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Extended Essay

Digital Divide: Exploring National Factors and Approaches to Bridge the Digital Divide in India

What are the factors contributing to the digital divide in India?

Word Count: 3,997

Abstract

When I visited India in 2004 I observed the great divide between rich and poor countries, such as Austria and India with regard to economic wealth and social and economic conditions. I realised that a gigantic gulf existed between the industrialized and developing countries in terms of access to information and communication technologies, such as radio, computers, TV and mobile phones. So I decided to research possible factors for the digital divide in India and accordingly my research question is: *What are the factors which contribute to the digital divide in India?*

This paper reviews scholarly published books, articles, newspapers, journals and conference proceedings that address the issues related to the digital divide in India. The research focus includes exploring few contemporary approaches at national and international level to address the issues of the digital divide. Based on reviews and observations of several literatures, recent approaches at national and international levels, news and research findings, I have recommended possible solutions that can be implemented in developing India to reverse the widening gap of the digital divide.

The first solution, building a cheaper computer named Simputer may resolve the current economic problem making computers more affordable but Simputer does not meet the requirements of access for some universal-access proponents. The second solution, creating a multilingual Windows XP starter edition to prevent language issues, forces the programming of 22 diverse languages, each with its unique characters, in order to promise universal access. However, such software will be too expensive for the majority to afford. Both solutions are therefore ineffective unless a number of factors are resolved together. This leads to the conclusion that all factors are interrelated with another and trying to bridge the digital divide in India means finding a solution to all factors.

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Introduction

As information technology (IT) continues to have a great impact on the lives of people and the global economy it is important to consider a major question at the national and international level of whether the use of information technologies leads to increasing disparities among and within developing countries. A major gap has always existed between affluent people living in developed societies with an access to modern information technology and underprivileged people living mainly in rural communities in developing countries. Even today, there is a significant divide between those who can effectively use new information and communication tools, such as the Internet, and those who cannot.

Information and communication technology (ICT) can empower people, benefit businesses and individual and virtually link people around the world to share their views, ideas and innovations. It can enable and assure sustained economic growth, better public welfare, and stronger social cohesion and democratic forms of government. As the IT innovation continues to grow, it is important that steps be taken to help bridge the digital divide that has been emerging.[1]

Background

Living in a more economically and industrially developed country as Austria I was never aware of what we call the "digital divide" because in Austria over 45 percent of the population have access to a home computer,[2] including myself. However, finding my roots in

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[1] Giri
[2] Trappel

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India I have always wondered why my grandparents living in India do not use computers although ICT has many benefits. Different to the mentality of my grandparents, my cousin studied computers and thinks of them as a powerful tool. He uses the computer regularly to enhance his IT skills, word process assignments and on occasions chats with my family over the Web. My cousin would be considered one of the well-off people in India because with a population exceeding a billion the majority fight for a day's meal and do not have the money to buy a computer or the education to operate such machines. If you would therefore walk 2 kilometres down that very road where my cousin lives you would find malnourished, illiterate countrymen. In many cases a poor man presented with a computer would sell it to meet the basic needs, such as food for his family.

Looking at a wider picture, as India becomes more dependent on digital technologies in their democratic and economic processes it seems rather crucial to stop the digital divide which focuses on separating the small proportion of educated people who have access to the Internet from 70 percent of the population who still live in villages.[3]

Bangalore according to the United Nations Development Program (UNDP) human development report for 2001 is better off than many cities in the United States, Europe and Japan when it comes to technological innovation. It secured a joint fourth slot along with the US cities of San Francisco and Austin, Texas, and the Taiwanese capital Taipei and is even ahead of New York, Montreal, Cambridge, Dublin (where the European Media Lab is located), Tokyo, Paris, Melbourne, Chicago, Hong Kong, Kuala Lumpur and Singapore.[4] The report clearly identifies India's digital divide between a few urban areas and the vast rural surroundings.

Interesting enough, barely a decade ago India and China, the world's two most populous countries had 5 million telephone lines each. Now while India has 50 million

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[3] India's digital divide
[4] Giri

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connections, China has some 150 million and is adding to these at the rate of 25 million a year.[5] The question arises, why China was able to make such a great advancement but India's telecommunications became slower. To answer this question we have to look at contributing factors within each country. Generally, China has put greater emphasis on telecom infrastructure to avoid what India is currently experiencing: digital divide. The challenge is therefore to find possible factors contributing to the digital divide in India and in conclusion to suggest possible solutions to bridge this separation. The research question is accordingly:

What are the factors which contribute to the digital divide in India?

