A STUDY ON DIGITAL INCLUSION IN TAMIL NADU

UGC Sponsored Major Research Project Report Submitted to the

University Grants Commission, New Delhi-110 002

Approval cum Sanction Letter No. F.No. 5-520/2012 (HRP) Dated 16.08.2012

By

Dr. K. ALAMELU
Professor & Principal Investigator
Department of Banking Management
Alagappa University
Karaikudi – 630 004

DEPARTMENT OF BANKING MANAGEMENT
ALAGAPPA UNIVERSITY
[Accredited with A+ Grade by NAAC (CGPA: 3.64)
and Graded as Category-I University by MHRD- UGC]
Karaikudi- 630 004
Tamil Nadu, India

Date: 22.07.2021

From

Dr. K. Alamelu

Professor & Principal Investigator

Department of Banking Management

Alagappa University

Karaikudi – 630 004

To

The Under Secretary (FD – III)

University Grants Commission

Bahadhur Shah Zafar Marg

New Delhi- 110 002

Through Proper Channel

Dear Sir/Madam,

Sub: UGC- MRP- Submission of Final Report- Reg.

Ref: UGC Reference F.No. 5-520/2012 (HRP) Dated 16.08.2012

I herewith submit hard and soft copies of the final report of Major Research Project titled “A Study on Digital Inclusion in Tamil Nadu”. This is for your kind perusal and further action.

Thanking you

Yours sincerely

(K. ALAMELU)

ACKNOWLEDGEMENT

I express my sincere thanks to the Under Secretary, University Grants Commission, Ministry of Education, Government of India, Bahadhurshah Zafar Marg, New Delhi-110002 for the opportunity given to me to undertake this research study with their financial support.

I take this opportunity to record my deep sense of gratitude to our Honourable Vice-Chancellor, Registrar, Finance Officer, Dean- Faculty of Management, Head of the Department- Department of Banking Management, Alagappa University, Karaikudi for their encouragement, guidance, support and help to complete the research project successfully.

I thank all the respondents for providing the required details pertaining to the study and for their cooperation.

I thank all the authorities of TRAI, BSNL and other telecommunication companies for their support and kind co-operation and help in completion of this research work.

I thank the research scholars and office staff for their assistance in the process of this research study.

Dr. K. ALAMELU

(Principal Investigator)

DETAILS OF THE FINAL REPORT OF THE WORK DONE ON THE PROJECT

1.	Name of the Principal Investigator	:	Dr. K. Alamelu
2.	Address of the Institution	:	Alagappa University, Karaikudi 630004, Tamil Nadu
3.	UGC Approval No. and Date	:	F.No. 5-520/2012 (HRP) Dated 16.08.2012
4.	Tenure of the Project	:	01.07.2012 – 30.06.2014- 2 years 01.07.2014 – 31.12.2014- 6 months
5.	Total Grant Allocated	:	Rs. 4,45,000/-
6.	Total Grant Received	:	Rs. 2,70,000/-
7.	Final Expenditure	:	Rs. 2,14,013/-
8.	Title of the Project	:	A Study on Digital Inclusion in Tamil Nadu
9.	Summary of the Findings	:	Enclosed
10.	No. of Publications out of the project	:	3

PRINCIPAL INVESTIGATOR **REGISTRAR**

PROPOSAL FOR MAJOR RESEARCH PROJECT

PART – A

1. Broad Subject : **Management**

2. Area of Specialization : **Banking and Insurance - Inclusive Growth**

3. Duration of the Project : **2 years**

4. Principal Investigator

i. Name : **K. Alamelu**

iii. Sex : **Female**

iii. Date of Birth : **19-01-1966**

iv. Qualification : **M.com, M.Phil., Ph.D.**

i. Designation : **Professor**

Official Address : **Department of Banking Management**
Alagappa University,
Karaikudi - 630004
Tamil Nadu

Residential Residence : **S4 Senora Towers**
Subramaniyapuram,
6th street south extension
Karaikudi-630002
TamilNadu

5. Co – Investigator(s) : **NIL**

6. In case of a retired teacher, please give the following information: **Not Applicable**

7. Name of the Institution where the project will be undertaken:

(a) Department : **Department of Banking Management**
(b) University/College : **Alagappa University**

8. Whether the University/College/Institution is approved under Section 2 (f) and 12 (B) of the UGC Act? : **Yes**

9. Teaching and Research Experience of Principal Investigator

a. Teaching experience : **20 years**

b. Research experience : **20 years**

c. Year of award of Doctoral degree : **2002**

d. Title of thesis for doctoral degree : **Bank Marketing by Private Sector Banks**

e. Publication:

Type of Intellectual Capital	**Published**	**Accepted**	**Communicated**	**Total**
Paper	20	1	2	23
Books (Course Material)	7	---	---	7
Total	27	1	2	**30**

PART – B

Proposed Research Work

10. i. Project Title: **A Study on Digital Inclusion in Tamil Nadu**

ii. Introduction

- Origin of the research problem
- Interdisciplinary relevance
- Review of Research and Development in the Subject:
  - International status
  - National Status
  - Significance of the study

iii. Objectives

iv. Methodology

v. Year wise Plan of work and targets to be achieve

As given in Chapter I

11. Financial Assistance required:

Item	**Estimated Expenditure**
i. Research Associate (Rs.12,000 X 24 Months)	: Rs.2,88,000
ii. Hiring Services	: Rs. 50,000
iii. Field Work and Travel	: Rs. 65,000
v. Contingency (including special needs) @ 10%	: Rs. 70,000
vii. Books and Journals	: Rs. 40,000
viii. Equipment:	
Desktop Computer (1)	: Rs. 27,000
Statistical software package	: Rs. 40,000
Printing and Stationary	: Rs. 50,000
Secretarial Assistance	: Rs. 70,000
GRAND TOTAL	**: Rs.7,00,000**

12. Whether the teacher has received support for the research project from the UGC under Major, Minor, scheme of support for research or from any agency? If so, please indicate**:** **Granted Rs. 20,000 from Alagappa University Research Fund for one year project on "Technology as a Tool for Inclusive Growth" in December 2010.**

13. (a) Details of the project/scheme completed or ongoing with the P.I :

Name of the agency	**Year**		**Total**
	Started	**Completed**	
Alagappa University Research Fund	December – 2010	On going	Rs.20,000

(b) Institutional and Departmental facilities available for the proposed work:

1. Department Library – 2500 books.
2. Computer Lab – 30 Computers with internet connectivity
3. Seminar Hall Equipped with LCD Projector – 1
4. Reading Room – 1
5. Subscription to Financial Dailies, Magazines and Journals

14. Any other information which the investigator may like to give in support of this proposal which may be helpful in evaluating.

- The proposed inter-disciplinary research work on Digital Inclusion will unearth the research potentials in the arena of financial inclusion – the core agenda of the government today.

- The Principal Investigator has already initiated dissemination of relevant information on digital inclusion by publishing articles in reputed national magazines.

To certify that:

a. The University/College/Institute is approved under Section 2(f) and 12(b) of the UGC Act and is fit to receive grants from the UGC.

b. General physical facilities, such as furniture/space etc., are available in the Department/College.

c. I shall abide by the rules governing the scheme in case assistance is provided to me from the UGC for the above project.

d. I shall complete the project within the stipulated period. If I fail to do so and if the UGC is not satisfied with the progress of the research project, the Commission may terminate the project immediately and ask for the refund of the amount received by me.

e. The above Research Project is not funded by any other agency.

YEAR WISE PLAN OF WORK:

Nature of Work	**Quarter**							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Review of Literature	+							
Framing the Questionnaire & Pilot Study		+						
Redrafting the Questionnaire & Finalizing the Sampling Frame			+					
Data Collection				+	+			
Processing the Data						+		
Analysis and Report Preparation							+	+

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CHAPTER I

INTRODUCTION

For decades, information and communication technologies (ICT) have been driving profound changes in the way in which individuals, organisations and governments interact. In particular, the internet has been a major force behind the development towards a more globalizes knowledge-based economy. However, in terms of access to the internet, a digital divide between the 'haves' and the 'have nots has long been recognized. The applications of ICTs have now developed far beyond just computing hardware and the internet towards a much wider realm of digital technologies. As such, the digital equality agenda must capture the disparity of access and functional usage for both the traditional communications technologies such as the internet, mobile phones and interactive digital television, and support new ways of working, managing information, improving the delivery of public services or enabling personal development through electronic gaming. The benefits of digital technologies are numerous and far-reaching. Moreover, certain types of digital technologies can have a huge impact on the quality of life and range of opportunities available to socially vulnerable individuals and groups. As such, digital equality matters because it can help to mitigate some of the deep social inequalities derived from low incomes, poor health, limited skills or disabilities.

The benefits of wider digital technologies are vast Wider digital technologies can yield benefits for all members of society; they can make our lives easier, more productive and more entertaining. In particular, they have the potential to generate significant positive benefits for *at risk* groups.

DEFINING DIGITAL INCLUSION:

Digital Inclusion aims at creating an informed society by including the digitally excluded as we proceed on the road of development. Accessing technology is an imperative to the whole process of bridging the digital divide and fomenting a digital cohesion that secures opportunity through internet, mobile services and computerization of processes, bringing in a new era of a connected nation and using technology better on behalf of citizens and communities. This is a challenge relating to access and the ability to effectively use information and communications technologies (ICTs) to address the needs of people disadvantaged due to education, age, gender, caste or location and enable improved service planning and delivery.

In Microsoft's Digital Inclusion White Paper (Microsoft 2009, p.3) Karen Archer Perry (Founder and Principal Consultant, Karacomm) explains how Digital Inclusion is not just a matter of being connected to the technology:

The problem is not a binary one. It is not a question of being connected or disconnected. As such, the best initiatives address more than inclusion; they address Digital Empowerment, Digital Opportunity, Digital Equity, and Digital Excellence. These programs recognize that technology is a tool, but more and more it's a central tool for education, economic development, and social well-being. People may start as very basic users who simply need access to resources at a community technology center or a library. Digital Empowerment refers to the ability to use the wealth of resources in computing and the Internet to learn, communicate, innovate, and enhance wealth—to move from being a digital novice to a digital professional or innovator. An effective Digital Inclusion strategy provides a path to full participation in a digital society.

Therefore, there is a broader concept of digital inclusion: citizens empower citizens to go beyond being 'users and choosers' of technology to become 'makers and shapers of the technologies available to them and the rest of society. In a truly inclusive digital society, citizens need to be "actively engaged in the creation of socio technical systems".

These ideas suggest a hierarchical framework for progress in 'Digital Inclusion' (akin to Maslow's hierarchy of needs) which might comprise the following stages:

Level 1: The technical infrastructure as the essential and fundamental foundation for inclusion which provides access to ICTs.

Level 2: Digital awareness programmes and campaigns to increase awareness of what is available and to improve take up,

Level 3: Development of 'know how'', understanding and basic IT skills training for citizens.

Level 4: Digital opportunity: access to ICTs and the ability to influence their design

Level 5: Digital Empowerment: enabling people to tailor technology to meet their needs and aspirations, to innovate and to participate in planning and design decisions.

The different levels identified above are incremental stages enabling progression from Level 1 provision of access to infrastructure for connecting to the internet, through to Level 5 where people are empowered to influence the design and shaping of digital technologies.

Grass roots engagement as well as leadership from Government and major corporations will be key to the successful delivery of digital inclusion at all levels - eventually empowering citizens to meet their needs and aspirations through full engagement in the Digital Economy and Digital Society. This vision needs to be clearly articulated, widely promulgated and shared for it to filter down through businesses and organisations and to individual citizens. Only then can the citizen be regarded as really 'included' – and not simply as a consumer of goods and services and the passive target of policies, strategies and projects.

Analysis (HM Government, 2008) suggests that digital inclusion should be categorized in two general ways:

i) **Direct access to** technologies such as computers and the Internet, mobile phones, personal digital assistants (PDAs) and digital TV. These devices can help people gain access to:

- Employment and skills
- Social, financial, informational and entertainment benefits of the Internet
- Improved services, including public services
- Wider choice and empowerment around the major areas of their lives

This requires people to have the motivation, skills and opportunity to engage in technology. Until they become self-sufficient users, they may initially be supported through an intermediary, such as a school or UK online centre, or community volunteer.

ii) Indirect use of technologies, where greater use of digital technology to plan, design and deliver services leads to significant improvements through:

- Better service integration so that multiple services across sectors work together (often an issue for socially excluded people).
- Better and quicker service planning (through better mapping of overlapping services, needs, and tackling problems in deprived communities, including crime and security).
- Equipping frontline staff to support complex needs, for example, using mobile networked technology which can provide immediate access to information and allow an immediate delivery of services while in the field.

KEY ELEMENTS OF DIGITAL TECHNOLOGY:

Three key factors are identified as the elements necessary for using technology effectively – access, motivation, skills and confidence.

- **Access –** whether an individual has some means to access the technology in terms of affordability, time, training or support, literacy levels, disabilities and usability of interfaces.
- **Motivation –** whether the individual sees the benefit from or has interest in accessing these technologies.
- **Skills and confidence –** whether the individual is able to, and feels able to, make affective use of technologies. Concerns about security also fall into this category. In the following section we take each of these drivers in turn and consider the extent to which they have contributed to the recent rise in individuals using the internet.

COMPONENTS OF DIGITAL INCLUSION:

Digital Inclusion encompasses three areas: Access, technology literacy, and relevant content and services. Inclusion seeks equity for all residents, as well as small businesses and community-based (non-profit) organizations. The three areas include these components:

i) Access

a. Connectivity to the Internet

b. End user equipment: hardware and software, including tools for people with disabilities.

c. Access to technical support?

ii) Technology literacy

a. Skills required utilizing the equipment and Internet effectively for essential services, education, employment, civic engagement and cultural participation.

iii) Relevant online content and services

a. Services available for those in need

b. Culturally and educationally appropriate design

c. Marketing and placement appropriate to reach underserved communities

d. Enabling of content production and distribution by lower capacity residents, businesses and organizations.

BENEFITS OF DIGITAL TECHNOLOGIES:

The benefits of digital technologies can be categorized in two ways:

- ✓ **Direct:** where they immediately impact upon the user
- ✓ **Indirect:** where greater 'back office' efficiency leads to indirect savings through, for example, the freeing up of public resources for improved frontline delivery. Access to quality public services is of particular importance for those people with greater social needs. Those who have more social needs – and so require more interaction with public services – are less likely to be digitally included. However, the benefits of digital inclusion for vulnerable social groups are extensive and include:
  - Enhanced self-sufficiency for vulnerable adults
  - Increased access to public services through e-government channels
  - Enhanced community cohesion
  - Improved education, attainment and life/work chances
  - Greater value for taxpayers' money through enhanced public service efficiency
  - Improved quality of public services
  - Time and monetary savings
  - Enhanced working and environmental savings through more stimulating and flexible remote work practices

MEASURING DIGITAL INCLUSION:

Benchmarking Global Digital Inclusion:

Several methods for measuring Digital Inclusion have been developed and applied over recent years to enable comparisons to be made of progress towards digital inclusion. Three of the most widely used bases of comparison are: Maplecroft's Digital Inclusion Risk Index Map; the Digital Opportunity Index and the ICT Development Index. Other methods of measuring Digital Inclusion include:

Government for the Third Millennium (Gov3 n.d.) has produced a White Paper entitled 'Benchmarking Digital Inclusion' which sets out the results of their 2005 analysis. Gov3 is an international public sector consultancy business. They have the following categories (Gov 3 n.d.):

- Digital Leap froggers - countries which currently have below average levels of Internet use, but are catching up due to above average growth rates.
- Digital Pacesetters - countries which are both above average in current levels of Internet use and also are enjoying above average growth levels.
- Slow Starters - countries which have below average levels of Internet use, and also below average growth rates.
- Successful but slowing - countries which have above average levels of Internet use, but which are growing at less than the average rate.

