

ICT ENABLED DEVELOPMENT AND DIGITAL DIVIDE : AN INDIAN PERSPECTIVE

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Abstract

The direction and pace of development in ICT have led practically all world economies to recognize the improvement of ICT in catalyzing economic activity, in efficient governance, empowerment of society and bringing about major socio-economic transformations in societies. Developing countries like India, have, therefore, made significant investments in these technologies and integrated the same with the development programmes to gainfully realize the fruits of such developments to their society. However, it is realized that this development has created a divide between the 'have' and the 'have-nots' in the form of a gap between the 'technology empowered' and the 'technology excluded' communities. It is therefore catching the attention of governments the world over to device programmes to alleviate this divide, called the digital divide. This paper highlights the digital divide scenario in India, various ICT initiatives undertaken and the major challenges and key solutions in bridging the digital divide in the Indian context.

Keywords: Digital divide/ Information Communication Technology/ India

1. Introduction

The first industrial revolution and related economic growth between the 1780s and the 1840s was associated with major innovations in textiles and related areas. Innovation in steam power and railways provided impetus between the 1840s and the 1890s. Electricity and steel were at center stage of human progress during the 1890s to the 1940s. Innovations like mass production, especially of automobiles and synthetic materials, have been instrumental in economic growth since the 1940s. Now we are at the threshold of the era of ICTs, which are generally seen as the technology of the new millennium. Many developing countries have initiated policy measures and instituted interventions to harness the new technology as a shortcut to prosperity. ICT are a significant enabler of successful governance and can go a long way in touching the lives of the common man. The role of ICT is popularly held to be very critical to economic and social development, but there has to be greater use of ICT as an engine of growth. ICT benefits the poor by removing social, economic and geographic isolation by increasing access to information and education and by enabling poor people to participate in

decision-making. India is also known for a number of ICT applications in e-governance and poverty alleviation, through the progress of ICT use.

While the ICTs in general and the Internet and the world wide web in particular have made life easier by facilitating easy communication and easy access to information located anywhere in the world, they have also widened the gap between the 'have' and 'have-nots'. The new technologies while improving our life in many ways have created what is called the 'Digital Divide'. The term refers to the gap between the 'technology empowered' and the 'technology excluded' communities. It has become a popular phrase to describe the perceived disadvantages of those who are either unable, or do not chose, to use ICT in their day-to-day activities, decision-making, learning and pleasure. Digital divide results from not only differences in access to ICT resources between rural and urban areas, but also the differences in access that arise from the rich/poor divide and the developed/underdeveloped nation divide. Bridges asserts that digital divide does not emerge out of technology, but is due to inequitable distribution of technology. It is a reflection of the lack of basic literacy, poverty, health and other related social issues. Nothing will enable the society to bridge the digital gap until basic literacy, poverty and health care issues are addressed.

2. ICT and Development

To understand ICTs role in development, we must first have an understanding of what constitutes development. Rahul De states that development has to be understood in a holistic manner, where the basic freedoms and capabilities of population are built upon and grown, and this growth has to include all aspects of people and communities, not just capabilities like access to information. Access to markets, adequate health care and education, social support, ability to participate in political agenda setting and access to information about policies and procedures of the government are essential for overall development. Development has to address the needs of the population in a manner that complements these basic capabilities and builds all of them.

The contribution of ICT to development can be analyzed at two different but interrelated levels.

- In terms of growth of the ICT sector which refers to output, employment, export earning etc., from the ICT goods and services which are more visible than those from use.
- The extent of ICT diffusion and use which refers to ICT induced development through enhanced productivity, competitiveness, growth and human welfare arising from use of this technology in different sectors of the economy and society.

ICT in an economy can be conceptualized in terms of four main sectors:

- ICT goods sectors, which create, make and move physical hardware devices that process and display information (computers, consumer electronics, telephones and other appliances).

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- Information content sectors, which create, make and move information.
 - Communication network sectors, which provide the enabling infrastructures to support transmission of information between ICT devices.
 - Information sector, which consists of economic use of ICT devices and information, contents either for consumption by household users or for production by enterprises in all sectors of the economy.