Digital Divide

The term "digital divide" refers to the gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard to who have access and the resources to use new information and communication tools, such as the Internet, and people who do not have the resources and access to the technology. The term also describes the discrepancy between those who have the skills, knowledge and abilities to use the technologies and those who do not.[6] People living in urban areas and developed countries have the best access to the fastest computers, best telephone services, competitive Internet Service Providers, and a wealth of content and training relevant to their lives. On the other hand, people living in rural communities have limited access or no access at all to these technologies.[7]

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[5] Devraj
[6] Digital Divide
[7] Giri

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Social Considerations

Economic

     The most significant factor that adds to the digital divide is India's economic value. India's diverse economy focuses on traditional village farming, modern agriculture, handicrafts, a wide range of modern industries and a multitude of services that are the major source of economic growth. About 17 percent of India's work-force is in industry and another 23 percent is in services. The rest 60 percent is in agriculture.[8] That 60 percent are focused around agriculture means that the government can introduce an economic reform program that includes developing basic infrastructure to improve the lives of the rural poor and boost economic performance. To bridge the digital divide in India this is exactly what is necessary since the majority of India's population live in rural parts where there is limited or no access to the Web, and not enough telephone lines to offer everyone equal access.

     Another sub-economic problem arises from 25 percent of India's population being below the poverty line. This gives host to an important issue. Even if people want access to the Web and computers because they do not have the money to buy computers and the government who have the money are unlikely to give out computers to anyone who wants one, these people are likely to get left behind when India bridges the digital divide. Confusing enough, while there are 12 phones and 10 television sets for every 100 Indians, the total number of people with personal computers in the country is less than 2 percent in a population of over a billion.[9] Recollecting that Bangalore secured a fourth joint slot along with other US cities we can assume that the people in India have heard of computers and are aware of its benefits. In this case it is surprising that only 2 percent of the population own computers. Reasons for this are a variety of factors discussed in this paper.

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[8] India
[9] Thakurta

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Further figures suggest that in mid-2002, with a billion population, less than 1 percent had home access to computers, and at most 0.5 percent of the population had home access to the Internet.[10] Such figures reinforce the difficulty trying to bridge the digital divide because the question frequently arises where the Indian government, as a major player, should begin to settle the growing crisis?

According to a Times Mirror survey poor children and children of some ethnic minorities had less access to computers both in schools and at home.[11] This links well with the idea that different religions in India are treated in another way because of religious conflicts reaching back to the eighteenth century Muslim-rule in India. However, these are only claims made by individuals suggesting an unfair treatment of some groups to others. However there is no proof that these claims hold true and the government is unlikely to accept such accusations.

Cultural factors

Language

India has 15 official languages including Hindi that is the national language and the mother tongue of 30 percent of the people, and Bengali, Telugu, Marathi, Tamil, Urdu, Gujarati, Malayalam, Kannada, Oriya, Punjabi, Assamese, Kashmiri, Sindhi and Sanskrit. Each language has its own alphabet and sometimes you find similar words with similar meanings in different languages. However, what seems to be a unique feature of Indian culture is actually what increases the gap of digital divide. Apart from the problem of poverty the fact that even within India people do not speak the same language means that language prevents many of the educated or literate people from using computers because for one most

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[10] Keniston
[11] Baase

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of its content is written in English and only an estimated 2 to 10 percent of the population speaks fluent English.[12]

An article written in 2000 by Ricardo Gomez suggests that by the end of 2000 there would be more non-native than native English speakers using the Internet.[13] Such statistics demonstrate how the medium can create two kinds of linguistic divides: a divide between English and non-English populations and a divide within non-English-speaking communities where understandable content is available only to those who have knowledge of English.

Education

In my opinion if you emphasis the role of education you can solve many problems associated with illiteracy and access. The main idea is that schools search for ways to make the best use of computers since a serious digital divide exists between those with and those without computer skills. A great relief is that not all skill-development requires the user to be literate. Such an idea greatly benefits the rest of India's 40.5 percent of illiterate people who because they cannot read and write are automatically physically prevented from using computers. One must consider that although these people are illiterate, many work and earn money even if this means growing crops. However, children who do not acquire basic computer skills will be at a disadvantage when they try to find a job and the human cost in joblessness, wasted potential, and poverty will remain high.