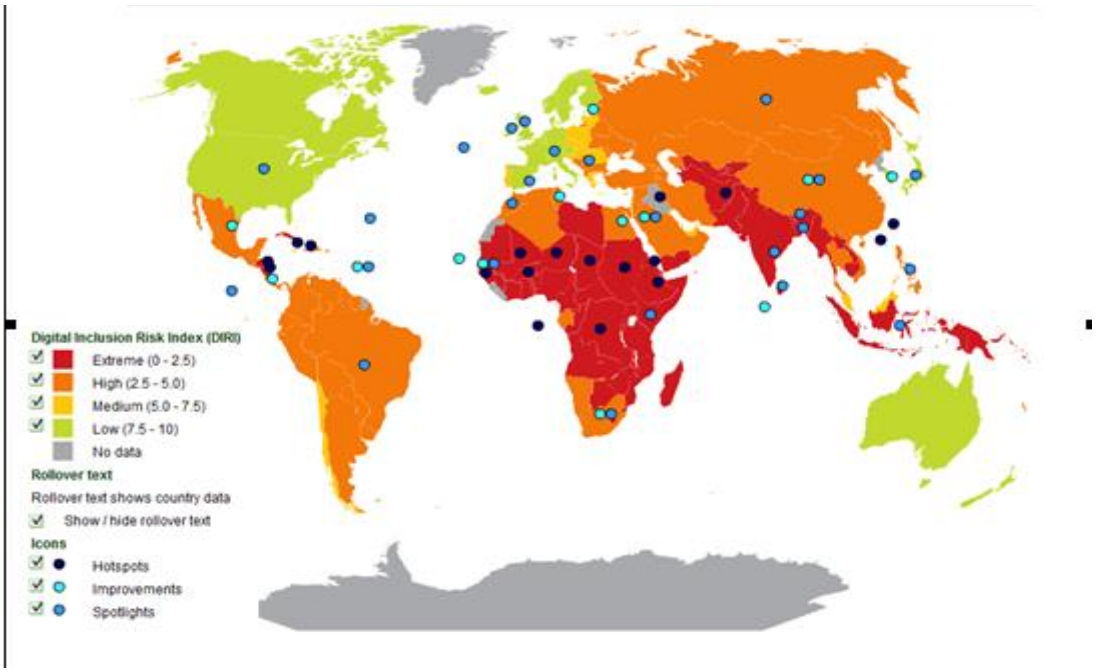
DIGITAL INCLUSION RISK INDEX MAP:

Maple croft (2009) have developed the Digital Inclusion Risk Index (DIRI) as the basis for a system of benchmarking progress towards Digital Inclusion across the world. The results are used to compile the ***Digital Inclusion Risk Index (DIRI) Map*** and are based upon data from the International Telecommunication Union's (ITU) ICT Opportunity Index (ICT-OI) 2007.

The ICT Opportunity Index is a composite of 10 core ICT indicators, which cover access to computers, internet and broadband access, mobile telephony and fixed line telephony. It also places specific emphasis on mobile technologies which are a key driver of ICT access in developing countries. The four sub-indices (on networks, skills, uptake and intensity of use) allow the identification of the specific strengths and weaknesses of the countries studied.

The DIRI map (see below) serves to demonstrate pictorially the position of various countries categorised according to whether they represent: **Extreme risk** (concentrated in Africa and parts of Asia); **High risk** (most of South America, Russia and other parts of Asia); **Medium risk** (includes Eastern Europe and Chile) and **Low risk** (North America, Western Europe and Australia).

Figure 1.1: Global Map of Digital Inclusion Risk



Source: www.Maplecroft.com

The coloured circles on the map are used to demonstrate the following:

- **Hotspots** - profile countries where the digital divide is especially significant
- **Improvements** - profile countries or regions whose actions are improving e-readiness and inclusiveness and where there are opportunities for future business engagement
- **Spotlights** - profile countries where business is currently engaging with other stakeholders to facilitate digital inclusion.

The **'Hotspot'** circles draw attention to the following risk areas:

- South America- highest risk countries being Haiti, Honduras, Nicaragua and Cuba (low mobile phone access).
- Africa – highest risk countries being Guinea-Bissau, Congo (lowest score on the index), Mali, Niger, Chad, Burkina Faso, Sudan (conflict zones), Eritrea (low mobile phone access), Ethiopia (low mobile phone access)
- Middle East – Iraq and Afghanistan (conflict zones)
- Asia – Hong Kong and Taiwan.

The **'Improvements'** circles denote the following areas of progress:

- South America – Mexico (widespread digital community centres), Costa Rica (increasing access to ICTs), Caribbean Nations (offshore software developments).
- Africa – Tunisia (Internet access in schools), Cape Verdi (privatised Telecoms operators), Senegal (transferring telephone services to the private sector), Egypt (free Internet access), South Africa (mobile phones facilitate black economic empowerment).

The **'Spotlights'** identify initiatives established to proactively promote inclusion:

- The Americas – Hewlett Packard (Inventor centres, microenterprise development programme), Nokia (accessibility for disabled and hearing impaired, connecting Native Americans), Reuters (adopt a school programme), Microsoft (involved in education and technology in South America), Motorola Foundation and ISTEC, World Economic Forum's Internet Access For Everyone Project - ITAFE (pilot project in Brazil)
- Europe – Alcatel (supports scientific collaboration), Ireland (Skills for life), Switzerland (World Economic Forum's Internet Access For Everyone Project – ITAFE), Spain (Telefonica EducaRed Programme, Vodaphone technology in healthcare), Serbia and Montenegro (Microsoft and UNHCR)
- Africa – Senegal (Alcatel Digital Bridge initiative dedicated to the rural sector), Morocco (ST Digital Unify Programme), Kenya (Reuters Adopt a School programme), South Africa (ABB link employees to the Internet, Alcatel Digital Bridge initiative dedicated to the rural sector, Microsoft Digital Villages, Vodaphone community service)
- Middle East – Jordan (Cisco empowering women, Jordan education initiative)
- Asia – Sri Lanka (Ericsson Response involved in Tsunami reconstruction), India (Hewlett Packard i-community and Tsunami rebuilding, Rajasthan Education Initiative, Simputer Trust and computer access for all), Bangladesh (Mobile telephony and microfinance through the Grameen Bank), Japan (Fujitsu education and international exchange, Microsoft IT skills programme for battered women), Philippines (Ayala Partnerships for youth education in schools, Smart Education and the Digital Dividend).

The DIRI map above makes clear that while there is significant progress towards the goal of universal access, there are still major disparities in provision across the globe. Moreover, the primary focus of many of the projects is on the provision of infrastructure to provide connection to the internet to growing numbers of people. Some of the initiatives go

beyond this and provide training and opportunities to develop ICT related skills. Much of the activity is driven 'top-down' from Governments. However, there is significant grass-roots engagement in the smaller projects and evidence of the empowering impact of ICTs such as mobile phones in some of the poorest nations.

DIGITAL OPPORTUNITY INDEX (DOI):

The Digital Opportunity Index is an e-index based on internationally-agreed ICT indicators. This makes it a valuable tool for benchmarking the most important indicators of ICT opportunity. The DOI is a standard tool that governments, operators, development agencies, researchers and others use to measure the digital divide and compare ICT performance within and across countries.

The scoring ranges between 0 and 1, "where 1 would be complete digital opportunity" (ITU 2007). The table which follows gives world rankings for 2007 (ITU 2007) – this being the current data on the site:

Figure 1.2: Digital Opportunity, Top 25 Economies, 2007

Source: www.Maplecroft.com

ICT DEVELOPMENT INDEX (IDI):

The ITU (2009c) website also hosts a publication giving a league table ranked according to the ICT Development Index (IDI). As the ITU state, "the overall objective of the IDI is to benchmark ICT progress among countries at the global level". The top 20 countries according to this ranking scheme are given in Table 1.

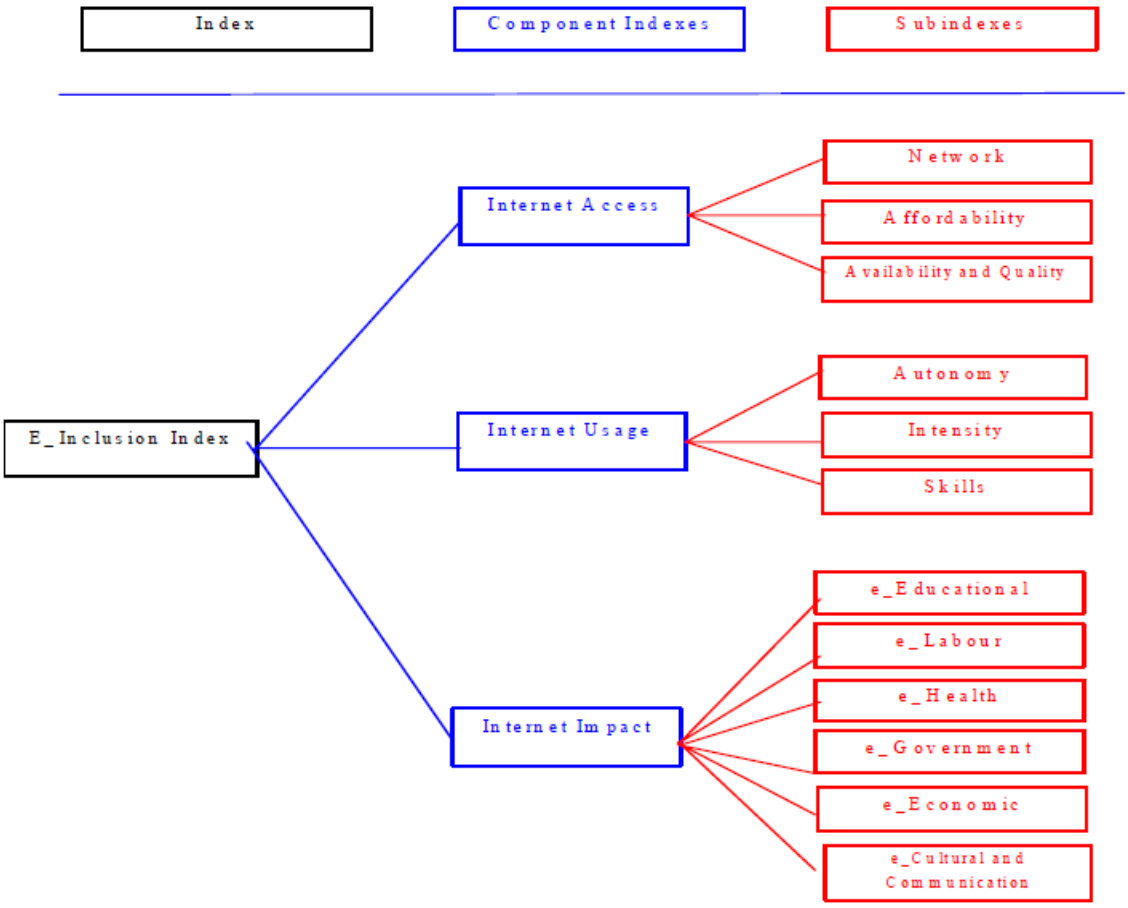
Table 1.1: ICT Progress Ranking

Economy	Rank 2007	IDI 2007	Rank 2002	IDI 2002
Sweden	1	7.50	1	6.05
Korea (Rep.)	2	7.26	3	5.83
Denmark	3	7.22	4	5.78
Netherlands	4	7.14	6	5.43
Iceland	5	7.14	2	5.88
Norway	6	7.09	5	5.64
Luxembourg	7	7.03	21	4.62
Switzerland	8	6.94	7	5.42
Finland	9	6.79	8	5.38
United Kingdom	10	6.78	10	5.27
Hong Kong, China	11	6.70	12	5.10
Japan	12	6.64	18	4.82
Germany	13	6.61	14	5.02
Australia	14	6.58	13	5.02
Singapore	15	6.57	16	4.83
New Zealand	16	6.44	19	4.79
United States	17	6.44	11	5.25
Ireland	18	6.37	26	4.36
Canada	19	6.34	9	5.33
Austria	20	6.32	20	4.64

Source: www.Maplecroft.com

In order to define and measure e-Inclusion Sara Bentivegna & Paolo Guerrieri (2010) have proposed a multi-focal approach to this complex concept in continual evolution. The analytical framework underlying the construction of the e-Inclusion index is structured into three components (dimensions of the general concept: access, usage, impact on quality of life) and into twelve sub-indexes. Obviously, the sub-indexes, the dimensions and the final index are strongly interdependent. So, without Internet infrastructure and access, there is no Internet usage.

Figure 1.3: Digital Inclusion Index



Source: e-Inclusion impact Report of European Commission, January 2010.

The e-readiness Assessment Report 2008 (2010) has measured digital inclusion with the composite index derived thorough the PCA has a mean of 0 and a standard deviation of 1. This being the case, the states have been divided in 6 levels. The states have been classified in terms of their e-Readiness on the basis of index value as follows:

- Leaders (L1): Index value above 1.0
- Aspiring leaders (L2): 0.5 to 1.0
- Expectants (L3): 0 to 0.5
- Average achievers (L4): -0.5 to 0
- Below-average achievers (L5): -1.0 to –0.5
- Least achievers (L6): below –1.0

IMPORTANCE OF DIGITAL INCLUSION:

The relationship between digital exclusion and social and economic outcomes is deeply entrenched and, as such, complex. It is when we relate the benefits to individuals and communities that we can see how it matters most to people's daily lives. The effect of digital inclusion on four core groups in worth mentioning here; young people, adults, older people, and communities. The under-pinning benefits derived through the delivery of effective public services for everybody through digital inclusion is also important to be observed.

Learning about computers and the internet can help improve the lives of disadvantaged groups, according to a research report from UK Online Centres and Ipsos Mori. The probable link between digital and social inclusion has long been recognized as connecting people to technology connects them to new information and skills, to communities, each other, services, savings and employment opportunities. The UK Online Centres and Ipsos Mori report, 'Digital inclusion, social impact', goes one step further in an effort to prove the link both qualitatively and quantitatively. (e-learning age, 2008)

Based on 20 UK Online Centre-led projects involving hundreds of local partners, the research tracked the impact of informal learning about technology on the lives of different groups, including those with mental health issues, families in poverty, isolated older people and teenage parents. More than 12,000 people took part in the social impact demonstrator projects between January 2007 and March 2008. By the end of the projects, participants were more likely to feel confident and 40% had progressed into further training, employment, advice and guidance. The study found that working with computers helped to improve people's maths and English. It also suggested that people with a greater digital understanding are more likely to spend time with friends and family, and more likely to connect with and help out in their communities. The demonstrator projects and research were funded by the Department for Innovation, Universities and Skills. David Lammy, Mirùster for Skills, said: "The aim of these projects was to help the most socially excluded in our communities and they've done exactly what was said on the tin. Understanding how digital inclusion can help curtail social exclusion is incredibly important if we're to maximize the potential of technology to improve individual lives."

Recent studies (Rodrigo Baggio, 2006) show how hard digital inclusion will be. In Brazil alone, fewer than 16% of households own computers and a mere 12.2% of them have access to the Internet. The vast majority of computer technology is concentrated in just three

regions — the federal capital, the south and south-east — according to a 2004 study of 183 nations by the International Telecommunications Union. The study also revealed that Brazil ranked 65th in terms of Internet connectivity, The high cost of personal computers, poor computer training in the classroom and inconsistent public policies are the main reasons why middle- and lower-income Brazilians are still outsiders in modern information society.

According to U.S. Department of Commerce (2000) more and more Americans have computers and use the Internet. If current trends continue, we expect more than half of all U.S. households will be connected to the Internet by the end of 2000, and more than half of all individuals will be using the Internet by the middle of 2001. We are approaching the point where not having access to these tools is likely to put an individual at a competitive disadvantage and in a position of being a less-than-full participant in the digital economy. Most groups, regardless of income, education, race or ethnicity, location, age, or gender are making dramatic gains. Nevertheless, some large divides still exist and groups are going online at different rates. The report also measures the extent of digital inclusion by looking at households and individuals that have a computer and an Internet connection. We measure the digital divide, as we have before, by looking at the differences in the shares of each group that is digitally connected. For the first time, we also provide data on high-speed access to the Internet, as well as access to the Internet and computers by people with disabilities.

STAKEHOLDERS IN DIGITAL INCLUSION:

Maplecroft (2009) identifies the following categories of stakeholders:

- **Governments** – who have a leading role to play in developing and implementing comprehensive, forward looking and sustainable national e-strategies.
- **The private sector** – who are the key to the development and diffusion of ICTs, for infrastructure, content and applications?
- **Civil society** – the engagement of citizens is important in implementing ICT-related initiatives for development.
- **International and regional institutions** (including financial institutions) –these have a key role in providing resources, including innovative micro finance.

DIGITAL INCLUSION: LITERATURE SURVEY

The e-readiness Assessment Report 2008 (2010) has given the percentage share of computer-related services and communication services sector in overall GDP.