3. What ICT deliver?

The potential of ICT is manifest in several ways in being able to bring about development in both economic and social sectors. It also helps in citizen empowerment through delivery of efficient government services. Some examples of the ICT enabled services include:

- Government interfaces for filing tax, billings, statutory record collection, etc. to empower citizens with information leading to transparency.
- Efficient services for health care, education and disaster mitigation.
- Access to information on rights and responsibilities for citizen empowerment.
- Access to vast educational content for improving literacy.
- Help entrepreneurs in gainful employment and improve their economic condition.
- Efficient disbursement of loans, pensions and maintenance of authentic person and property records.
- Help farmers with value based information to improve their productivity and provide timely information to traders, artisans, fisherman etc.
- Entertainment through broadcasting, gaming and multimedia services at doorsteps in remote areas.
- News delivery, which helps, integrates people in diverse groups and at different places.
- Serve the physically disabled and disadvantaged to enable them take advantages of what technologies have to offer.

The relevant and wide ranges of technologies available to address these services include: Internet, e-mail, browsing, multimedia, wireless loops, cable TV, Direct-to-Home (DTH) TV entertainment and internet access. Language computing technologies, access devices, network security, open source and shareware software, digital libraries, speech recognition, text-to-speech, smart cards, optical fibers, satellite connectivity, powerful and affordable computing devices and platforms, kiosks, server farms, etc. These technologies have enabled effective e-commerce, e-governance, e learning, and e-health and e-entertainment applications the world over including India.

4. Indian Scenario

India is the second most populated country with more than one billion population. About 26% people in India live below the poverty line and have no proper electricity, no proper drinking water, and no proper sanitation facilities. India's Gross National Income when compared to USA (11012.6\$) and Japan (4360.8\$) which ranks 1st and 2nd respectively, is 570.8\$ with 12th ranking in world development indicators. India's Income Per Capita is 540\$ and ranks 159 whereas USA and Japan have 37870\$ and 34180\$ respectively. According to the India 2006; a reference annual, India has about 593643 villages and more than 72% of the Indian population live in alienated rural areas who earn their livelihood from agriculture. Most of the villages are lacking proper ICT infrastructure, though India spends 28% for ICT. Only 5.63% of the population has access to telephone and less than 1% has a PC. The rural Tele-density is also very low as compared to the urban areas. A wide rural urban disparity, which is further aggravated on the regional basis, has created an acute divide in variety of social and economic activities including education. Though education is being provided through millions of schools, 17000 degree as well as post graduate colleges and 342 universities, the present literacy rate is about 65% leaving 35% illiterates with female sharing 53.67% literacy. Latest world development indicators show that in information society indicators, i.e., computer, Internet, radio, television, newspapers etc. India is far behind USA and Japan and even some Asian countries. India's position along with that of USA and Japan in information society indicator is depicted in Table 1 below:

Table 1

Sr. No.	Information Society Indicator (per 1000)	USA	Japan	India
1	Daily Newspaper	196	566	60
2	Television	97	99	37
3	Personal Computers	749	542	12
4	Internet Users	630	587	32
5	Schools connected to Internet	99	99	-
6	Broadband subscribers	129	145.8	0.6
7	International bandwidth (bits per capita)	3305	1038	11
8	Application secure Internet (per million)	783	257	1
9	Price basket for Internet (\$ per month)	14.9	21.1	8.7
10	ICT expenditure (GDP %)	9	7.6	3.8
11	ICT expenditure (per capita \$)	3595	2732	24

There are some positive aspects, which significant indicate the changing Indian scenario. India has made significant progress in the ICT and the IT infrastructure particularly, the penetration of IT has improved. The Tele-density has increased from 1.44 % to more than 6%. The cellular mobile sector has also grown exponentially from 1.2 million to more than 19 million subscribers. The rural Tele-density has increased

from 0.44% to 1.5%. The telecom sector in Indian economy has the largest network after China, USA, Japan and Germany. India proposes to achieve target of 22% Tele-density by 2007. In rural areas the universal access to rural telephony is provided through VPT (Village Public Telephone). 87% villages are connected with VPTs. WLL and mobile telephony will cover most of the villagers by 2007 by BSNL. According to the annual report of DOT, the Internet connection shall increase from 5.45 million (December 2004) to 18 million by 2007 and further to 40 million at the end of 2010.

India has a large educated English speaking workforce and produces about 350,000 computer professionals per year. Its IT sector has experienced rapid growth. As per NASSCOM study software exports recorded US\$ 17.2 billion in 2004-05. Employment in the sector grew by 30% per year between 1999/2000 to 2003/04. Although India has its own problems of population, poverty, literacy and education, and the rural-urban divide, yet the IT sector is catching up pace.