The next generation of the World Wide Web, referred to as Internet 2.0, emphasizes the need to go beyond text to give users a sensory experience of the web.[14] In addition governments are exploring the use of cell phones and applications like voice recognition technology or the use of visual icons on various devices to bridge this problem. The way people think in general shows that you must be able to read and write in order to operate such

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[12] Keniston
[13] Ghosh
[14] Smith

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machines. But in fact there are many new ways that the poor can be helped by new technologies even with without them becoming literate.

Telecom infrastructure

Although computers became cheaper the majority of Indians nevertheless do not have access to the Internet because the quality of Internet access available to individuals and schemes varies with the quality, availability and price of access, the existing telecom infrastructure, and so on. Unfortunately telecom networks are designed for people who can afford to pay around $35 monthly.[15] However, only few people living in rural areas can afford this.

Thriving to bridge the digital divide TeNet (Telecommunication and Computer Networks) Group, a group of faculty members from the Indian Institute of Technology (IIT) Chennai, have been developing a technology which would not only be low cost, but require low initial investments to install (about Rs.2 million). Together with Midas Communication Technologies Pvt Ltd they have worked out products that could be deployed effectively throughout India. The kind of connection required to maximize the presence of Internet in India means that at least 28.8 kbps is needed to enable effective video conferencing, remote education, agriculture, commerce and so on. Of course a 64 kbps connection will be much better and truly empower rural areas however this requires higher initial investments to install the technology and brings about higher costs. From previous instalments by BSNL* it was understood that on average a 7 km radius connected around an exchange would cover most rural areas. A wireless system with 10 km range, if installed at existing fibre connected exchange would cover 80 to 85 percent of villages in India. A system that will connect 10 km radius would serve at least 80,000 persons in most rural areas. Assuming the need for one Internet connection per 500 people, roughly 150 connections would have to be served by base

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[15] Devraj
* "Bharat Sanchar Nigam Ltd." or BSNL, a telecommunications company in India

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stations in an exchange area.[16] The main issue is that the base structure and exchange has to be cost effective even if only 150 connections are deployed in an area otherwise, such a technology even if installed is useless for the rural poor who can simply not afford it.

Ashok Jhunjhunwala from IIT suggested the use of radio waves to beam telephone signals from local exchanges into homes within a 10 km radius, using Wireless in Local Loop (WiLL) technology. He says that apart from reliable voice communication, this revolutionary technology also provides reliable fast and affordable Internet at 70 kbps. This provides both a telephone as well as a 35 kbps Internet connection at the same time using a fixed wireless connection (not mobile) at home or office.[17] Supported by solar-powered relay stations, the system can work in an extended radius of up to 25 km, making it useful in rural areas that have no electricity supply and where expensive cabling is not practical. In addition Internet traffic is separated at the exchange from voice traffic and carried separately so that telephone network does not get congested. In central Madhya Pradesh state the WiLL system is being used by the state government to help farmers access land records and also check on agricultural prices and also make complaints, in a prime example of e-governance.

Fig.1[18] provides the percentage of Indian households that could afford telephones and Internet (assuming 5 percent of their household income is spent on communications) at various levels of investment per line. If the investment was more than Rs.30,000 barely a few percent of homes can afford it. But if one could reduce this cost to about Rs.10,000 a line, the affordability would go up to almost 50 percent of homes. The 200 million connections would then look definitely achievable. The key is whether one can reduce the cost per line to Rs.10,000.

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[16] Jhunjhunwala
[17] ibid
[18] ibid

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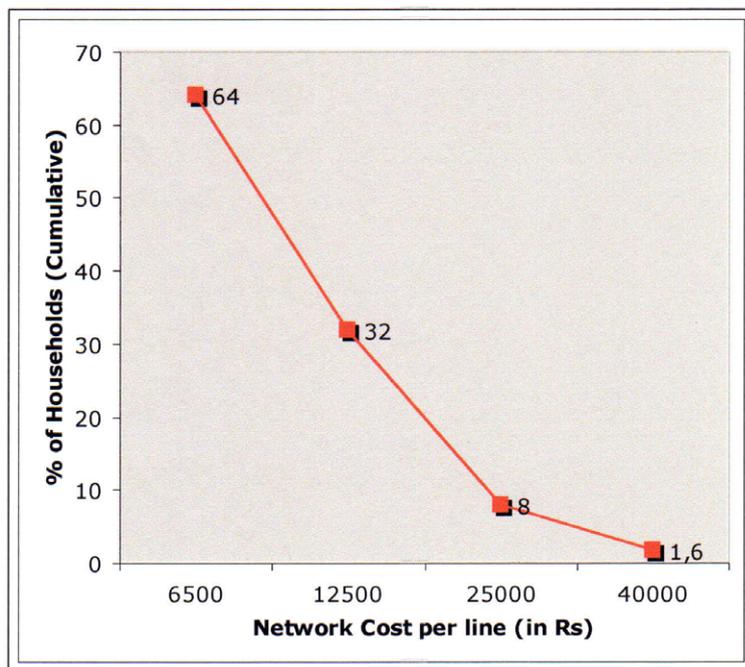Extended Essay   Information Technology in a Global Society   Digital Divide in India