Table 1.2: Percentage Share of Computer-Related Services and Communication Services Sector in Overall GDP

	(at constant 1999-2000 prices)								
	1999-2000	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Computer-related Services	1.0%	1.4%	1.6%	1.8%	2.1%	2.4%	2.7%	3.0%	3.3%
Communication	1.6%	1.9%	2.2%	2.6%	3.1%	3.6%	4.2%	4.9%	5.7%
Total Share of Computer-related Services and Communication	2.6%	3.3%	3.8%	4.4%	5.2%	6.1%	6.9%	7.9%	8.9%

Note: Total may not match due to rounding off.
Source: CSO.

The report also provides Percentage share of computer-related services in business services sector 1999-2000 through 2007-08.

Table 1.3: Percentage Share of Computer-Related Services in Business Services Sector 1999-2000 through 2007-08

Business services sector	1999-2000	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Renting of Machinery	4.1%	3.3%	3.0%	2.7%	2.3%	2.0%	1.7%	1.5%	1.3%
Computer-related services	50.3%	59.8%	63.6%	66.6%	71.2%	75.0%	77.9%	80.9%	82.9%
Legal services	9.0%	7.3%	6.7%	6.2%	5.4%	4.7%	4.2%	3.7%	3.3%
Accounting	5.0%	4.2%	4.0%	3.8%	3.4%	3.1%	2.8%	2.5%	2.4%
Research and development	31.6%	25.4%	22.8%	20.7%	17.7%	15.3%	13.3%	11.4%	10.2%
Total business services	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Note: Total may not match due to rounding off.
Source: CSO

India has been one of the fastest growing economies of the world since the 1980s. Not only has the growth been relatively stable, it has also been accompanied by poverty decline. This phenomenon has been primarily led by the Services sector – it has grown faster than others and is the dominant sector of the economy.

Services exports, both technology embedded and technology enabled services are becoming a key factor in India's economic development currently. Prior to the advent of ICT enabled services, service Exports comprised mainly of additional services exports i.e., finance, transportation & travel associated with merchandise exports. In ICT Enabled Services Exports, the focus is on all Commercial Services exports i.e., financial, insurance, commercial, R&D, legal accounts, etc. Such services sector led growth is not constrained by domestic demand conditions. Within Services, the fastest growing sectors are computer-related services and communications, both of which have been growing at rates in excess of 20 per cent since 1999-2000. The share of computer-related services in GDP has also grown exponentially – from a mere 1 per cent in 1999-2000 to 3.3 per cent in 2007-08. The output multiplier of this industry is 2.1. The importance of the computer-related industry is further brought out by its contribution to the external sector. Exports of software and services account for 80 per cent of all IT exports and 46 per cent of all services exports. The development of communication technologies that allow offshore development of software and the emergence of professional and more flat organizations in the post-liberalization scenario, partly explain the Indian software industry's success.

According to Shirin, M. et. al. (2009) digital inclusion projects are the processes of institutionalization in three ways;

A first, institutionalization process for digital inclusion projects involves getting symbolic acceptance by the community who are the targets of the project. This was achieved in the e-literacy projects in Kerala by the linking of the projects to Kerala's development philosophy, partly through vigorous grassroots campaigning. However, acceptance became more problematic later when the goals shifted towards stimulating entrepreneurial activity.

A related process is stimulating valuable social activity in the relevant social groups. The e-literacy projects in Kerala were very successful in this respect; there was a widespread participation of groups, such as Muslim women who are often part of the socially excluded.

A third process of great importance in sustaining digital inclusion projects over time is generating linkage to viable revenue streams. The later attempts to do this in Kerala have been problematic, with limited success in generating entrepreneurial revenue, and some concern that the expansion of the entrepreneurial symbolism approach to districts outside Malapurram may compromise social inclusion goals. The Siyabuswa project has, in the end, become self-financing, but it is worth noting that this would probably not have been achieved without the continuous long-term backing of outside agencies such as the University of Pretoria. Revenue remains a problem for the S˜ao Paulo Tele-centres aimed at the digitally excluded, including those under the auspices of the city government. However, some innovative models are being tried, including partnerships with NGOs and, in the case of the CDI projects, donations in cash and kind from commercial organizations.

A final process that was important, and often crucial, in all the case studies was enrolling government support. This process is an example of the strongly political nature of the institutional processes of digital inclusion projects in developing countries. Government support was achieved successfully in the Kerala case in the e-literacy phase through the strong symbolic linking of the project to the state government's espoused development goals. It is currently more problematic in the entrepreneurship phase with some potential conflict between the state government's approach and wider social inclusion goals. The linkage to government was not that important during the development of the Siyabuswa project due to its relatively small scale and the backing of other agencies. However, a key reason for failure of the later deep rural project was inadequate government backing, and the project initiators recognize that more effort should have been devoted to achieving government support. The enrolment of political forces in the S˜ao Paulo case study has been a crucial feature throughout, but this can be something of a mixed blessing. For example, the political views of the current centre-right government of the City of S˜ao Paulo often conflict with those of local community activists, resulting in disagreement concerning the goals and methods for digital inclusion projects. Various partnership models between outside agencies, government, and NGOs are being tried, but the outcomes of these experiments are yet to be clear.

Ronaldo Lemos (2010) has concluded that the majority of Brazilians who access the Internet today do so through LAN houses. LAN stands for local area network, i.e., computers assembled together to allow people to play multi-player games. Popular in Korea and elsewhere in Asia, and previously existing only in the rich neighbourhoods of Brazil, they have now become a phenomenon proliferating in poor communities, especially the *favelas.* One of the

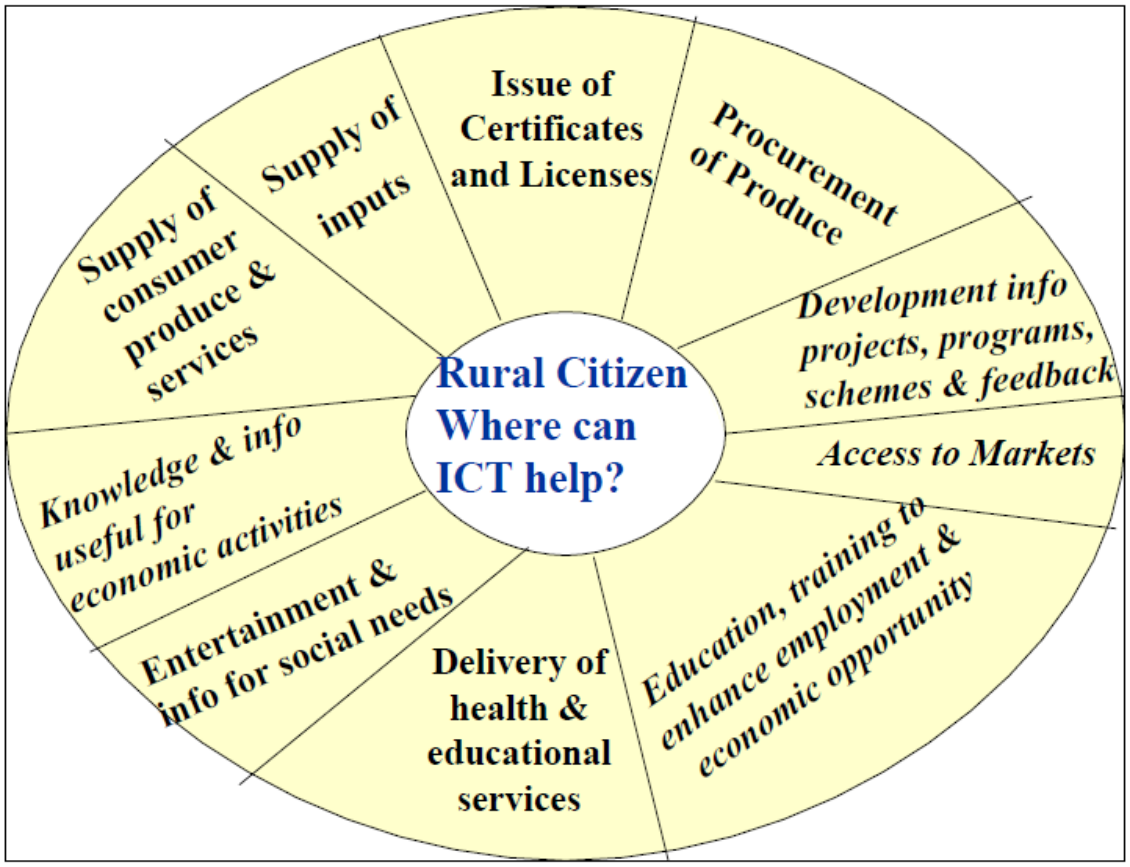
biggest *favelas* in the world, located in Rio de Janeiro, Rocinha has approximately 130 LAN houses. Charging from US$0.40 to $1.50 for each hour surªng the Web (or playing online games), those shops often have queues of people waiting for an available computer. The Brazilian Association of Digital Inclusion Centers (ABCID) estimates that 108,000 LAN houses are active in the country.

Maplecroft reports that new research developed to identify countries whose populations and economies are stifled by a lack of 'digital inclusion'- the ability to use and access information communication technologies (ICTs), such as computers, the internet and mobile phones- has revealed that India is trailing behind the other BRICs nations of Brazil, Russia and China.

In India, for example, the wealthier, more affluent segment of the population, primarily based in urban areas, has embraced the use of modern communications technology. The growth of the middle classes in the country, which now sits at around 30% of the population, has driven demand for consumer goods, including ICTs. The vast majority of the population has, however, been excluded from this process. Most cannot afford ICTs (only 3% of households own PCs), lack the education required to use it effectively (India has secondary school enrolment rates of 55% and adult literacy rates of just under 63%) and are located in geographical areas that have little or no connectivity to ICT services. Although the division between those who can access ICT and those who cannot is less severe in the other BRICs nations, this trend is reflected throughout them all.

Subash Bhatnagar in his presentation titled "Strategy for Digital Inclusion: Experience from India" has identified the benefits derived by rural citizens through ICT initiatives. The following picture depicts those benefits;

Figure 1.4: Role of ICT in Empowering Rural Citizens



Source: Presentation on "Strategy for Digital Inclusion: Experience from India" by Subhash Bhatnagar

According to www.digitallearning.in (2009), the policy challenges for developing countries like India and for the international community as a whole are daunting and complex. Bridging the digital divide is not simply about giving people access to tools. It is about creating policy and regulatory environments, institutional frameworks, and human capacities that foster information flows, innovation, and effective use of the world's knowledge resources in every dimension of sustainable development, from health, agriculture, medicine and education to trade and economic development, effective governance. Coming to India, John sees Internet as the game changer for the country. The country, where 2 lakh railway tickets are sold on the website of Indian Railway, 40% of legal queries are getting addressed through blogs, farmers get latest equipment and fertiliser tips from e-Choupals, etc., he said, the change is already happening through technology.

According to www.microsoft.com, India moves into its next phase of growth in the global knowledge economy, Microsoft continues to work in close partnership with all the stakeholders, including governments, Indian IT industry and academia, to ensure that technology is leveraged as a catalyst for enabling more businesses, individuals and communities to realize their full potential. In this endeavour to create a digitally inclusive society, Microsoft India ensures that the benefits of information technology are accessible to everyone at the grassroots level. This involves reaching out to those communities in rural and semi-urban India which are marginalized and are on the wrong side of the 'Digital Divide'.

In its latest Performance Indicators reports (October - December 2010), Telecom Regulatory Authority of India (TRAI) has unfolded the digital inclusion Scenario in India.

Table 1.4: Digital Inclusion - Indian Scenario (December 2010)

Telecom Subscribers (Wireless +Wireline)	
Total Subscribers	787.28 Million
% change over the previous quarter	8.85%
Urban Subscribers	527.50 Million (67.00%)
Rural Subscribers	259.78 Million (33.00%)
Market share of Private Operators	84.60%
Market share of PSU Operators	15.40%
Tele-Density	66.16
Urban Tele-Density	147.88
Rural Tele-Density	31.18
Wireless Subscribers	
Total Wireless Subscribers	752.19 Million

% change over the previous quarter	9.38%
Urban Subscribers	501.30 Million (66.65%)
Rural Subscribers	250.89 Million (33.35%)
GSM Subscribers	641.73 Million (85.32%)
CDMA Subscribers	110.46 Million (14.68%)
Market share of Private Operators	87.75%
Market share of PSU Operators	12.25%
Tele-Density	63.22
Urban Tele-Density	140.53
Rural Tele-Density	30.11
Wireline Subscribers	
Total Wireline Subscribers	35.09 Million
% change over the previous quarter	-1.34%
Urban Subscribers	26.21 Million (74.68%)
Rural Subscribers	8.88 Million (25.32%)
Market share of Private Operators	17.02%
Market share of PSU Operators	82.98%
Tele-Density	2.95
Urban Tele-Density	7.35
Rural Tele-Density	1.07
Village Public Telephones (VPT)	0.58 Million
Public Call Office (PCO)	3.34 Million

Internet & Broadband Subscribers	
Total Internet Subscribers	18.69 Million
% change over the previous quarter	4.43%
Broadband Subscribers	10.99 Million
Broadcasting & Cable Services	
Total Number of Registered Channels with I&B Ministry	604
Number of Pay Channels	155
Number of private FM Radio Stations	245
DTH Subscribers registered with Pvt. SPs	32.05 Million
Number of Set Top Boxes in CAS areas	786,422

Source: The Indian Telecom Services Performance Indicators (October-December 2010)

Reasons for sustainability of technology embedded services/software exports are the focus on an appropriate market segment. This is mainly users of software in developed economies where bulk of value added employment opportunities exists rather than software products dependent development.

Proactive public policy also has been the driving force in sustaining growth of technology enabled services; policies have been the major factors such as:

- e-Governance program
- Interstate competition in e-Readiness status
- Technology Embedded (Software) and Technology Enabled Services Exports
- Communication Reforms
- Favourable Environment
- Entrepreneurship and openness
- PPP facilitation.

In terms of digital usage there is a significant improvement in the scenario. New research developed to identify countries whose populations and economies are stifled by a lack

of ‘digital inclusion’- the ability to use and access information communication technologies (ICTs), such as computers, the internet and mobile phones- has revealed that India is trailing behind the other BRICs nations of Brazil, Russia and China.

The Digital Inclusion Index, released by risk analysis firm, Maplecroft, uses 10 indicators to calculate the level of digital inclusion found across 186 countries. These include numbers of mobile cellular and broadband subscriptions; fixed telephone lines; households with a PC and television; internet users and secure internet servers; internet bandwidth; secondary education enrolment; and adult literacy.

Of the BRICs nations, India (39) is the only country to be classified as ‘extreme risk’, meaning that the country’s population suffers from a severe lack of digital inclusion. China (103) Brazil (110) and Russia (134) are rated ‘medium risk’. Despite huge economic growth, the BRICs nations are still significantly outperformed by developed nations in the Digital Inclusion Index. Trends suggest that the BRICs nations may not lag behind for much longer however.

The BRICs have witnessed huge growth in demand for ICTs, which is currently driving global spending for the sector. China has the highest total number of internet users in the world (420 million), accounting for just over half of Asia’s internet users and is set to become the world’s largest ICT market, whilst India, Brazil and Russia have all seen huge expansion in demand and market size for ICT’s in recent years. The distribution of ICT use in these nations and other developing countries is cause for concern however.

In India, for example, the wealthier, more affluent segment of the population, primarily based in urban areas, has embraced the use of modern communications technology. The growth of the middle classes in the country, which now sits at around 30% of the population, has driven demand for consumer goods, including ICTs. The vast majority of the population has, however, been excluded from this process. Most cannot afford ICTs (only 3% of households own PCs), lack the education required to use it effectively (India has secondary school enrolment rates of 55% and adult literacy rates of just under 63%) and are located in geographical areas that have little or no connectivity to ICT services.