5. ICT enabled programmes

For the last few years the state governments, NGOs and some pioneering companies have tried to crack the technology barrier by developing pilot projects to showcase the marvels of IT in a rural setting. Kiosk based approaches to delivering e-governance have received considerable attention and funding. Bhoomi is a kiosk based project of Karnataka and holds millions of records of land ownership. It is widely successful as there are almost 8 lakh people in various talukas of Karnataka that use the system every month. The system called e-seva in the Ranga Reddy district of Andhra Pradesh, including the twin cities of Hyderabad and Secunderabad, is also very successful with thousands of citizens using the system for paying bills, getting motor permits and licenses and for various other government services. There are other successful projects such as CARD (Computer Aided Administration of Registration Department) in Andhra Pradesh; Saurkaryan operational in Port City of Vishakapatnam to facilitate payment of property tax online, view details of schemes and projects of the government and local bodies, etc. The information kiosk set up by entrepreneurs with help from government of Kerala named Akshay Kendras that was first implemented in Mallapuram district with 600 kiosks help citizens make payment of electricity bills, get birth certificates and contact police stations by e-mail. Another project launched by the state government of Kerala is the Friends project which serves more than 13 million people in 12 districts of Kerala.

Another important rural information network project is Gyandoot in Dhar district of Madhya Pradesh, where every village has an information kiosk that provides information on crop, forests, water resources, etc. There are many more e-governance and related projects set up in various states like the UNDP supported Jana Mitra Scheme in Rajasthan, Choice in Chattisgarh, Lokmitra in Himachal Pradesh, Rajnidhi in Rajasthan, Lokvani in U.P., Setu in Maharashtra, Jai Kisan in Uttaranchal. There is a community focused projects like CIC project that enables localized governance in North-Eastern states of India through VSAT connectivity to 478 blocks for providing internet access and information relevant to local needs. The government of West Bengal has

taken up a project of setting up about 1500 community library and information centers (CLIC) in the villages for providing normal library services relating to career and vocational opportunities. The Ministry of Information Technology has set a target to establish one lakh 'common services centers across villages where e-governance services will be available by August 2007.

Apart from these there are projects such as ITC's 6000 e- Chaupals covering 35000 villages empowering farmers with value based information on their produce and its marketing. Similar services are offered by Swaminathan Research Foundation, where weather conditions in the sea are obtained from the satellites and is broadcasted to the fisherman community to improve their safety. Other ICT initiatives include the digital library and digitization initiatives. Language computing technologies are being developed to enable large non-English speaking people to effectively use computers in Indian languages. Telemedicine experiments are being carried to help people in North-East region and other remote areas with Tele-education, Tele-consultation and Tele-diagnosis. Mobile digital libraries are being promoted to allow school children in rural areas access internet via VSAT connectivity. Many more projects are in the pipeline.

6. E-Governance Projects: The Reality

Although , in India the ICT has contributed to the economic prosperity of urban India, yet it has yet not reaped full benefits in rural areas. Rahul De (2006) states that the overall story of e-governance projects is somewhat dismal because about 85% of these projects in developing countries like India fail. The reason being that whenever the Indian government is involved with delivering projects there are delays, changes in functionaries, shortages in money, lack of motivation, lack of coordination between departments, projects are tied to election cycles and so on. Hence, there are challenges ahead including: bringing in a positive attitude towards moving to e-governance, educating the bureaucrats about the need for change and imparting training to use technology effectively. Creating a viable coordination between the state and the centre regardless of political reservations by eliminating the state monopoly is also essential. Massive campaign involving the rural people to bring awareness about the advantages of e-governance to the society is required .

7. Key Challenges and Solutions

Despite the developments in the Indian context there are still a number of challenges that need to be attended including providing necessary content for education, literacy, equitable access opportunities for all, enhancing libraries, particularly rural libraries and community centers role. It requires a bending of the powerful ICTs, which are highly flexible and moldable.

7.1 Improving ICT Infrastructure

Telecommunications and the IT infrastructure is the key to provide universal and affordable access to information to citizens scattered geographically. The challenge

that we face in ICT for development is designing and building technologies and networks that are suited for the needs of our citizens. Despite the growth of Internet, India has to provide a robust telecommunication infrastructure with suitable, sufficient and reliable bandwidth for Internet connections alongwith necessary hardware and software. Faster network with sustainable funding for their necessary updating is the need of the hour.

