Reports of Ministry of Information Technology (Govt. Of India) and Economic Survey of India.

From the table 1.1 it is clearly seen that the production if IT related products like electronic hardware and computer is continuously is increasing over the years. There has been an IT revolution in the world in the last few decades. This revolution has changed the life of the people in terms of their work as well as thoughts. The ability to use computer has become as much an expectation of the society as the ability to read and write (Tyack and Cuban, 1995). In the present day of knowledge explosion, every country has realized the significance of information and communication technology (ICT) and IT enabled services (ITES). With the advent of globalization it is very essential for all the countries to use ICT and ITES. This has resulted to the tremendous growth of the ICT and IT industry which in turn is the cause of the high demand for well qualified personnel to operate the system.

India is gradually building a hardware manufacturing base but the electronic hardware industry in India is oriented towards the domestic market. An export in electronics hardware industry has increased but not as fast as imports. The picture of hardware and software production in India is already mentioned in the table.1.1. Following table has tried to represent a brief picture of the principal export items related to ICT industry in the past decade.

Table-1.2. Export of Principal Commodities

Year	Engineering goods(Rs Cr)	Electronic Goods(Rs Cr)
2001	1979.74	492.89
2002	2760.96	524.35
2003	3250.22	619.07
2004	4000.36	656.74
2005	6543.33	663.56
2006	7925.39	849.17
2007	10097.12	1022.13
2008	15885.5	2098.41
2009	14116.28	2332.88
2010	76641.08	15375.12

Source: DGCIS Kolkata.

From the table it is found that there is an increasing trend of exports in the ICT related item like engineering goods and electronic goods from India. Hence it can be concluded that

with the increase of exports of ICT related goods the revenue earnings from ICT industry is also high.

Table-1.3. Direct Employment ('000s) in the Services and Software Product Segment

Sectors	2007	2008	2009	2010*
Domestic market	378	427	500	525
BPO Exports	553	704	738	768
IT Exports	690	865	958	993

Source: Strategic Review 2008, 2010; NASSCOM. *Forecast

From table-1.3 it is seen that there is significantly high employment opportunity in the IT sector in India. With high employment opportunity in this sector many young people are now demanding to get trained professionally in the technical field. Thus the educational institutions which belong to the technical field are now developing in every corner of the country. It has been estimated that Indian ICT sector employed 48 lakhs people by the end of 2008. The total training market in ICT stood at Rs. 1752 crore (Dataquest, 1999-2000). Thus the number of educated training professionals went on increasing year after year during the past two decades. With this huge number of trained professionals there is generation of employment opportunities in the IT sector, BPO sector and the ICT industry as a whole. With the expanding ICT industry there is more generation of employment as well as income.

Table-1.4. Trend of Knowledge Professionals in India

Category	2003-04 (in'000)	2004-((in '00	2005-0((in '000	2006-07 (in'000)
Number of Engg. Graduates	215	284	348	382
Number of ICT (Computer science/Telecom Professionals)	141	165	181	193
Number of ICT professionals entering the workforce	80	94	103	109
Number of non IT/ICT engineers entering the ICT workforce	40	40	40	40
Engineering IT graduates(degree)	95	100	111	117
Engineering IT graduates(diploma)	46	65	70	76
Total fresh IT/ICT labour supply	150	164	173	180

Source: NASSCOM.

Table-1.4 represents a picture of the pattern of the technically trained knowledge workers over the years in the ICT sector in India. From the above table it is seen that over the years the number of knowledge professionals in the IT sector has increased. The number of working professionals in the IT sector has also increased in the decade. Hence it can be said that as the ICT industry expanded the employment opportunities also increased and with this the number of well trained professionals also increased. With more generation of employment opportunities there is scope for more economic activity. With demand for more IT professionals and knowledge workers there is remarkably high growth of educational institutions in the past few decades. The higher educational institutes have grown in large numbers along with the growth of the technical institutes in the country. The IT-BPO sector not only concentrated themselves into the urban areas but it also penetrated into the rural areas too. The BPO business flourished into the rural areas also. The BPO business has four main inputs: communication, systems, hardware and people. It is advantageous for the BPO to operate in the rural areas because the cost associated with infrastructure and people are much lower in the rural areas than in the urban areas. Thus the IT industry has spread in every corner of the country which indicates that it has a significant role in the economic activity which leads to the employment generation and ultimately enhances economic growth.

An important aspect of the Indian economy in the pre-reform period was the inefficient use of the capital. At that time a relatively high saving rate was associated with relatively low growth rates. So the economy needed the mobilization of the savings. Financial sector reforms in 1992-93 has focused on making the country's organized capital market more efficient by institutional improvements such as electronic trading and settlement, guidelines for corporate governance have been introduced. The IT sector is an important source of growth for a country like India. Here the reference of the endogenous growth models can be made which states IT as an important aspect for the development of an economy. The variables in the endogenous models include differentiated capital inputs, production of new inputs through R&D and ultimately increasing returns that allow sustained growth to occur. The endogenous growth model by Romar rules out the possibility of diminishing marginal productivity. With the IT enabled services and the R&D the possibility of diminishing marginal productivity is ruled out. Hence it can be said that the development of the IT sector is definitely endogenous to the economic growth of a country. The endogenous growth theory shows that the determinants of growth variables are explained within the model. The development of human capital can explain the endogenous growth theory. The technological change is a prime mover of economic growth. As the economy shifts from lower to higher stages of development there is also change in the technique of production. This shift requires higher skills on the part of human resources, targeted to achieve efficiency in production or service delivery system. The endogenous growth models have advocated the active role of public policy in promoting economic development through direct and indirect investments in the human capital formation and encouragement of foreign investment in knowledge intensive industries such as information and communication technology related sectors (Romer, 1991). The Indian ICT industry has witnessed an excellent growth in the past two decades. India has developed ICT manpower over the years through huge investments in the engineering and technical institutions over the years and across the states. With the growth in ICT there is huge penetration of personal computer among the households in India over the years. Now-a-days communication is fast through email, mobile, internet etc. Common people have started to adopt these gifts of ICT very fast. Following table represents the growth in Personal computer and Internet adoption among the households in India.