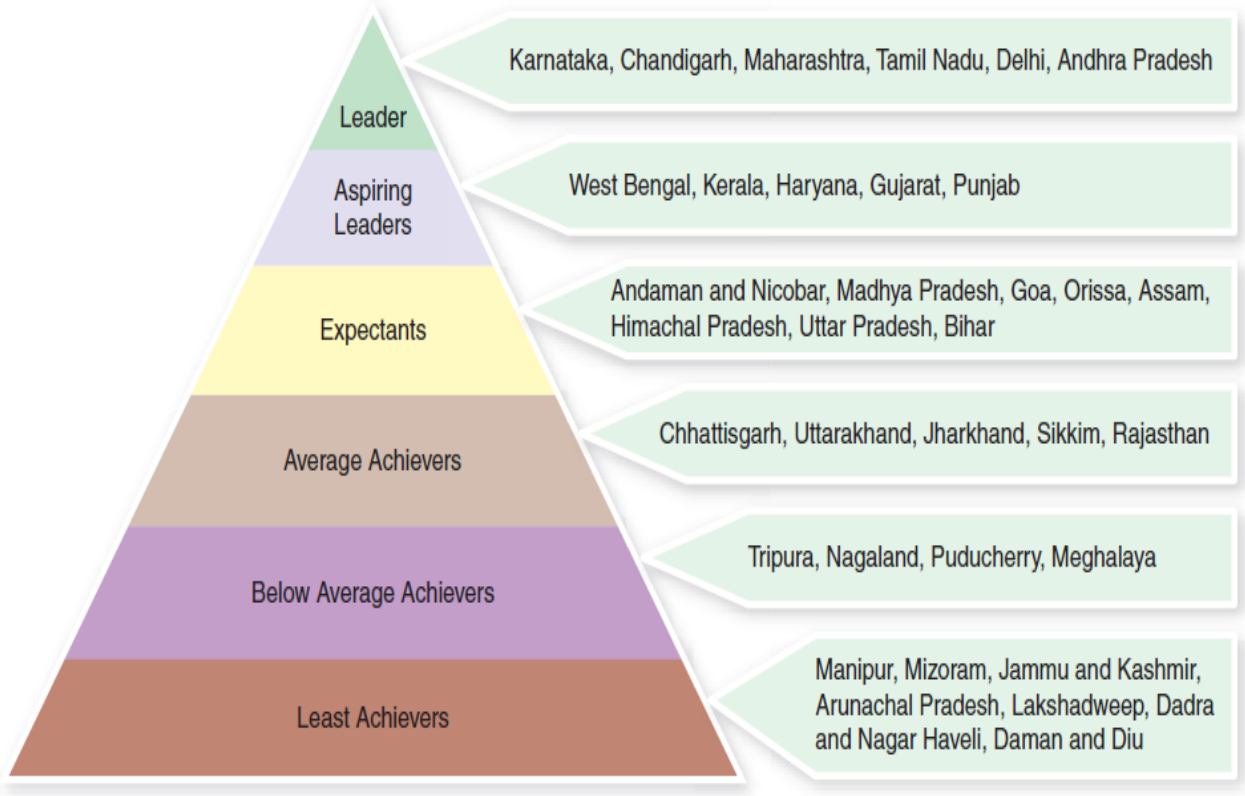
To sum up, digital inclusion is still in its transition stage in India, including Tamil Nadu. It throws open lot of research opportunities so as to create a well-developed digital economy.

SIGNIFICANCE OF THE STUDY:

The world today is characterized by revolutionary changes in the way in which we communicate as well as in the way in which the information is stored, processed, transferred and accessed. This transformation has largely been enabled by innovations in 'networking technologies' and 'convergence technologies', among others. The increasingly pervasive role of ICT in different aspects of modern life has been recognized in the common metaphors being used for present-day society as 'information society', 'digital society', 'knowledge economy', etc. it is in this background a major research project is proposed on "DIGITAL INCLUSION IN TAMIL NADU".

The study is proposed to be confined to Tamil Nadu on account of its supremacy in e-readiness as identified by National Council for Applied Economic Research (NCAER) in one of its recent reports. The relevant details are as follows:

Figure 1.5: Ranking of States in Terms of Different Levels



Source: India: e-Readiness Assessment Report 2008

OBJECTIVES OF THE STUDY:

i. To identify the level of technology literacy in the state.
ii. To measure the level of digital inclusion in the state.
iii. To ascertain the role of different stakeholders viz., the government, private players, civil society, and regional institutions in the process of digital inclusion.
iv. To gauge the impact of various demographic factors on the level of digital inclusion.
v. To provide an insight into journeys undertaken by individuals towards digital participation.
vi. To assess the role of digital inclusion in improving the level of financial inclusion in the state.
vii. To conduct a review of policies /practices in digital inclusion across the country in order to produce a map of leading states and to position the Tamil Nadu in this context.
viii. To identify best practices and actions necessary to develop an inclusive digital economy.

HYPOTHESES:

i. There is significant relationship between per-capita income and digital inclusion in Tamil Nadu.
ii. Level of literacy has an impact on digital inclusion in the state.
iii. Availability of higher educational institutions in Tamil Nadu has an impact on digital inclusion in Tamil Nadu.
iv. Investments on IT sector have resulted in a positive impact on the growth of digital inclusion in the state.
v. Digital inclusion and financial inclusion are interdependent.
vi. The IT policies of the Government of Tamil Nadu have null impact on the digital inclusion in the state.
vii. Tamil Nadu ranks highest among the top 5 states in India with regard to digital inclusion.

METHODOLOGY:

The study aims at measuring the digital inclusion level in Tamil Nadu. The primary source of data is to be mobilized from the respective district collectorates, BSNL, Private Telecom Operators, NGOs, Government Officials and people representing different segments of the society. To gauge the impact of various demographic factors on the level of digital inclusion, and to analyse the extent digital participation, primary data is to be collected through schedules from the public representing all districts of Tamil Nadu.

The secondary data will be collected from the websites of Government of Tamil Nadu, Department of Communications and IT, Government of India, Telecom Regulatory Authority of India and Census records.

The study also aims at constructing of a digital inclusion index exclusively for the districts of Tamil Nadu. The analytical framework underlying the construction of the digital Inclusion index is structured into three components (dimensions of the general concept: access, usage, impact on quality of life) and into twelve sub-indexes.

For measuring the level of digital inclusion, a multi stage Principal Component Analysis is proposed to be used on the basis of three main categories of indicators of digital inclusion- readiness, environment and usage. The study intends to use other statistical techniques such as index numbers, correlation, regression analysis, percentage analysis, ratios, trend analysis, etc.

IMPLICATION OF THE STUDY:

- The study will ultimately improve the digital inclusion in the state and which in turn will improve the quality of lives and life chances for all citizens of the state.
- The study will also result in reducing the number of people who lack skills, resources, or motivation to engage with digital technology.
- The study will also try to develop more responsive public services by using digital media – to support the design, delivery and personalization of local government, central government and third sector services appropriate for the needs of the disadvantaged groups and communities.
- The study will also analyse the opportunities and risks for digitally excluded groups and communities arising from the increasingly digitally driven society and recommend actions.

CHAPTER DESIGN

The study is divided into Five chapters arranged as follows.

Chapter I, "Introduction" presents the needs, objectives, hypothesis, methodology, implication and chapterisation of the study.

Chapter II, "Review of Literature" deals with review of literature, various studies pertaining to financial inclusion with national and international perspectives.

Chapter III, "Conceptualizing and measuring the links between Social Exclusion and Digital Inclusion" deals with the literature in relation to economic, cultural, social and personal resources.

Chapter IV, "Digital Inclusion Scenario in India – An India" covers the present Digital Inclusion and Economic Development and Application of Technology.

Chapter V, "Digital Inclusion in Tamil Nadu" analysed the construction of Digital Inclusion Index.

Chapter VI, "Summary of Findings, Suggestions and Conclusion" gives the brief account of the findings of the study and suggestions to improve Digital Inclusion.

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CHAPTER II

REVIEW OF LITERATURE

INTRODUCTION

Digital Inclusion aims at creating an informed society by including the digitally excluded as we proceed on the road of development. Accessing technology is an imperative to the whole process of bridging the digital divide and fomenting a digital cohesion that secures opportunity through internet, mobile services and computerization of processes, bringing in a new era of a connected nation and using technology better on behalf of citizens and communities. This is a challenge relating to access and the ability to effectively use information and communications technologies (ICTs) to address the needs of people disadvantaged due to education, age, gender, caste or location and enable improved service planning and delivery.

The impact of inequality in access to information is not a new field of enquiry. Theorising the digital divide originated from knowledge diffusion research of the 1970s (Husing & Selhofer, 2004). The knowledge gap hypothesis stated that: "segments of the population with higher socio-economic status tend to acquire information at a faster rate than the lower status segments so that the gap in knowledge between these segments tends to increase rather than decrease" (Tichenor, Donohue, & Olien, 1970, p.159). The focus of this study is to categorise similar digital access profiles in order to determine who has access to information through various digital platforms. This chapter provides an extensive literature review that explores why digital access is important, defines the digital divide/ inclusion, provides a framework for the digital divide and looks at the current elements of the digital divide.

DIGITAL TECHNOLOGY DEFINITION

"Technology is not like anchovies, which some people can love and others hate, nor is it like the right to abortion, which some are for and others are against. Rather, it is an indelible feature of our cultural environment – one we must strive to understand in all its grey-shaded complexity" (Shapiro, 1999, p.xvi).

Corrocher and Ordanini (2002) noted that the term *digitalisation* belongs to those concepts that are too wide to be represented and described well by a synthetic and precise definition. In pure technical terms, the term *digital* is defined by the online Oxford Dictionary as an adjective of signals or data. It is expressed as series of the digits 0 and 1, typically represented by values of a physical quantity such as voltage or magnetic polarization relating to, using, or storing data or information in the form of digital signals (Oxford University Press, 2011).

There are many definitions of *technology*. Technology is defined as a means to fulfil a human purpose (Arthur, 2007). The online Oxford Dictionary defines technology as the application of scientific knowledge for practical purposes (Oxford University Press, 2011). Technology can refer to something explicit like a motor vehicle or to something hazy like the Internet. Technology is also a double-edge sword (Hilbert, 2010, p.756).

Technology is both the parent of technology because it is the creator of wealth and development, but also the child because technology stems from technology (Hilbert, 2010).

From the definitions above, when combing the term 'digital' and 'technology', digital technology refers to technology that uses digital signals or data as a platform. Digital technology can be defined as a means to fulfil a human purpose through utilising digital signals or data. Digital technology can refer to devices like mobile phones or services like the Internet. Information and Communication Technology (ICT) is encapsulated in digital technologies if they are based on a digital platform.

DIGITAL INCLUSION

In Microsoft's Digital Inclusion White Paper (Microsoft 2009, p.3) Karen Archer Perry (Founder and Principal Consultant, Karacomm) explains how Digital Inclusion is not just a matter of being connected to the technology:

The problem is not a binary one. It is not a question of being connected or disconnected. As such, the best initiatives address more than inclusion; they address Digital Empowerment, Digital Opportunity, Digital Equity, and Digital Excellence. These programs recognize that technology is a tool, but more and more it's a central tool for education, economic development, and social well-being. People may start as very basic users who simply need access to resources at a community technology centre or a library. Digital Empowerment refers to the ability to use

the wealth of resources in computing and the Internet to learn, communicate, innovate, and enhance wealth—to move from being a digital novice to a digital professional or innovator. An effective Digital Inclusion strategy provides a path to full participation in a digital society.

Therefore, there is a broader concept of digital inclusion: citizens empower citizens to go beyond being 'users and choosers' of technology to become 'makers and shapers of the technologies available to them and the rest of society. In a truly inclusive digital society, citizens need to be "actively engaged in the creation of socio technical systems".

Governments across the globe have declared their commitment to building a people-centred, inclusive and development-oriented Information Society. But despite rapid proliferation and, in many cases, extensive penetration of digital technologies, a significant proportion of the global population remains 'digitally excluded'. In the UK, the majority of those who fall into this category are the elderly, and yet digital technologies offer enormous potential benefits to this sector of the population. Age itself is not a barrier to using digital technologies, and although older people tend to face other barriers to access such as cost, skills or disability, research suggests that many simply do not perceive the relevance of these technologies to themselves. The authors also present the results of a survey to investigate the perceptions of older users and non-users of the internet as a step towards understanding the factors which lie behind the current situation. A critical factor appears to be a lack of awareness and understanding of the 'digital world' (C. W. Olphert*, L. Damodaran & A. J. May (2005)

Homeless people in central Scotland integrate and appropriate mobile phones and the Internet into their everyday lives, and the meanings these information and communication technologies (ICTs) come to hold for them. The researcher also found that 'digital inclusion' does not necessarily lead to 'social inclusion' into mainstream society, since homeless individuals tend to use ICTs in ways that reinforce the patterns and practices of their subculture. There is no standard way of making use of technologies. Many homeless people thereby remain socially excluded in numerous ways despite their somewhat regular use of ICTs. It also emerged that mobile uptake can actually be more 'inclusive' than Internet uptake. (Claire Bure (2005))

The majority of Brazilians who access the Internet today do so through LAN houses. LAN stands for local area network, i.e., computers assembled together to allow people to play multi-player games. Popular in Korea and elsewhere in Asia, and previously existing only in

the rich neighbourhoods of Brazil, they have now become a phenomenon proliferating in poor communities. The Brazilian Association of Digital Inclusion Centres (ABCID) estimates that 108,000 LAN houses are active in the country. The Brazilian LAN house phenomenon is, in part, a side effect of a federal government program called Computers for All. The program, rather than taking the patronizing approach of simply distributing computers to poor people, created credit lines that allow low-income families to purchase computers by paying small instalments every month for a few years (approximately US$25 per month). (Ronaldo Lemos & Paula Martini (2010),)

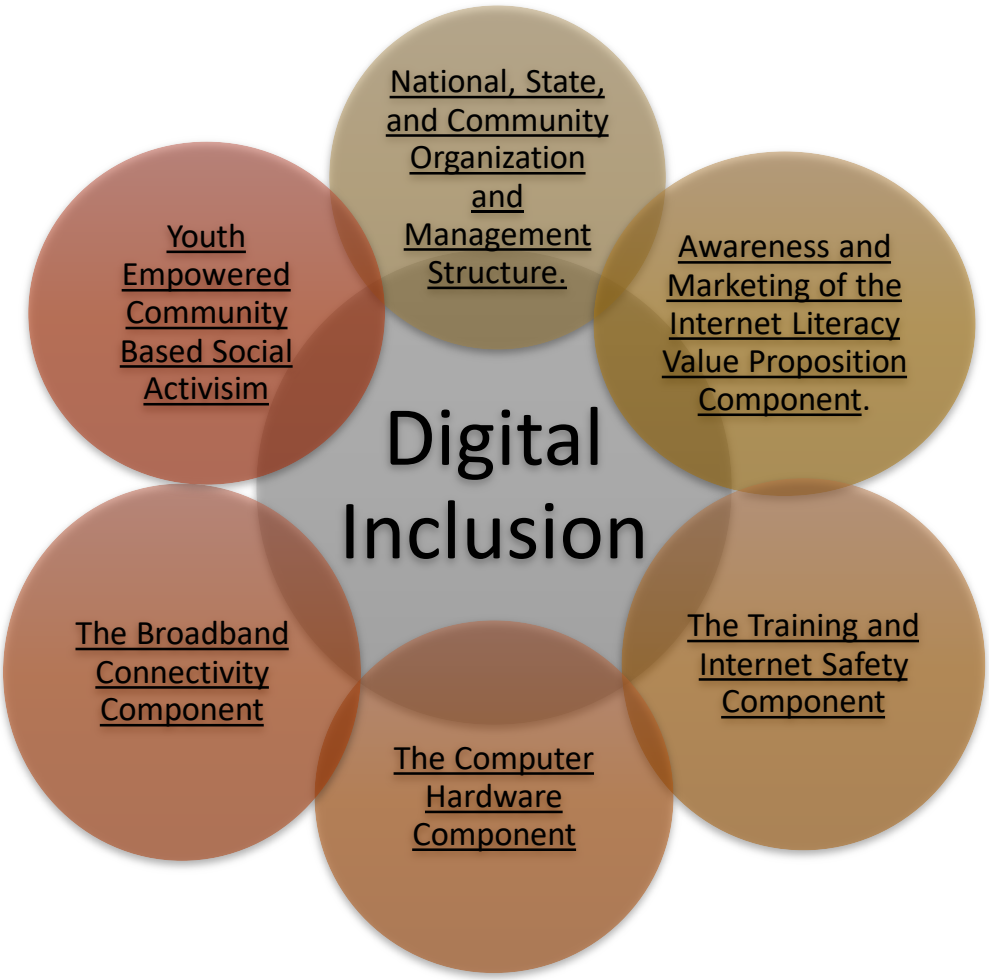
The development of a digital training project aimed at groups at risk of social exclusion in the community of Cantabria, Spain. They described the results of two-and one- half years of training activities that aim to bring certain social groups into closer contact with information and communication technology (ICT). Although the training program is based on the notion that access to technologies, as well as certain uses that can be made of them, is linked to digital and social inclusion, the authors try to avoid what some have called myths and mistaken beliefs surrounding ICT, especially the idea that more and better technology necessarily produces a society that is more in touch, more socially committed, more just, and more democratic (Adelina Calvo Salvador, Susana Rojas, and Teresa Susinos (2010),)