7.2 Connectivity and Affordability

Access to the Internet as well as the telecommunications is confined mainly to the urban centers in India and the rural areas remain beyond the ambit of new technology. Hence connecting rural areas is a bigger challenge, because subscribers are geographically dispersed, sparsely populated and economically weak. About 4 lakh villages have a mearge population of 1000 or less, therefore it is difficult to provide internet facility to each village. Moreover telecom companies may not venture into remote villages because the purchasing power in the villages is not enough to recover the cost of connecting them. Therefore affordability, ease of deployment and appropriate organizational innovations are critical to sustainable deployment of telecom systems in India. Some of the issues have been effectively addressed by a radio technology called CorDECT wireless in local loop technology, developed by the IIT, Chennai. This low cost wireless access technology aims at connecting primarily homes and small offices in rural areas and small towns. Another technology project is DakNet in Karnataka, which offers Wi-Fi based broadband linkage where wired communication is not available.

The issue of affordability arises mainly because the prices of hardware and software are high in relation to average income levels of people. Hardware innovations like the 'Simputer' (simple computer developed by IIS, Bangalore) helps to address the issues of affordability and literacy. It offers computing facilities at drastically lower costs and has many advantages, with the most important aspect being that literacy is no longer an impediment for the masses to derive benefits from it, given the simputer's voice output.

7.3 Equitable Access

One of the foremost things to be done is to provide universal access. It is imperative that any benefits of ICTs are shared equitably by all sections of society. One obvious implication is to make more and more e-governance services available through kiosks, which would save time and costs in terms of a reduced number of visits to the government offices and less corruption. Access to ICTs alone cannot generate the knowledge or redress the social inequalities. This requires meaningful use of ICTs for accessing the contents in local language as well. The access conforms to the following classifications:

- Physical access: provide infrastructure and expand applications covering local needs.
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- Financial access: Suppliers enhance competition; promote investment in village and underdeveloped areas.
 - Cognitive access: continuous learning to public masses and to promote science and technology policies to promote IT at all levels.
 - Content access: Support local content with minimal restrictions.
 - Embedded access: People should be able to access through computers, mobile phones, landlines, PDAs, touch screen or interactive voice recognition system.

7.4 E-Literacy

Another attribute of the kiosks that affect their diffusion is the perception that the technology is complex and therefore only the educated people can understand and use it. The very image of a computer which they can use only with the help of an external operator is too complex for them. This situation is expected to get better with the improvement and propagation of the e-literacy skills among the masses. Therefore to reap the fruits of the ICT, it is important that the citizens are provided opportunities to learn and apply a set of literacy skills. A user has to acquire the required competencies for the use of these technologies like reading skills, information handling skills, ability to interpret contents, computer literacy, information literacy and network skills, etc.

7.5 Local Language and Local Content Development

A related aspect is to design and deliver appropriate and localized content through the kiosks as at present the content provided is mostly standardized content. Serious efforts are needed to make the content relevant and localized to attract a larger number of users. Information network will be meaningful in a rural context only if there are local content. There is a requirement of local language accessible software that caters to the needs of the local citizens. The customization will help the government to know the citizen's need. Government has to ensure that the disadvantaged groups and communities are provided online content and services that are potentially usable. For e.g., e-seva is providing information in regional language also. Developments in Open Source Software (OSS) are likely to provide an alternative. Several Indian groups are actively working at localizing OSS to Indian languages including groups like Malayalam Linux and Tamil Linux. Other language computing technology development programmes cover developing and providing software tools for text processing, spreadsheets, messaging, publishing, and text-to-speech and optical character recognition to enable large non-English speaking people effectively use computers in Indian language.

Another issue is that of providing dynamic, on demand multimedia content. It is required to develop platforms where concepts can be elucidated in multiple formats such as flash animation, videos, audio and text, combined with streamlining technology on the web. This is a powerful way of delivering educational and other content on the web.