From the Table 1.5 it can be seen that the adoption of internet and personal computers have increased over the years. This shows that ICT have made a mark in the common individual's life. Thus ICT plays a major role in the development of faster communication not only in the BPO and IT sector but also in the common individual household's life. The ICT industry and the IT-BPO sector have been developing over the years as seen

Table-1.5. Growth in Personal Computer and Internet Adoption among the Households (hhs)/ Individuals ('000)

Year	PC owners(hhs) (units '000)	Internet Subscribers(hhs) (units '000)	% of PC owners with Internet
1998	288	25	8.7
1999	461	126	27.3
2000	732	318	43.4
2001	1073	624	58.2
2002	1550	837	54
2003	1886	1025	54.3
2004	2550	1304	51.1
2005	3683	1891	51.3
2006	3861	2927	75.8
2007	5723	3878	67.8
2008	7805	4846	62.1

Source: Strategic Review 2009, NASSCOM.

in our chapter. It is very obvious that the development of IT-BPO sector and the spread out of ICT in different parts of the country requires huge investments. The Investments may be domestic or foreign. An outline of the top sectors attracting private equity funds in India in the year 2008 has been demonstrated in Table-1.6.

Table-1.6. Top Sectors Attracting Private Equity Funds in India in 2008

Industry	No. of Investments	Amount(USD million)
IT & BPO	107	1567
Manufacturing	49	1014
Others	48	951
BFSI	45	1101
Healthcare & Life Science	33	535
Energy	28	1693
Engineering & Construction	24	538
Media & Entertainment	22	578
Shopping & Logistics	13	509
Telecom	10	1468
Textiles & Garments	8	323
Food & Beverages	6	378
Retail	6	138
Total	399	10793

Source: Strategic Review 2009, NASSCOM.

From the Table 1.6 it can clearly be seen that the IT-BPO sector has one of the highest amounts of investment apart from telecom and energy. Hence the IT sector is the booming sector in the economy as a whole. Thus it can be said that the prospect of IT sector is quite high in the present situation as it is not only generating revenue but also attracting foreign investment in the country. Information technology is spreading fast in India, but India has a long way to catch up with the developed economies. There are various mode of ICT apart from mobile, personal computers and internet.

Table-1.7. ICT Status in Selected Countries (per 1,000 persons) in 2005

Countries	Daily News Papers	Television Sets	Telephone	Mobiles	Personal Computers	Internet Users
USA	196	980	606	680	762	630
UK	326	950	528	1088	600	473
France	142	950	404	997	575	430
Japan	566	990	460	742	542	668
Canada	168	566	514	417	700	520
Russia	Na	980	280	838	122	43
China	59	890	269	302	41	85
India	60	320	45	82	16	55

Source: World Development Indicators (2007), Washington DC.

They are daily news papers, television sets and number of telephones. The number of daily news papers per 1000 persons in India was 60 as compared to 566 in Japan 326 in UK and 196 in USA (World Development Indicators 2007). Table-1.7 will help to analyse Indian status as compared to other developed countries of the world. It is clearly can be seen in the Table-1.7 that India had a long way to go to catch up with the developed economies in 2005. But now the entire scenario is quite different as India has become one of the largest numbers of mobile subscribers in Asia after China. That means that there has been a huge development of the ICT industry which clearly shows that within few years span of time from the year 2000-2010 the country has seen revolutionary changes in the field of ICT. Not only this, the ICT had spread to the length and breadth of the country. The introduction of e-Choupal in the rural areas has made much easier for the farmers to know about the agricultural pricing and marketing. These e-Choupals besides providing connectivity and information also serve as ground level outlets for agriculture. Products such as seeds and fertilizers of guaranteed quality are made available at reasonable rates. These e- Choupals carry out other commercial transactions with farmers such as purchase of agricultural produce thereby eliminating the village middle man. The scheme has received very positive responses from the villagers as they are able to get better price for crops in a transparent manner. The villagers even have the option of choosing the time of sale based on market information.

Conclusion

In present era Information and Communication Technology (ICT) industry is contributing a lot into Indian national economy in various ways. Almost all the states in India are targeting this sector as a vehicle for economic development. From the study it is revealed that over the period of 1990-91 to 2006-07 there has been a huge development of ICT in India. There has been growth and investment in ICT and its components in India. To support ICT growth it is seen that there is enormous growth in the human capital development in different states of India. The growth of ICT has been indicators that for the development of exports and imports of the related items like hardware, software and engineering goods. The ICT development has made the rural people better informed about the market and the many Indian farmers are benefitted with the reach of ICT in the form of mobile phone or internet in the remote villages.

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