Youth as citizens in a multi-ethnic and multi religious society in Malaysia use the Internet to accelerate their economic and political participation. Their findings indicated that about half of the respondents had the experience of using the Internet for more than four years. The ethnic Chinese who have high access to the Internet also used commercial and government online facilities more frequently than other ethnic groups. There was no significant difference with regard to using online educational and entertainment facilities or with regard to political participation. There were no significant differences among the ethnic groups. The findings indicate that the online facilities have contributed to the levelling of active participation among ethnic groups in political matters. However, gaps still exist with regard to commercial and public sector online activities among the ethnic groups. (Samsudin A. Rahim & others (2011))

Digital Inclusion is a term that encompasses activities related to the achievement of an inclusive information society. Under such a definition, new developments in technology convert the prospects of a digital divide into opportunities for "digital cohesion," bringing the benefits of the Internet and related technologies to all segments of the population, including people who are disadvantaged due to education, age, gender, disabilities, ethnicity, and remote

geographical areas. Digital Inclusion covers mainly the development of appropriate policies, maintenance of a knowledge base, research & technology development and deployment, & best practices dissemination. (Daniel Kent & David P. McClure (2009),)

Figure 2.1: Digital Inclusion



Change needs to be something which is done 'with' people rather than 'to' people if the goal of an 'Inclusive Digital Economy' is to be reached. It is also evident that there is considerable dispersed global activity concerned with mitigating Digital Inclusion Risk, being carried out by a multiplicity of stakeholders (governmental, corporate, research) who operate at the national, transnational and transcontinental level. Although it will be complex and demanding to achieve, greater cooperation and collaboration within an international framework might greatly increase the likelihood of achieving success on a global scale. (Melanie Heeley (2009))

The school appears to be playing a secondary role, as compared with children and young people's social practice in heterogenic contexts of everyday life, not only for Internet training but also for providing opportunities to develop and master basic digital skills. (Julio Meneses & Josep Maria Mominó (2010))

The teacher's contribution to improving digital inclusion in Chilean rural schools, is analysed using a multidimensional definition of the digital divide. Results show that teachers function as gatekeepers. They do not teach students how to use ICT explicitly, but when teachers have high expectations, skills and technology access, this leads to conditions for students learning how to use ICT. Finally, the data contributes to a better understanding of the new role that teachers and schools play in rural areas in terms of social and symbolic integration)). (Alvaro Salinas & Jaime Sa´nchez (2009

INEQUALITY

Inequality has many levels and impacts various aspects of life such as income, skills, education, opportunities, happiness, health, life expectancy, welfare, assets and social mobility (Heshmati, 2006); and now in the information and knowledge age, digital inequality has come into existence. The primary concern surrounding digital inequality is that it provides improved access to goods and services as well as the ability to enhance life chances through access to digital platforms that provide access to education, jobs, and higher incomes (DiMaggio & Hargittai, 2001). Digital technologies have already penetrated so many facets of our lives that access to technology has even become a dimension of social inclusion (Husing & Selhofer, 2004). According to Selwyn (2002) social exclusion is a far wider concept than poverty. Burchardt, Le Grand and Piachaud (1999) recognised an individual as socially excluded - if (a) he or she is geographically resident in a society and (b) he or she does not participate in the normal activities of citizens in that society. There is a real concern that individuals without access to information technology may be disadvantaged (Dewan & Riggins, 2005; Jaeger, 2004; Wei, Teo, Chan & Tan, 2010) and of specific concern to governments is the lack of access by the youth, which can exacerbate social stratifications in the information era (Ching, 2005; Selwyn, 2004; Warschauer, 2003; Wei et al., 2010). Even after the implementation of policies to increase access to digital technology in the United Kingdom (UK) by providing public Internet access points, there is still evidence of social divisions in digital technology use and engagement in that country (Sinclair & Bramley, 2010). Concerns around digital inequality were first recognised when researchers measured access to technology between countries and

between developed and developing nations (Selwyn, 2002). In order to fully grasp the concept of digital inequality, the next section considers the effect of inequality in access to knowledge and also information.

ACCESS TO KNOWLEDGE

"A knowledge gap by definition implies a communication gap and a special challenge in resolving social problems" (Tichenor et al., 1970, p.170).

The digital divide is closely related to the larger issue of social inequality (Attewell & Gates, 2001; DiMaggio, Hargittai, Neuman, & Robinson, 2001; Vehovar et al., 2006 and Warschauer, 2003). Rao (2005) and Schleife (2010) elaborated that the digital divide is an amplifier of economic and social divides. To ensure a decrease in the current social inequalities, the digital divide needs to be turned into a digital dividend (Rao, 2005), by connecting individuals to a universe of knowledge and learning (Gunkel, 2003). Harrison, Waite and Hunter (2006) found that Internet usage makes consumers feel empowered and adds significant gains through access to information which leads to knowledge and understanding. The only way to expose individuals to this universe of knowledge is to grant them access to information through the Internet because knowledge forms part of the commons of society (Fuchs, 2010). Jung, Qiu and Kim (2001) and Van Dijk (2006) questioned the difference of inequalities of access to and use of ICT as compared to other scarce resources. Jun get al. (2001) illustrated that there are two contradictory sides to inequality in access to the Internet: on one side, there are the people who believe that disparity is inevitable and will narrow as diffusion increases; on the opposing side are the people who believe that various inequalities will persist and may even increase in the process of diffusion. Van Dijk (2006) answered the afore-mentioned question by saying that if it is believed that the current information society is fruitful and beneficial to humanity, attention should be focused on the effects of access to information as it may be a source of inequality. Inequality in access to knowledge has not changed much over the last 40 years. Tichenor et al. (1970) completed a study on mass media flow and differential growth in knowledge. He tested a few events that were widely covered in the printed media and stated that mass media in 1970 were reinforcing or increasing existing inequalities. He continued to say that other mass information delivery systems are required if lower- status segments of the population are to avoid falling further behind in relative familiarity with events and discoveries of the day.

ACCESS TO INFORMATION

The impact of having access to or using information is not at all new (Husing & Selhofer, 2004). Arrow (1962) said that ―information is a commodity with peculiar attributes…and any information obtained, should, from a welfare point of view be available free of charge (excluding the transmission costs) . Arrow (1962) further argued that by applying the basic supply and demand theory, the demand for information will not be optimal if the price of obtaining the information is above zero. The information age will provide economic opportunity and growth but it is only destined to those with access to these technologies (Mariscal, 2005).

The notion of access to digital technology is not one dimensional. DiMaggio and Hargittai (2001) redefined access to the Internet by saying that access is no longer about who can find a network connection at home, work or at the community centre, but rather what people are able to do when they access the Internet. Similarly, it is believed that equal Internet access does not guarantee equal Internet usage, and it is important to determine not only who is using the Internet but moreover how or in what way the Internet is used (Brandtzaeg, Heim & Karahasanovic, 2011).

The South African government perceives universal access as access to a telephone within 30 minutes travelling distance (Jensen, 2000; cited by Mutula, 2008). The universal term has been expanded and now includes Internet access facilities (PANOS, 2004; cited by Mutula, 2008). The Internet is not only a communication medium or a social networking platform, but is becoming more important because it serves as a market place. Greater levels of intimacy will emerge between individuals and business because business has more information about individuals (Orange, 2011).

Not only will consumers be in more control than ever before, business will be forced to engage in ―greater transparency and openness‖ (Orange, 2011, p.41).

DEFINING THE DIGITAL DIVIDE

It is unclear who coined the term the ―digital divide‖ but it has been widely discussed in literature since the mid-1990s. The digital divide can be defined as the difference between

those who have access to ICT resources and those who do not (Atkinson et al., 2008; Gunkel, 2003). There is no consensus on the definition of the digital divide after years of debate by experts in public policy, communications, philosophy, social sciences, and economics (Dewan & Riggins, 2005).

Van Dijk (2006) stated that the term ―digital divide‖ has perhaps caused more confusion than clarification. Warschauer (2003) further argued that the term ―digital divide‖ is unclear and confusing because the word ―divide‖ suggests a bipolar division, meaning that individuals are either connected or not. Vehovar et al. (2006) added that it is not a binary, yes or no answer and this study also assumes that each individual has a level of digital access and not a simple yes or no status.

There are two main differences in the available definitions of the digital divide. The first difference is the technologies that are included in the definition. Attewell and Gates (2001) defined the digital divide as the technology gap between individuals that have access to PC's and the Internet. The definition which Fuchs and Horak (2008) used focused on unequal access to only new technologies. Dewan and Riggins (2005) extended their definition to include all digital technologies. Dewan and Riggins (2005) defined the digital divide as the separation between those who have access to digital Information and Communications Technology (ICT) and those who do not. The second discrepancy in the definition of the digital divide is in inequity type. Rao (2005) defined the digital divide as the gap in opportunities, while Smith (2010) emphasized on the gap in benefits. Dewan and Riggins (2005) defined the digital divide as the gap between those who have access to digital technologies. The definition for the purposes of this study is that the digital divide refers to the inequality in access to digital technologies. The focus on mere access to digital technology is discussed and is labelled as the first level digital divide. In the section below, a framework of the digital divide is provided and each concept is then discussed.

DIGITAL DIVIDE FRAMEWORK

The examination and interrogation of the digital divide from various perspectives is to accurately understand its multifaceted nature, which is essential in order to have a clear conceptual foundation on which to base the digital divide (Vehovar et al., 2006).

AGGREGATION LEVEL

The aggregation level of the digital divide conceptual framework can be seen as the highest level focus of the study. Vehovar et al. (2006) provided examples of aggregation levels as regional, national, international and global. Heshmati (2006) used the same three levels of aggregation namely, global, international and intra-national in his income distribution analysis. In this study the aggregation level was selected as national. South Africa is therefore the high level focus of the digital divide measurement and no other countries was included in the study.

LEVEL OF ANALYSIS

The lowest level of observation or the granularity of the data is referred to as the level of analysis. Examples of the level of analysis include individuals, households and companies (Vehovar et al., 2006). Dewan and Riggins (2005) added global levels as another level of analysis. Vehovar et al. (2006) said that although there is an obvious aggregation and hierarchy between these levels, there are ―unique questions of interest at each level of analysis. The level of analysis in this study is individuals. Many studies have been done on macro level, measuring the digital divide between countries (Billon et al., 2010; Chinn & Fairlie, 2007; Corrocher & Ordanini, 2002; Fuchs & Horak, 2008; Howard et al., 2009; James, 2009b; Vicente Cuervo & Lopez Menendez, 2006 and Vicente & Lopez, 2011), but research on an individual level is limited; hence the need for this study.

INEQUALITY TYPES

The digital divide is a phenomenon linked not only to the topic of access to the Internet, but also to the one of usage and usage benefit‖ (Fuchs & Horak, 2008, p.99). There are currently three levels of inequality types when looking at the digital divide. The first order digital divide refers to inequality in access to technology, the second order digital divide refers to inequality in the ability to use the technology (Dewan & Riggins, 2005) and the third order digital divide refers to inequality of outcomes or benefits from using the technology (Wei et al., 2010). The first order digital divide will eventually disappear when ICT becomes universally accessible (Vehovar et al., 2006). The second order digital divide will then become more important than the first order digital divide due to more people gaining the ability to use ICT, the benefits or outcomes derived from the technology will be most significant (Dewan & Riggins, 2005).

There is a hierarchy of needs towards digital technology as digital technology integrates more into society. It is important to understand that mere access to digital technology is only the first step towards a fruitful digital society. The next section explains each level in the hierarchy of digital needs.

INEQUALITY IN ACCESS – THE FIRST ORDER DIGITAL DIVIDE

The first order digital divide refers to the unequal physical access to digital technologies or the differences among those who have access and those who do not and most of the current research focused on physical access (Van Dijk, 2006; Hargittai, 2002). Variation in the level of digital access occurs when new digital technologies become available in the market (Dewan & Riggins, 2005). This is because there is a difference in the rate in which individuals, organisations and countries adopt these technologies (Dewan & Riggins, 2005). The first step towards adoption of a new technology is to gain access.

Husing and Selhofer (2004) mentioned that because of the rapidly changing technological environment, access to information is now more prone to happen from a mobile device which is becoming a substitute for a home Personal Computer (PC). Present day digital technologies will soon be available to all because digital technology is ―getting cheaper and easier to use by the day (Van Dijk, 2006, p.232). But, access to digital technologies is never enough to ensure productive use (Dimaggio et al. 2004) and even motivation and skills do not guarantee actual use (Van Dijk, 2006). This leads to the next level in the hierarchy of digital needs and second order digital divide.

INEQUALITY IN USAGE – THE SECOND ORDER DIGITAL DIVIDE

The pressing issue is no longer access, but rather ―what are people doing and what are they able to do, when they go online‖ (Dimaggio, Hargittai, Celeste, & Shafer, 2004, p.28). Measuring the usage or functionality rather than the technology will be a more suitable indicator. Van Dijk and Hacker (2003) stated that even in the Netherlands, one of the most digitised countries in world, more than a third of the population in 1998 had little or no digital skills. Even aspects such as the way in which individuals connect to the Internet has an influence (Dewan & Riggins, 2005). Davison and Cotten (2003) found a substantial difference in the Internet usage between users using broadband and dial-up Internet connections. Atkinson et al. (2008) stated that even basic digital access will allow individuals to use electronic mail

and the more advanced ICT services will increase that level of sophistication. This is echoed by Van Dijk (2006) who stated that an ―active and creative use of the Internet, that is, contributions to the Internet by users themselves, is a minority phenomenon. Most of the interaction on the Internet is passive and consuming whereas active contributions include ―publishing a personal website, creating a weblog, posting a contribution on an online bulletin board, newsgroup or community and perhaps, in a broad definition, exchanging music and video files‖ (Van Dijk, 2006).

This level of the hierarchy of digital needs explains that the use which includes both passive and active use is the next level of ensuring a fruitful digital society. The second order digital divide considered that mere access to digital technologies do not guarantee actual use. The next level or third order digital divide goes even further by considering the benefits obtained from the use of digital technologies.

INEQUALITY IN BENEFITS OR OUTCOMES – THE THIRD ORDER DIGITAL DIVIDE

Gunkel (2003) argued that the Internet ―is not an unqualified and unquestioned human good‖, but that it could be beneficial in some ―highly-specific sociocultural situations‖ (p.508). Gunkel (2003) continued to say that ―unlike clean water, nutritious food, and adequate shelter, the value of this technology has been determined by unique circumstances that are only applicable to a small fraction of the world's population‖ (p.508). Contradictory to Gunkel (2003), Mariscal (2005) argued that the benefits of the information revolution are boundless and that it ―promises to provide economic opportunity, growth and democratic communication‖ to everyone (p.409). But whether digital technology is destined to everyone, users of technology have to actively engage to give meaning to digital technologies (Vehovar et al., 2006).

Dimaggio et al. (2001) found that information is a centrally important determinant of life chances. However, Anderson and Tracy (2001) stated that ―applications and services delivered via the Internet are not changing the way people live their lives in a simple, straightforward manner, but are supporting and enhancing their existing lifestyles, whatever those lifestyles may be‖ (p.458). Mere access to new technologies will not be sufficient to prevent the widening of a digital knowledge gap but it is nevertheless a necessary prerequisite (Husing & Selhofer, 2004). The digital divide measurement created in this study is on the first

order digital divide, because it forms the basis of and the prerequisite for the following levels. The next step will then be to measure the second and third order.

ICT ADOPTION CYCLE

The adoption and dissemination of digital technologies is a phenomenon of interest, because the diffusion of ICT innovation is at the heart of the digital divide and that the ICT adoption cycle represents that process (Dewan & Riggins, 2005). The ICT adoption cycle consists of ICT Innovations, ICT Access and ICT Use, and is discussed in terms of inequality (Dewan & Riggins, 2005). The ICT adoption cycle impacts levels of digitisation directly because as new technologies introduced to the market, the new technology needs to be adopted, used and benefits should be obtained through actual use.