Fig.1: Telecom Affordability for Indian Households at different Network infrastructure costs

A more detailed look at the cost of telecom and Internet networks around the world reveals that in the West, the cost of providing a telephone line is around $700 (Rs.35,000). We use the same technology and it is not surprising that our numbers are similar. But this cost of $700 was reached in the West more than a decade ago. There too, an operator needs between 35 to 40 percent of initial investment as yearly revenue to break even. However, this amounts to barely $30 (Rs.1,500) a month and is affordable to over 90 percent of the homes. Therefore, homes in the West have been fully wired up quite some time back. Now, reducing the cost further, no longer expands their market.[19]

Geographical

The geographical factor interrelates very much with the previous factor of telecom infrastructure; the way in which telephones lines are distributed throughout India and whether such lines reach every person in rural areas are questions that can be answered once both

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[19] ibid

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factors are considered. Reviews show that telephone systems provide local and long distance services throughout all regions of the country although services are primarily concentrated in urban areas. With the involvement of more private and private-public investors a steady improvement can be observed although telephone density remains low at about seven for each 100 persons nationwide but only one per 100 persons in rural areas and a national waiting list of over 1.7 million.[20] The question is currently, how much private and private-pubic investors are contributing to bridge the digital divide and how much money is still needed to improve technology? However, the figures presented above about India's present telephone density are not surprising but rather expected considering the current situation.

There are a wide range of social factors, such as economic, language, education, telecom infrastructure and geographical contributing to the current digital divide in India. Chiefly all factors are interrelated with another and to resolve the problem of digital divide means having to take a universal approach to resolve all factors. However, this is only part of the argument. Ethical factors must also be considered to present the current situation better and these will be discussed now.

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[20] India

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Ethical considerations

Universal access advocates

During the mid-1990s many organizations and government committees developed principles, arguments, and proposals for universal access. Universal access ensures that information resources are accessible to all people regardless of whether they live in urban or rural areas, in developed or developing countries, at affordable prices. Many universal access advocates who are at a continuous fight to ensure this universal access see the digital divide as an issue of social equity. Computer Professionals for Social Responsibility (CPSR) stated that "Universal access to the NNI* is a necessary and basic condition of citizenship in our information-driven society. Guaranteeing such access is therefore an absolute requirement for any degree of equity."[21] However, the question still unrequited is how the digital divide can be bridged when so many factors prevent closing this gap?

Universal access advocates proposed various methods to achieve their goals, including requiring companies to provide discounted rates to poor people, taxing businesses that provide Internet services and providing government programs to pay for computers in libraries, public schools, and community centres. It is clear that advocates of universal access see access as a right, in particular a positive right (or claim-right) that imposes a moral obligation on a person to do something for someone with a positive right,[22] something that must be provided for everyone who cannot afford it. Ethical objections to mandatory and tax-funded programs to provide access are raised by those who emphasise negative rights (liberties) over claim rights. This obliges others to refrain interfering with someone's attempt to do something.[23] It is currently argued that mandatory programs violate the liberties of business owners and taxpayers who must pay for them. In fact imposing taxes on those who are actually providing

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* "National Information Infrastructure," or NII, was a political term for the Net in the U.S. in the 1990s.
[21] Baase
[22] Positive right
[23] Negative right

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us Internet service is ethically wrong. We cannot request them to offer discounted rates to poor people and at the same time charge them on the investment, depreciation and operation and maintenance costs as this could cause companies to close down in the near future.