7.6 Community Ownership of ICTs

A combination of community owned ICT enterprises and new wave of wireless and related technologies together may offer significant potential to extend networks and offer new services in rural areas. It can greatly reduce costs and maximize the use of value added community resources, enabling the emergence of a new business model that is both more economically sustainable and more empowering than anything else. Pooling users in the form of Tele-centers or community information centers enhances the ICT usage level, but extending the reach of the network serves the key challenge. In India, the Ministry of Information and technology have taken several initiatives for rural development through the community information centers. For e.g., the CIC project of North-East and Sikkim has server computer system and clients computer systems linked to a LAN and connected to VSAT for accessing Internet. The Akshaya project is an interesting amalgam of public, private and community collaboration largely under local community control. The importance of these centers cannot be neglected as they can serve as a basic support services for providing telecommunications services (such as providing telephones, Internet access, fax, e-mail etc.) for the rural masses. It is also necessary that these centers be integrated with the rural library services. Opening up community owned and community controlled centers and strengthening the existing ones is what is required on the part of the rural administration.

7.7 Strengthening Public and Rural Libraries

Libraries have a long held value of people's universal access to information. These are structurally and programmatically prepared to address the digital divide issues. Public libraries are required to be made more meaningful for the common citizens. These should be equipped to provide access to relevant information with good online content, information databases specifically designed for the rural masses. Public libraries must have reliable and fast internet connectivity, local and wide area networking for serving those who cannot afford online computer access. Such libraries need to take active part in the promotion of information literacy, including ICT and internet skills.

A very important reliance to rural development initiatives are the rural libraries. But the rural libraries in India are a forgotten identity and are suffering from the financial crunches. Though IT was introduced in rural development but these libraries were totally neglected as an asset in the dissemination of information to the rural population. Even the IT policy formulated in year 2000 showed little interest in developing such libraries. The rural administration should explore the tremendous potential of the rural libraries in bridging the digital divide and hence should understand the changing scenario and find a better solutions to transform these into valuable centers. However in India, Public information agencies utilizing models of ICTs like information kiosks, Tele-centers, multipurpose community centers and digital villages are being set, without the involvement of libraries, which could have made a useful contribution. Libraries should be centered to the information/knowledge society. The libraries in India should provide the infrastructure for connectivity, technical support, provide major contribution to the content, through digitization programmes, provide national portals to digitized

information resources. If the resources are carefully evaluated, selected and organized, such portals can add a great value by seamlessly integrating rapid and powerful access to huge range of resources. Libraries should have a responsibility to see that their services reflect the needs of the full spectrum of their society. This means that the content provided in digitized form should as far as possible be in the local languages and should be relevant to minorities and disadvantaged groups, including the illiterate and neoliterate. Libraries may be tested with promoting information literacy, e.g. by collecting, evaluating and making available literacy materials, developing, piloting and coordinating literacy programmes.

To some extent the libraries have been changing in their role from the storehouses of information to providing access to information. Various digitization initiatives are being undertaken. The government of India with the collaboration of C-DAC (Centre for Development of Advanced Computing) aims at bringing one million books of digital library at the doorsteps of the common citizens. Several projects like the NSDL (National Science Digital Library) and Vidya Vahini projects are under way. Vidya Vahini aims to connect government and government aided secondary schools in India. INFLIBNET, NIC, NISCAIR, NASSDOC, NISSAT, ICHR, INDEST, DELNET, UGC, Universities, government bodies and IITs are providing information through e-journals, e-books as well as databases on Internet.

8. Conclusion

Radio, television, telephones etc. are common all over India. Satellite invasion with large number of channels has virtually changed the life of people in urban and semi urban areas. In the rural settings, various successful e-governance models, the digital library initiatives, the improvement of IT infrastructure and many ICT projects for development are giving hope for the digital unite opportunity for India, though the pace of their development is quite slow. What is required to sustain these projects is adequate financial support, support of the government, industry and community participation, encouraging private participation on a mutually beneficial basis, collaboration amongst researchers, social scientists, librarians, technologist, etc, stable and corruption free government, massive campaign on e-governance involving rural people, etc. The National Knowledge Commission was constituted on 13th June 2005 with the mandate of devising and guiding reforms that will transform India into a strong and vibrant knowledge economy. It focuses on certain key areas such as education, science and technology, agriculture, industry and e-governance.

The government has declared IT as one of the thrust areas for the country's development. However, it should be remembered that ICT though provide the fruits of digital unite, at the same time they also pose a potential and additional threat to development and digital opportunity if the rural population is unable to join the bandwidth connectivity group. Many technologies are developed for the literate class, but we need to build technologies for the masses. The pace of India's future progress will depend to a large extent on its ability to make available the most useful knowledge to vast section of the population.

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