The following section describes the elements of the digital divide and inputs to the digital divide measurement. These elements describe the inequality in access to digital technologies. It is also the final component of the digital divide conceptual framework.

ELEMENTS OF THE DIGITAL DIVIDE

DiMaggio and Hargittai (2001) stated that access to a new technology, like the telephone, the television or the Internet is only accessible to a select few at first. The element that describes digital access include access to digital devices, individual attributes and environmental factors. These elements are the catalysts and characteristics of the digital divide.

The digital divide has a multifaceted character (Billon, Marco, & Lera-Lopez, 2009). Due to the many elements that define the digital divide there is a large amount of literature surrounding almost every aspect of this topic. Variables include income, level of education, type of household, age, gender, race, language, ethnicity, labour-force participation, physical disabilities, skills, spatial issues, occupation, trust, Gross Domestic Product (GDP), autonomy of use, social support, number of young people and infrastructure (Atkinson et al., 2008; Bagchi, 2005; Dewan & Riggins, 2005; DiMaggio & Hargittai, 2001; Husing & Selhofer, 2004; Schleife, 2010 and Vehovar et al., 2006). DiMaggio and Hargittai (2001) divided the digital divide into five dimensions including equipment, autonomy of use, skill, social support, and the purpose of using digital technologies. However, Schleife (2010) differentiated only between two kinds of characteristics namely, individual characteristics and regional

characteristics. Hence the characteristics of the digital divide for this study are broken into three categories. The first element is technology, the second element is individual characteristics and the third element is geographical regions.

The digital divide identifies advantaged and disadvantaged individuals and groups within a community in terms of access to digital technologies (Atkinson et al., 2008). In order to profile these groups of individuals with similar levels of digital access, various individuals' attributes and geographical regions were identified to sketch these groups. The elements below therefore also profile the characteristics of individuals with similar levels of digital access according to the digital devices they use, their individual attributes and their geographical locations.

DIGITAL TECHNOLOGIES: DIGITAL DIVIDE ELEMENT

*"There is no reason anyone would want a computer in their home."*Ken Olson, President, Chairman, and Founder Digital Equipment Corporation 1997. (Venkatesh & Brown, 2001, p.71)

Vehovar et al. (2006) argued that to fully understand the complex nature of the digital divide, all factors should be taken into account when it comes to technologies because researchers should look at all digital devices such as PCs, Internet and mobile technology. Billon et al. (2010) added that different technologies show different patterns of diffusion and that the analysis of a single technology does not provide much information about the level of digital development within a country. One of the reasons for the complexity of the digital divide is the multiple technologies that are available (Vehovar et al., 2006) and International Telecommunication Union (2003) stated that―no single indicator is sufficient to measure access to the information society‖ (p.20).

In the developing world, in countries like South Africa, older technologies such as electricity, the telephone and television have not yet been widely adopted (Fuchs & Horak, 2008), while in developed countries these technologies have already saturated the market (Vehovar et al. 2006). Popular personal digital devices that are currently available in the South African market are listed in the table below as well as the authors that have included the device in prior digital divide studies. In this study the digital inclusion measurement is based on various different digital devices or technologies, some of which have been used in prior studies

and some not. But no study that uses a variety of technologies to create an index has been found.

Table 2.1: List of technologies included in the study

No	Digital Technologies	Authors of Prior Digital Divide Studies
1	Television	(Vehovar et al., 2006) (Venkatesh& Brown,2001) (Quibria,2003)
2	Satellite television	(Corrocher& Ordanini,2002)
3	DVD Player	No References
4	Mobile Phones	(Venkatesh& Brown,2001) (Quibria,2003) Corrocher& Ordanini,2002) (Bagchi,2005)
5	Personal computer	(Vehovar et al., 2006) (Dewan&Riggins,2005) (Chinn& Fairlie,2007) (Corrocher& Ordanini,2002) Venkatesh& Brown,2001) (Quibria,2003) (Bagchi,2005)
6	Digital Camera	No References
7	Portable music player	No References
8	Video or Portable gaming console	No References
9	Global positioning system	No References
10	e-Book Reader	No References
11	Tablet Computer	No References
12	Electricity	(Rao 2005)
13	Internet	(Vehovar et al., 2006) (Dewan&Riggins,2005) (Chinn& Fairlie,2007) (Corrocher& Ordanini,2002) Venkatesh& Brown,2001) (Quibria,2003) (Bagchi,2005)

Source: Review of Literature

Even though electricity is not a digital device, access to digital devices is constrained by infrastructure parameters such as electricity (Rao, 2005). Access to electricity is therefore an important element in determining access to other digital devices. Similarly, access to the Internet through a digital device adds an additional dimension of benefits. Mere access to a personal computer or mobile phone does not guarantee Internet access and access to Internet is included to the list digital technologies. Video games, computer games and the Internet form part of children's everyday lives in the Western world whether they have access or not (Aarsand, 2007).

Husing and Selhofer (2004) explained that because of the rapidly changing technological environment, access to information is now more prone to occur from a mobile device which is becoming a substitute for a personal computer at home. Measuring access to a personal computer will soon become obsolete. This phenomenon is referred to as leapfrogging. Davison, Vogel, Harris and Jones (2000) define leapfrogging as ―the implementation of a new and up-to-date technology in an application area in which at least the previous version of that technology has not been deployed‖ (p.2). New technologies should be incorporated into the indices continuously. Padayachie (2011) further highlighted that even though mobile communications have had unprecedented growth rates in recent years, Internet connectivity to the home remains low. Broadband penetration in South Africa stands at approximately 5per cent of the population (Padayachie, 2011, par. 13).

Because access to digital technology is the prerequisite in obtaining any use and benefits from the digital environment, access to various digital technologies is the foundation of the index. The level of digital access of an individuals will be directly proportional to the number of digital technologies an individual has access to. A wide range of digital technologies are included to ensure that the index is comprehensive.

Akhter (2003) found that when looking at the product adoption process two types of characteristics are commonly studied: Personality traits and demographic characteristics. The following two sections titled individual attributes and environmental factors respectively, will help to explain and contextualise the digital access divide.

INDIVIDUAL ATTRIBUTES: DIGITAL DIVIDE ELEMENT

Individual attributes refer to the attributes that describe the user. According to Atkinson et al. (2008), the digital divide identifies advantaged and disadvantaged individuals and groups within a community in terms of access to ICT services. Atkinson et al. (2008) continued by saying that the available literature has identified a range of socio-demographic characteristics of individuals with different levels of access and use of ICT. Van Dijk and Hacker (2003) found that income, education and employment are strongly associated with the digital divide. In addition, Schleife (2010) stated that an individual's age is also important. Husing and Selhofer (2004) elaborated and examined the digital divide by looking at four socio-economic variables including gender, age, income and education. Husing and Selhofer (2004) added that ethnicity, labour-force participation and spatial issues are crucial dimensions to consider but they did not have access to appropriate data. For a future wish-list they recommended also analysing attitudes towards IT, open-mindedness, frequency of usage and skills or experience (Husing & Selhofer, 2004).

GEOGRAPHICAL REGIONS: DIGITAL DIVIDE ELEMENT

Bagchi (2005) used several indicators in the study of the digital divide phenomenon and found that the chosen indicators impacted the digital divide measurement in different ways across various nations and over time. These significant indicators included trust, GDP and infrastructure. Bagchi (2005) continued by saying that the indicators which impact the digital divide are not the same for developing and industrialised nations in a given year. In addition, Howard, Anderson, Busch and Nafus (2009) found additional factors such as telecommunication infrastructure, telephone access cost, the country's economic structure, and human capital, can best explain the digital divide. Rao (2005) added rural or urban and geographic location to the indicators. In this study, the measure is created on an individual level for citizens within South Africa; therefore, these factors are not relevant.

Hindman (2000) conducted a study to determine adoption and use of information technologies among resident in metropolitan areas and nonmetropolitan areas. He found that other variables such as education, income and age had a more closely relationship with digital access levels. According to Schleife (2010) is geographical diffusion of the Internet two-fold, it is firstly determined the decision of individuals to adopt the Internet and secondly determined by the decision business to supply Internet connectivity in a specific region.

DIGITAL DIVIDE MEASUREMENT

"Count what is countable, measure what is measurable, and what is not measurable, make measurable" by Galileo Galileo (Kaydos Wilfred,1999, p.20)

INTRODUCTION

Vehovar et al. (2006) said that the digital divide typically relates to socio-demographic differences in use of digital technologies, but current digital divide measurement is relatively imprecise and often only measures inequality in Internet access. Many different indices, tools and instruments have been developed to measure the digital divide over the last few years (Mutula, 2008; Vehovar et al., 2006) and all these indices are different in focus. A major difference in focus is the level on which the index was created.

Zandvakili (2008) stated that regardless of the motivation for an investigation into inequality, it is important to select an appropriate measure because some policy decisions are based on the result of these measures. The most common inequality index is the Gini coefficient. Heshmati (2006) stated that the Lorenz Curve is the standard approach used to analyse the inequality of income. According to Moyes (2007), the Gini coefficient and the Lorenz quasi-ordering are certainly the two tools used most often by economists for measuring inequality. In the case of the Gini coefficient, only one variable (income) is considered which would not be appropriate in this study. In order to develop a comprehensive, multidimensional, digital inequality measurement, various variables need to be considered and these standard inequality measures are not suitable.

The next section starts with a discussion on two indices which were developed on multinational level, the Digital Access Index (DAI) and the Technology Distribution Index (TDI). The section thereafter looks at indices developed on an individual level. Even though the study proposes an index on individual level, it is important to obtain an understanding of what is measured on a multinational level in order to understand the positioning of the index. Most studies found in literature were conducted on a multinational level where countries are compared between each other.

MEASUREMENTS ON MULTINATIONAL LEVEL

DIGITAL ACCESS INDEX (DAI)

International Telecommunication Union (2003) agreed that ―no single indicator is sufficient to measure access to the information society‖ (p.20). The DAI took various indictors into account and are listed in Table 4, below. The ratio for each indicator is calculated against the target identified and then multiplied by 0.2, all the ratios are then added together to provide a number out of 1 (International Telecommunication Union, 2003). Source. The result of this index is to list all the countries into four bands, high access (index between 0.7 – 1.0), upper access (0.5 – 0.69), medium access (0.3 – 0.49) and low access (0 – 0.29) (International Telecommunication Union, 2003). South Africa is listed in the middle band, with a score of 0.45 (International Telecommunication Union, 2003). But this score of 0.45 is not sufficient to make decisions regarding policies and allocation of resources. The DAI score is a mere indications of South Africa's position of digital inclusion compared to other countries.

Table 2.2: Indicators of the DAI

No	Weight	Indicator	Target
1	0.2	Fixed telephone subscribers per 100 in habitants. Mobile subscribers per 100 in habitants	60 100
2	0.2	Adult Literacy Overall school enrolment (primary, secondary and tertiary)	100 100
3	0.2	Internet access price (20 hours per month) as percent of per capita income	100
4	0.2	Broadband subscribes per 100 inhabitants International Internet bandwidth per capita	30 10,000
5	0.2	Internet users per 100 inhabitants	85

Source: International Telecommunication Union

TECHNOLOGY DISTRIBUTION INDEX (TDI)

Howard et al. (2009) created the Technology Distribution Index (TDI). This index relates to the number of Internet and personal computer users in comparison with the GDP of each country. This determines if the country‘s supply of information technology is in balance with its share of global economic product. The index is created using a ratio of two other ratios (Howard et al., 2009). For each country, the proportion of PCs is determined and then divided by the proportion of GDP in relation to the worlds GDP. The TDI is expressed as:

$$\text{Ratio of ratios}_T = \frac{\frac{PC_{country}}{\sum_{world} PC}}{\frac{GDP_{country}}{\sum_{world} GDP}}$$

Source: (Howard et al., 2009)

Howard et al. (2009) found that some countries with low GDP levels have higher than expected digital technology users and also that some countries with high GDP levels have lower than expected digital technology users. This index still does not provide any information regarding the level of digital access within a country. The index rank countries according the achievement of the expected technology distribution.

SUMMARY OF MEASUREMENTS ON A MULTINATIONAL LEVEL

As seen from the discussion on the Digital Access Index and the Technology Distribution Index the output from indices on macro level only provides information regarding the ranking of a country in relation to other countries. The measurement expected from this study aims to provide information not only to identify the current level of digital access but also to identify the risk group where individuals have limited digital access. Over and above the two indices discussed above, there are more digital divide studies that have been conducted on a multinational level. Appendix A contains a summary of some of the key digital divide measurements on a multinational level.

DIGITAL DIVIDE MEASUREMENT ON AN INDIVIDUAL LEVEL

Not many studies have been conducted on an individual level. Three digital divide indices created on an individual level are discussed in the section below and illustrates both the advantages and limitations of current digital divide measurements on individual level.

THE INTERNET CONNECTEDNESS INDEX (ICI)

The Internet Connectedness Index (ICI) is a measure to monitor the long-term inequalities in the quality of Internet connections among users (Jung et al., 2001). Jung et al. (2001) focused mainly on Internet connectivity but also included PC ownership, type of tasks performed, where Internet is accessed from and benefits obtained. Income and education are used to determine socio-demographic differences. Jung et al. (2001) further stated that the purpose of the measurement is to gauge the post- adoption aspects of Internet diffusion.

The study found that individuals who have higher levels of education and income are more likely to be connected to the Internet, as well as individuals that are younger and male. Only one indicator, the Internet, is considered in this index which provide a narrow view.

Findings based on socio-demographic differences provides interesting information regarding the individuals within the country.

DIGITAL DIVIDE INDEX (DDIX)

Selhofer and Hüsing (2002) created a digital divide index, named the DDIX, where four socio-economic factors (gender, age, income and education) are measured against four indicators. The four indicators are percentage of computer users, percentage of computer users at home, percentage of Internet users and percentage of Internet users at home. Selhofer and Hüsing (2002) further said that an arbitrary weighting was assigned to each indicator to calculate the compounded index. Table 4, below, lists the indictors used to develop the DDIX.

Table 2.3: Indicators of the DDIX

Indicators	Survey Question	Weight
Percentage of computer users	Do you use a computer at different locations given for selection?	30%
Percentage of computer users home	Do you use a computer at home?	20%
Percentage of Internet users	Do you use e-mail and or the Internet at (different locations given for selection)?	30%
Percentage of Internet users at home	Do you use e-mail and or the Internet at home?	20%

Source: (Selhofer & Husing, 2002)

Selhofer and Hüsing (2002) indicated that education levels may have the biggest impact on Internet usage and that the digital divide did not decrease between 1997 and 2000. Selhofer and Hüsing (2002) create another index, named the DIDIX, for measuring inequality in IT diffusion.

DIGITAL DIVIDE INDEX (DIDIX)

Hüsing and Selhofer (2004) created the DIDIX by using diffusion theory and by applying the S-curve diffusion models. Hüsing and Selhofer (2004) measured four socio-economic variables (gender, age, income and education). The index is created using the following indicators listed in Table, below.

Table 2.4: Indicators of the DIDIX

Indicator	Weight
Computer users	50%
Internet users	30%
Internet users at home	20%

Source: (Husing and Selhofer (2004)

Hüsing and Selhofer (2004) presented the divide index as the quotient of two axes, the diffusion disadvantage group and the diffusion population. If the derivative of the quotient in time is positive, it means that the digital divide is becoming narrower.

Hüsing and Selhofer (2004) found that the diffusion of Internet users in the European Union population is still in the lower part of the S-curve for all of the dimensions, hence there is still a lot of growth opportunity.

CONCLUSION

Many studies have been done on macro level, measuring the digital divide between countries (Billon et al., 2010; Chinn & Fairlie, 2007; Corrocher & Ordanini, 2002; Fuchs & Horak, 2008; Howard et al., 2009; James, 2009b; Vicente Cuervo & Lopez Menendez, 2006 and Vicente & Lopez, 2011). Research on individual level is limited because most existing indices measure the digital divide at the international and national level (Dewan & Riggins, 2005). The current focus on the higher levels of analysis short-changes detailed and vitally important data collection, and analysis at more micro levels‖ (Barzilai-Nahon, Gomez, & Ambikar, 2008). This study proposes an index that measures the digital access levels of individuals in Tamil Nadu. This measurement on micro level and the lowest possible granularity of analysis provides information essential to the identification of the risk group where individuals have limited digital access. The index on individual level also enables the profiling of groups of individuals with similar digital access levels.