Exploitation

IT has opened many doors to India's programmers since "transportation" costs for many kinds of information work have gone to almost zero. The significant difference in pay rates has attracted manufacturing jobs to fish programmers from less wealthy countries like India. U.S. companies employ Indian programmers for a variety of IT tasks: actuaries in India process insurance claims for a British insurance company and digitized voice files are sent to India by satellite, transcribed, and returned by e-mail.[24] This trend creates jobs for both low- and high-skilled workers in less wealthy countries but on the other hand, some view the globalisation of the workforce as a negative result of technology. When hiring foreign programmers we apply Kant's principle[25] that suggests that when we hire people for a job, we are interacting with them in a limited role. We are making a trade, money for work.

Some people believe it is unfair to both the U.S. and Indian programmers that the Indians get the jobs by charging less money. Thereby the question arises whether the U.S. are not taking advantage of the Indian programmers and perhaps "exploiting" them by paying them less than you would have to pay the U.S. programmers? Another question might be whether hiring Indian programmers to work in rundown, crowded offices, lacking air-conditioning is unethical or does it give them an opportunity to improve conditions in their country?

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[24] Baase
[25] ibid

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Solutions

   Government, political leaders and business entrepreneurs face many challenges but they have made little progress in expanding Internet connectivity. In fact solutions must be considered to make Internet access widely available and affordable to the most disadvantaged communities and individuals. To bridge the digital divide means to establish a better regulatory framework, provide better education and life-long learning opportunities, train their workforce, provide equal access to deserving and poor families, and offer better job opportunities.[26]

   The first solution is to build cheaper computers using cheaper hardware. *Simputer*[27] (short for simple computer) is a cheap hand-held computer that allows users to handle sound files and e-mail through icons on a touch-sensitive screen, overcoming the language and literacy barrier. It was developed by the Indian Institute of Science (IIS) in Bangalore and its free Linux software and cheap chips have lowered the cost of a computer to $200.

   The second solution suggests creating a multilingual Windows XP starter edition for India [28] to resolve the language problem. This starter edition will enable research on Indian language computing technologies and will help accelerate IT literacy once the people have the possibility to independently explore the ends of computers and the Internet through an ICT-based learning.

   Both solutions suggest a scope for improvement to close the existing gap but they are not perfect. Simputer might resolve the problem that computers are currently too expensive but Simputer does not meet the requirements of access for some universal-access proponents to the full range and quality of features and services currently available. By 2005, only 4000

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[26] Giri
[27] Null
[28] Microsoft to bridge digital divide in India

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Simputers were sold.[29] Reasons are that the "poor man" has no need of computers before their basic needs are met and the lack of purchasing by the Indian government and non-governmental organizations led to lack of adoption in the field. The SGPL, the license under which Simputer is marketed, asks for a license fee of Rs.1 Million to commercially exploit the Simputer design. This was perceived to be a high entry point for small scale organizations wishing to license the Simputer design.

A multilingual starter edition may be beneficial to resolve the problem of language like Simputer does. But producing software that is programmed in diverse languages, each with its unique characters brings up the problem of having to program millions of diverse characters into the software. More programming means higher costs so that only a minority can afford the software. The latest version of Windows XP Starter edition was launched in India this year, 2006. However, currently the starter edition is only available in English, Hindi and Tamil for the "common people."[30]

Both solutions aim at resolving the language and literacy barrier by inventing either a cheaper computer such as Simputer or a multilingual starter edition to help increase the population of computer-users in the country. However, the sound files and icons on the touch-sensitive screen of Simputer overcome the language and literacy barrier more effectively than the starter edition which is in theory only available to literate users knowing the languages: English, Hindi and Tamil. Therefore, the starter edition only overcomes the problem of language while raising the issue of equality of access.

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[29] Simputer
[30] Latest version of Windows XP Starter edition launched

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Conclusion

  Without access to computers and the Internet and without the ability to use and understand them, a nation cannot compete with those that have these resources and skills however stunning India's performance may be in IT. Yet, trying to bridge this gap seems more of a difficult task as it means bridging the tele-density divide between rural and urban areas, and this has become one of India's greatest challenges.

  The social and ethical factors identified are economic, language, education, telecom infrastructure, geographical, universal access and exploitation. An evaluation of all factors shows that they are interrelated with another and the only way to bridge the digital divide is by finding solutions to all factors. During the course of my research I came to the realisation that I was myself caught up in the digital divide because of my socio-economic level. The fact that I come from a "well-off class" in India prevents me from contacting any of the "underprivileged." For a better insight on the current digital divide in India I find it necessary to interview both the privileged and underprivileged. Since no contact exists between both classes, personal engagement is attempted in the *Background* section.

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