Barzilai-Nahon (2006) added that two types of indices have been developed for the measurement of the digital divide, focused monotopical indices which are widely available and comprehensive indices which are rare. Comprehensive indices should be promoted over monotopical indices. The digital inclusion index proposed in this study is comprehensive because it takes various digital technologies into account and various attributes are used to profile and clarify the different levels of digital access. According to Vehovar et al. (2006), one of the complexities in choosing the appropriate indicators for measurement is the multiple technologies that are involved. It is also essential for new technologies to be incorporated into the indices continuously.

The Digital Inclusion Index is based on whether individuals have access to broad scope of digital technologies and provide a level of digital access indicator to each individual. The

different levels of digital access are then grouped and profiled according to individual attributes and geographical regions. The main benefit from the index is benchmarking because it would be possible to determine whether the digital divide is narrowing or widening from year to year.

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CHAPTER III

CONCEPTUALIZING AND MEASURING THE LINKS BETWEEN SOCIAL EXCLUSION AND DIGITAL INCLUSION

Technological change permeates most areas of society and many different aspects of our lives. The increasing utilization of information and communication technologies (ICTs), such as the Internet, across all sectors of society has led many to conceive of Britain and other advanced industrial economies as Information Societies. While it is difficult to imagine that anyone in a modern leading economy like Britain is not affected by new ICTs, not everyone is equally well served. Many individuals and households, for example, do not use the Internet. Does this matter? What difference does it make? This section of the report develops and presents a framework that can be used to investigate the links between social exclusion and digital engagement for a range of different digital platforms.

CONCEPTUALIZING SOCIAL EXCLUSION

Indicators of social exclusion tend to focus on those important aspects of an individual's life that are associated with their health, wellbeing and general quality of life. They are closely associated with socio-economic status and often indicate a lack of material and/or social resources. Some indicators are based on combinations of measures.

Nevertheless, the sociological literature on inequalities has developed a diverse set of views on what exclusion means. Following Bourdieu's (1986) work, these different aspects of exclusion have been labeled as 'capitals'. These "various species of capital are resources that provide different forms of power" (Sallaz and Zavisca, 2007) and can be divided into five broad categories, economic, social, cultural, political, or civic, and personal (Anthias, 2001; Chapman et al., 1998; Commins, 1993; Durieux, 2003; Phipps, 2000).

A more recent approach to conceptualizing different types of social exclusion is Nussbaum and Sen's (1993) framework of capabilities. The focus in this approach is on individuals having the capability, defined as the 'free' or 'real' choice, to participate in society in the ways they wish to (Nussbaum, 2000). Governments under this approach should create 'substantial freedom' which, in the context of ICTs, means that they need to create an

environment in which people can use their capability to make informed choices about using or not using the internet.

A brief overview of the literature in relation to economic, cultural, social and personal resources follows.

ECONOMIC RESOURCES

Traditionally, indicators of exclusion were heavily based on Marx and Bourdieu's ideas of economic capital. These were defined as comprising income, labour prospects and education opportunities. These economic 'resources' can be found in most current measures of economic exclusion.

The index of Multiple Deprivation (DCLG, 2004) is one of the indices often used to measure exclusion at a community level, covering economic factors such as education, work and income. Miliband (2006) classified social inequality into three types; wide, concentrated and deep exclusion. Wide exclusion refers to a large number of people excluded on a single or small number of indicator(s) (Bradbrook et al.,2007). Concentrated exclusion refers to a geographic concentration of disadvantage (Which in the India is often in rural and Semi-Urban areas). Deep exclusion refers to disadvantage on multiple and overlapping dimensions.

Specific indicators that should be part of multidimensional indices of exclusion are: unemployment, discrimination, poor skills, low income, poor housing, high crime and family breakdown according to the Cabinet Office Social Exclusion Task Force (SETF, 2007). Disadvantage is further linked to teenage pregnancy and illness. While most of these are not permanent or stable conditions, they are often carried from one generation to the next, to create cycles of exclusion where parental socio-economic circumstances play a large part in determining the socio-economic situation of their children when they grow up.

CULTURAL RESOURCES

Cultural capital was famously proposed by Bourdieu in 1984 as an important aspect of inequality in society, and as distinct from economic capital. The original definition of cultural capital referred to "people's cultural practices, knowledge, and demeanors learned through exposure to role models in the family and other environments" (Portes, 1998). Current

definitions identify cultural capital as the shared norms that guide behavior within a group and which, due to their shared nature, give meaning to belonging to a certain group (Durieux, 2003; Kingston, 2001: Selwyn 2004).

Cultural resources are world knowledge and the interpretation of information that is learned through socialization. This includes norms about what certain groups of people are 'supposed' to behave like and what their aspiration should be. Room (1999) has labelled people whose particular cultural resources exclude them from society as 'negative subcultures'. Cultural resources thus do not necessarily have to be positive in nature when it comes to ICTs that is individuals can be socialised to understand ICTs as something negative – as something that is not part of their group's culture.

SOCIAL RESOURCES

Social capital is defined as the involvement in and attachment to networks within a society that give a person access to useful information and opportunities (Coleman, 1990). Thus, social resources can be defined as "the benefits accruing to individuals by virtue of participation in groups and on the deliberate construction of sociability for the purpose of creating this resource" (Portes, 1998). These social networks can be based on common interests, activities, family ties or other bonds that join a group of people together.

Based on Granovetter's (1983) study of offline social networks, researchers have started identifying different types of social resources as being of either emotional or instrumental support (Hinson et al., 1997; Lin, 2001; O'Reilly, 1988) and as weak or strong (Haythornwaite, 2002; Kavanaugh et al., 2005).

Social resources differ from cultural resources in that they are more flexible and can be severed or established throughout the lifetime and are not associated to specific types of socialization. People have little choice in their gender or ethnicity (both indicators of cultural resources), they can however, opt in or out of emotional and interest networks.

POLITICAL OR CIVIC RESOURCES

More formally organized types of social resources can increase political or civic capital (Giddens, 1998; Putnam, 1995). Bennett (2003) argues traditionally that political resources

could be defined as the way in which political order is established "through mutual identification with leaders, ideologies and memberships in conventional… political groups". She goes on to propose that ICTs might change the way in which people participate politically. Since political and civic resources involve participation in organized networks, political capital is often seen as a specific type of social capital.

Political resources are the opportunities that people have to participate in political and civic processes. These include voting rights, advocacy group membership, whether the person has a position of power within the local community, and whether this person can influence unknown others in relation to a certain interest that lies outside the personal interest sphere.

PERSONAL RESOURCES

Personal resources are related to the characteristics of an individual, for example, emotional or physical well-being. Psychologists have used personality and health indicators to judge how prepared people are to cope with different situations in everyday life. The Big Five (Saulsman and Page, 2004), the loneliness (Hughes et al., 2004; Russel, 1996), and the MMPI scales (Tellegen et al., 2003) are only three of the many indices that researchers use to understand a person's character. In relation to learning and acting in new environments, self-efficacy beliefs have been shown to be important even more than skills developed through formal training (Bandura et al., 1996).

When based on personality characteristics, disengagement from society often leads to a disregard for social norms and a need to rebel against a system that is perceived to have rejected or failed that person. Farrington (1992) links this to a sense of failure and feelings of alienation, which subsequently leads to anti-social behavior and addiction. This lack of personal capital has been related to a breakdown of family relationships, chaotic physical living environments and neighbourhoods, substance abuse and truancy.

FIVE SOCIAL INCLUSION RESOURCES

Most of the resources presented are not stable throughout the lifetime of a person; socio-economic mobility is without doubt possible and ICTs could be a facilitator of this type of mobility. Smaller changes in social and personal capitals can occur because people change their

position and thus status in society by identifying with new groups in different contexts. Context can also change how socially included a person is (Abrams, Hogg and Marques, 2005). On an individual level, social inclusion research often focuses on social and educational skills, attitudes and psychological wellbeing. Individual factors such as context and personal experiences fall outside the scope of most policy research, but can nevertheless be very important in determining how included or excluded people are from society.

There are typically limits and barriers to the speed and extent of social mobility. This is especially true for economic and cultural capital; an individual does not have much choice in increasing their income or, for example, changing their gender overnight. However, they are free to emphasize different capitals in different situations; for example, in certain circumstances they might want to stress being middle-class, in others they might want to emphasize being a majority or minority ethnic group. In general, economic and cultural capitals are considered less manageable while social and personal capitals can be influenced by outside factors and can change over a lifetime.

The five capitals of social exclusion are clearly a simplification of the immense body of literature on social exclusion that exists. In addition, it is difficult to separate the different types of social exclusion because they are often strongly linked, for example, personal wellbeing is related to economic as well as social resources. Furthermore, underlying these five 'higher levels' constructs are a myriad of 'lower level' indicators that can be used to measure different aspects of economic, cultural, social, political and personal capital. However, by focusing on these five higher level resources it is possible to compare research projects that use different lower level measures – as long as all five higher level resources are included in some way in the dataset. Applying this approach to social as well as digital exclusion further facilitates the study of resource-based links between social exclusion and engaging with technologies; therefore, improving the way in which digital interventions are evaluated.

In summary, the five overarching resources (economic, cultural, political, social and personal) form a robust academic basis for an aggregate model of social exclusion that can be measured through a number of lower level indicators depending on the survey data available.

CONCEPTUALISING DIGITAL INCLUSION

A review of different studies indicates that graduated approaches to measuring digital inclusion are being increasingly used to explore the issues. However, these graduations are all too often focused on different levels of access. They can also be too theoretical, which makes it difficult to operationalise the finding. If research is to more effectively steer policy, and provide actionable results, it is clear that researchers need to conceptualise digital inclusion not only around levels of access to ICTs, but also motivation, knowledge and skills.

Bradbrook and Fisher (2004) advocate the '5 Cs' of digital inclusion: connectivity (access), capability (skill), content, confidence (self-efficacy) and continuity. The latter, continuity, is related to the internet and other ICTs as part of the infrastructure of everyday life- not only is the technology widely available, it is becoming part of such an ingrained part of everyday life that it is more and more difficult to see the 'digital world' as separate from the 'real world'.

Digital inclusion often fails to incorporate this idea of continuity especially in groups that are vulnerable to social exclusion. People tend to 'dip in and out' of technologies such as the Internet, depending on their everyday circumstances. This means that at certain points in their lives they are digitally included and at others are excluded. The OxIS survey (Dutton and Helsper, 2007) show clearly that the differences between fully engaged users, the flexible in-out users, and those who have never used the Internet, are important to understand when examining the processes that lead to exclusion.

Against this context, digital inclusion can be defined and measured in a number of different ways. These digital resources have been grouped into four broad categories: ICT access, skills, attitudes and extent of engagement with technologies, and used to create an index of inclusion.

ICT ACCESS

Although policy and theoretical discussions in relation to digital inclusion have moved on from a focus on pure ICT access provision, it remains unclear which characteristics of access, e.g., speed, quality and location, play the, most important roles in engagement and also how best

to measure these. Most of the focus in terms of access is currently on where and how people access the Internet via PCs and therefore most of the research literature focuses on this. Nevertheless, the same issues of quality and quantity of access can be applied to understanding access to other types of ICTs such as digital TV, mobile phones and games consoles.

LOCATION

People have more freedom to use ICTs, such as the internet, in their own home than in other locations. Access at home enables individuals to become acquainted with the technology on their own terms and allows for efficient informal learning to take place. Home access, instead of just access anywhere, is now therefore used by most researchers as an indicator of high-quality access. Access at school is also important. Helsper (2007) argued that for young people, private, personalized access to computers and the internet at school will aid those who do not have access to these ICTs at home to develop digital skills and to explore the internet in a fashion that is learning oriented. Mobile access in the community using WiFi or mobile cards in laptops is also on the increase. For this study the researcher proposes to use the number of locations from which a person has access to the internet as an indicator within the digital inclusion index. Home access, however, is to be given increased weight for the reasons already given. So, an individual with access across multiple locations, including at home, would be measured as being more digitally included than individuals with only access in the community.

QUALITY

Broadband access is considered to lead to higher quality experience and broader use of the internet than dial – up internet access. However, developments in access and infrastructure are rapid, and recent studies (Ofcom, 2006) have indicated that wireless or mobile access is a good indicator of access quality since it is available across different locations and provides a high-speed connection the digital access index therefore includes indicators of infrastructure technology used by individuals, with greater weight given to broadband and wireless than dial – up. In other words, individuals with access to broadband would be seen to have a higher quality of access than those with dial – up and therefore to be more ‘digitally included’.

PLATFORMS

New platforms are emerging that allow for access to a wider variety of digital content for example, digital television, telehealth set top boxes, games consoles and smart energy meters. A range of platforms should therefore be included in studies that aim to measure digital inclusion. The wider the variety of platforms, the wider the diversity of content that is available to a person. In media studies literature this feature is often therefore described as the media richness of a household (Livingstone,1998).

SKILLS

Beyond access to ICTs, certain skills are required to use them. Digital exclusion based on skills is considered to result from a lack of training and direct hands-on experience.

Livingstone, Bober and Helsper (2005) have argued that the best measures of skill level are those that test expertise on a variety of tasks and aspects of ICT use. Skill types can be divided into four broad categories; technical, social, critical and creative skills. This classification is based on media literacy research that suggests that skills should be measured beyond the basic technical level and in relation to the ability to work with communication technologies for social purposes. Content creation and production skills are also seen as increasingly important, to enable individuals to respond to the content they consume and participate more effectively in the information society. Content production is particularly part of expert users' repertoires; experts are particularly familiar with the ways in which digital content is created. Some say these creative skills are necessary to develop true critical skills. This last aspect of ICT skills supports the critical evaluation of the trust-worthiness and accuracy of digital content (Ofcom, 2006).

TRANSFERABLE SKILLS

This combination of specific ICT-related skills is strongly linked to general 'non-ICT' based capabilities that are often labeled as 'transferable skills' (Bridges, 1993). These are skills that people have learned in one context but which they are able to apply in a variety of other contexts and are thus not tied to specific tasks. In relation to digital engagement, one can argue

that general life skills (eg. Critical evaluation of sources, self-efficacy, social skills and creative skills) will allow people to participate more fully in a digital context as well.

In education and workforce research, a series of studies has developed measures for transferable skills (Baker, 1989; CBI, 1989). Bridges (1993) gave a good overview of developments in relation to transferable and core skills, the latter related to specific contexts and activities.

A review of the existing research on digital engagement shows that little work has been done on identifying measures of general 'non-ICT' based capabilities that help individuals participate in an ICT-based society. In fact, transferable skills that are not specifically related to online activities are notable for their absence and this represents an important gap in current digital inclusion research. For example, general problem solving, numeracy or literacy skills are rarely included in studies of digital engagement. However, a lack in these types of transferable skills might be an important barrier to engaging with technology, particularly for those people who are socially excluded.

Specific research around the links between transferable skills and ICT engagement, perhaps around the four higher level skills categories of technical, social, creative and critical skills, should allow researchers to predict different types of uses of ICTs to a greater extent.

SELF-EFFICACY

There are a number of studies that use the general concept of self-efficacy to measure the ability of a person to handle technologies. ICT self-efficacy relates to a person's evaluation of their own ability to work with ICTs. However, this is more likely to be linked to a person's general access and attitudes towards technologies and less likely to be related to specific types of engagement. Internet self-efficacy has been described by Eastin and LaRose (2000) as:

The belief that one can successfully perform a distinct set of behaviors required to establish, maintain and utilize effectively the internet over and above basic computer skills".

In general, those people with higher self-efficacy scores have a greater chance of completing a task successfully than those who have low levels of self-efficacy, independent of their actual skill level (Bandura, 1996, 2003; Torkzadeh and Van Dyke, 2002). Besides

influencing success in using the internet, self-efficacy levels might also influence the motivation to go and use it. Those with low levels of self-efficacy are less likely to use the Internet in the future (Eastin and LaRose, 2000).

Haddon (2000) uses the term self-exclusion to describe processes of ICT rejection that are based on low perceptions of personal skill (not necessarily based on real skill levels) and negative attitudes towards technologies in general. Members of some social groups might be disadvantaged not because they do not have access or skills, but because they feel they do not have access or skills, but because they feel they do not have the skills to go online or because they imagine the internet to be of little use (Anderson, 2005; Cushman and Klecun, 2006; Dutton and Shepherd, 2006; Selwyn, 2003, 2004; Wajcman, 1991, 2000, 2004). These feelings might not be based on actual experiences with the technologies.

ATTITUDES

Attitude formation in relation to the usefulness and dangers of the Internet has been found to go beyond individuals' perceptions of the influence of ICTs on their personal experiences. There is from a review of the literature, no clear consensus emerging on classifying and measuring different types of attitudes in relation to ICTs. In this study three categories are chosen; general attitudes towards ICTs, attitudes towards regulation, and attitudes about the centrality or importance of ICTs.

GENERAL ICT ATTITUDES

The terms 'ICT anxiety' and ICT attitudes' have been used to describe people's evaluation of the effect that ICTs have on society and on an individual's quality of life. The concept of ICT anxiety particularly represents the apprehensions a person has regarding the use of ICTs. Some ICT anxiety indicators are similar to self-efficacy measures, but more generally they relate to attitudes about ICTs, impact on social interactions or on personal freedom and safety.

REGULATION

A number of studies have investigated the attitudes of people towards the regulation of the internet, data protection and privacy, and towards the influence of ICTs on an individual's

participation in society. This interest in attitudes towards regulation is often linked to people's concerns about problematic or harmful digital content that might be available through different ICT platforms.

Research has focused on people's attitudes towards the role of the government, educators, parents, service or content providers and children in regulating exposure to different types of content considered problematic for vulnerable individuals. On the other side of this debate are questions about people's attitudes towards freedom of speech and the importance of ICTs in providing a platform for dissent and public debate.

These attitudes towards regulation of digital content inform people's perceptions of what the most important opportunities and risks are in engaging with ICTs and can therefore shape the ways in which they engage or not.

IMPORTANCE OF ICTs

A further strand of research has asked what the importance is of ICTs in everyday life and how central they are to the ability to function in an increasingly information based society.

There is evidence that some attitudes to the importance of the internet to everyday life are grounded in cultural and social factors such as gender and ethnicity (Boneva, Kraut and Frohlich, 2001; Cummings and Kraut, 2002; Jackson et at., 2001; Spooner,2001). Feminist scholars have shown how certain social groups develop ideas of appropriate use of ICTs that are entwined with their group identity. This could explain why certain socio-cultural groups think that a technology is not made for them, that it is not appropriate for them to use or that they are not good at using it (Gill and Grint, 1995). Selwyn's (2004) work indeed suggests that a lack of interest in a technology can hide not only a lack of confidence in one's own skills but also a feeling that it is not directed at one's peer groups.

DIGITAL ENGAGEMENT

Access to ICTs is a necessary but not sufficient condition for successful engagement with technology, similarly, high skill levels and positive attitudes are not, on their own, sufficient to guarantee full, broad digital engagement. There are two main approaches to measuring digital engagement; it can be measured through a qualitative lens, focusing on the nature or content of

engagement, or it can be approached quantitatively through an evaluation of the number of things that people do using the technology.

NATURE OF ENGAGEMENT

There is often a range of ways in which people can engage with any one technology the mobile phone, for example, can be used to communicate with others, to find information, listen, to music or to play games. Since the internet is currently the most versatile medium in terms of the differently types of engagement that are possible, most of the research that has tried to classify digital engagement is based on the internet.

The internet itself a concept with unclear boundaries and many scholars have used the term in different ways. When one uses a narrow definition of the internet as meaning just 'websites', there are still many different types of websites offering many forms of engagement. Given that the internet has a wider range of different functions than traditional media, such as television and radio, the internet offers a new range of uses to individuals (e.g., Didi and LaRose, 2006; Slevin, 2000). Anderson and Tracey (2001) have argued that the Internet cannot be studied as a single unit, and view it as a "delivery mechanism for a range of services that are continually evolving and are used differently by different people". Clear-cut distinctions between commonly used categories of internet use, such as entertainment, information, services, communication and participation (e.g., Papacharissi and Rubin, 2000), cannot always be established in empirical research. It is still important to analyse the internet as offering resources in these different areas and not focus just on users and non-users but also on breadth and nature of use.

Digital engagement is especially difficult to measure consistently because technology is changing so rapidly. A classification of different types of engagement is also useful in a model of digital engagement that is concerned with multiple platform and technologies. The traditional classification of ICT use can be more or less distilled down to communication, networking, entertainment, leisure, information, learning, economic participation, political participation, civic engagement and creativity. The broad classification to be adopted in this study, based on a literature review is a subset of the broader list: information, entertainment, communication, participatory, and commercial forms of engagement.

When using ICTs, certain types of engagement have been considered to be more socially desirable (i.e., information seeking and civic interest) than others (i.e., pornography and gambling) by policy makers and educators. This indicates that some types of engagement would be better indicators of inclusion and 'proper' use than others. Digital inclusion research tends to ignore use of undesirable applications as indicators of inclusion and instead focus on those that are assumed to bring greater social advantage.

This latter approach requires researchers and policy makers to make a moral judgement as to which types of engagement are more valuable. This also implies that a person who engages heavily with ICTs, for example by being an expert gamer, could nevertheless be considered less digitally included than others by virtue of the absence of desirable types of engagement.

EXTENT OF ENGAGEMENT

All these types of engagement can be undertaken across different technologies. For example, information, entertainment and communication are all possible through digital TVs, mobile phones and computers connected to the internet. Breadth of engagement can therefore be measured across a range of activities and technologies. In this study it is proposed to measure the breadth of engagement as a sum of the different activities via ICT. Creating such a scale and standardizing the results makes it possible to compare different datasets both over time and across different studies.

Further measure of extent of engagement relate to the time people spent using different ICTs and the number of years they have been actively using these types of ICTs.

FOUR CATEGORIES OF DIGITAL INCLUSION

Technology is changing rapidly and therefore digital inclusion is also dynamic, that is, what was considered advanced three years ago can be considered 'basic' digital inclusion now. This means that the categories and measurement framework for digital engagement need to stand the test of time and be able to deal with these changes. The four categories that have been presented are therefore, contextual in a similar way to the categories of social exclusion. We have also focused on higher level, aggregate measures for each category are also to be focused. These aggregate measures are formed from lower level indicators (e.g., quality and location of

access). However, these lower level indicators have not been clearly defined in terms of specific questions that need to be asked to measure them. Any study or intervention that aims to understand digital inclusion needs to inquire at the very least into the four broader categories and their immediate lower level indicators. If all these indicators are measured then studies can be compared and interventions can be evaluated, independently of how the specific lower level indicators are compiled through surveys.

For each of the four categories (use, access, skills and attitudes) a separate scale can be constructed and used for comparative analyses. Similarly, for different datasets separate scales should be designed for the lower level measures (e.g. nature and extent of use) and while these scales might contain data derived from different questions, on an aggregate level they should be measuring the same overarching category. This framework and measurement approach provides a robust basis for an ideal measure of multiple digital deprivations, in contrast to current indices of digital exclusion which focus mainly on 'access' deprivation.

As was the case for the five social exclusion categories, the digital engagement categories are interrelated. However, in contrast to the way in which the social exclusion framework was developed, it is proposed that they do not all influence each other in parallel. Three of these categories (access, skills and attitudes) are considered to be mediators between social inclusion and digital engagement.

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CHAPTER IV

DIGITAL INCLUSION SCENARIO IN INDIA – AN OVERVIEW

INTRODUCTION:

The last decade, especially since 2003, has seen tremendous growth and dynamism in the Indian telecommunications sector. A phone has been transformed from a "luxury" good to a "necessity" connecting millions of people. Earlier India was primarily concerned with increasing teledensity, i.e., telephones. Now, the idea of phones has itself changed from fixed line/wireline phones to mobile/wireless phones connecting people everywhere and anywhere (except perhaps the rural areas where unfortunately majority of Indians reside). The concept of connectivity itself has changed. The term telecommunications now include many other services namely Internet services, radio paging services, Very Small Aperture Terminals (VSATs), Public Mobile Radio Trunk Service (PMRTS) and global mobile personal communication by satellite (GMPCS).

Of all the above mentioned segments, wireless and Internet have registered the highest growth in the last few years. The number of total telephone subscribers in India increased from 28.53 million in March 2000 to 943.49 million in February 2012. Wireless subscriptions increased from 1.88 million in March 2000 to 911.57 million in February 2012 and wireline subscriptions increased from 26.65 million in March 2000 to 32.33 million in February 2012. As a result, India has the second largest mobile market in the world after China. India reached its Eleventh Five Year Plan (EFYP) target of 600 million subscribers in 2010 itself. The number of total Broadband subscribers in India is 13.54 million in February 2012.

INTERNATIONAL COMPARISON:

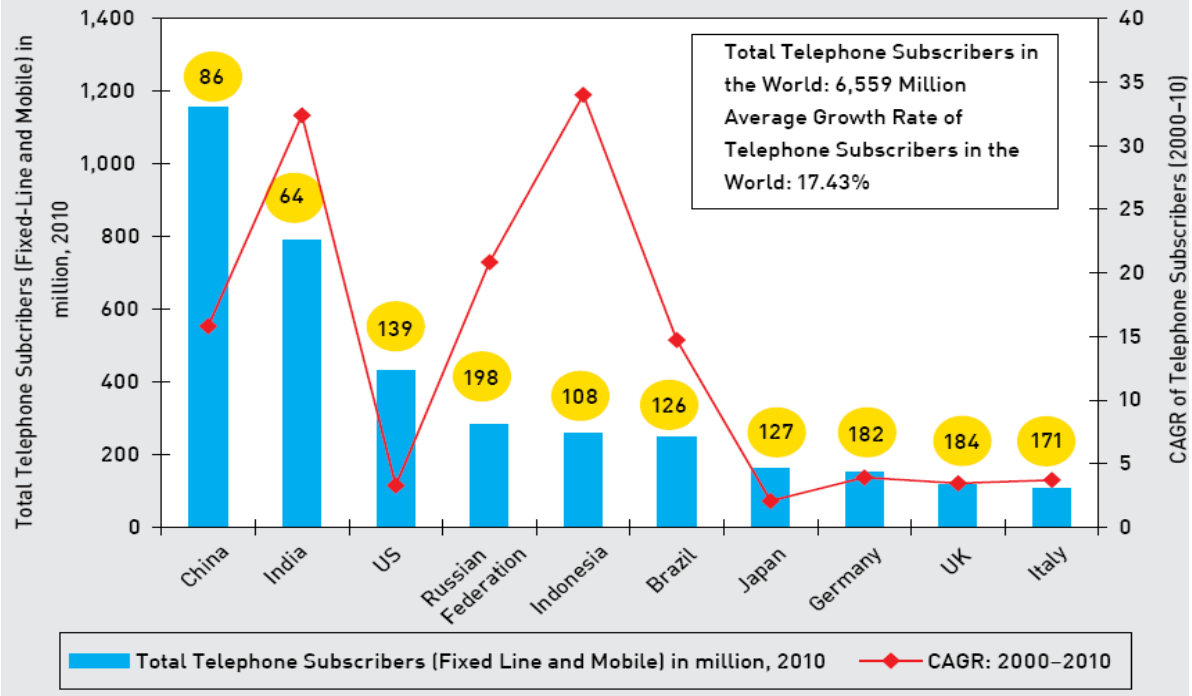
The total number of telephone subscriptions in the world including fixed line and cellular sector grew at a Compound Annual Growth Rate (CAGR) of 17.43 per cent between 2000 and 2010. A total of more than US$ 3,670 billion (6 per cent of the world's GDP) was spent on telecommunication services by governments across the world in 2008. India's expenditure on telecommunication services in 2008 was to the tune of US$ 52 billion. This was 4.3 per cent of the country's total GDP. Government's expenditure on telecommunications in India increased at the rate of 14 per cent during 2005–08.

This section compares India's position to that of the world in telephones and Internet availability and usage. India has risen through the ranks to be amongst the top telephone and Internet users in the world in absolute numbers but on a relative scale (to population) it still ranks low.

TELEPHONE SUBSCRIPTION:

Available international comparisons till 2010 show that India has the second largest number of telephone subscribers in the world (222 countries), accounting for 12 per cent of the world's total telephone subscribers as shown in Figure 4.1.

FIGURE 4.1: INDIA'S POSITION IN TELEPHONE SUBSCRIPTIONS



Source: International Telecommunication Union (ITU). Available online at www.itu.int

Note: Teledensity numbers are shown in the circles above the bars of the respective countries.

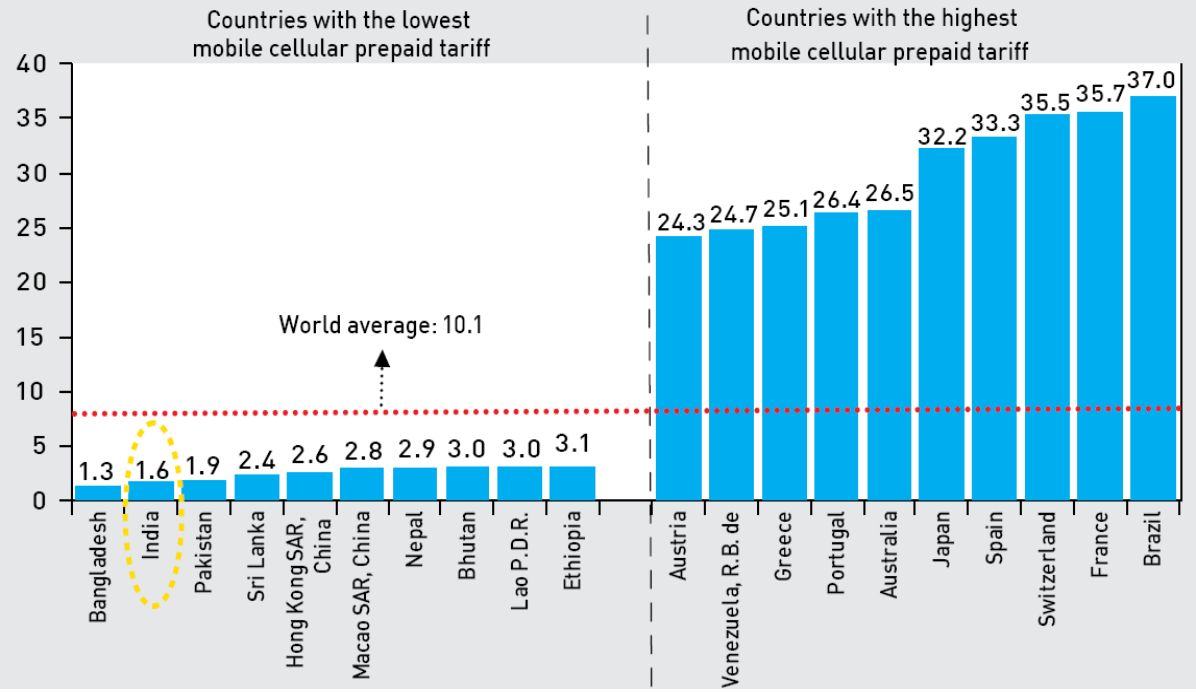
It is also one of the fastest growing in terms of telecom subscribers. Total telephone subscribers in India have increased at a CAGR of 32 per cent in 2000–10 against the world average growth rate of 17.34 per cent. However, India's teledensity, 64, is still lower compared to the world average of 108 (Teledensity as on February 2012 is 78.1). This indicates low penetration of telephones in the rural areas.

Teledensity has increased in India and around the world especially in the developing countries due to the rise of mobile phones. As of 2010, the ratio of mobile phones to fixed lines in the world ranged from 0.4:1 to 386.5:1. The average ratio of mobile phones to fixed lines in the world stood at 21.5:1 in 2010. In India the same ratio is 21.4:1 in 2010 whereas the comparable numbers for China and U.S. are 2.9:1 and 1.8:1, respectively.

TARIFFS:

Mobile cellular prepaid tariffs ranged between US$ 1.3 and 37 per month across countries in 2008 (Figure 4.2). Average mobile cellular prepaid tariff in the world is US$ 10.1 per month. Mobile tariffs are the lowest in countries such as Bangladesh, India, Pakistan, Sri Lanka, Nepal, Bhutan, and so on. Mobile tariffs in India are the second lowest (US$1.6 per month) in the world after Bangladesh. Countries with the highest mobile tariffs in the world include Austria, Venezuela, Greece, Portugal, Australia, Japan, Spain, Switzerland, France, and Brazil. This particularly low tariff in South Asia was an innovation (driven by intense competition, low purchasing power and strict regulatory environments) from this region called the "budget telecom network model"

FIGURE 4.2: INDIA'S POSITION IN MOBILE CELLULAR PREPAID TARIFFS (US $ PER MONTH), 2008

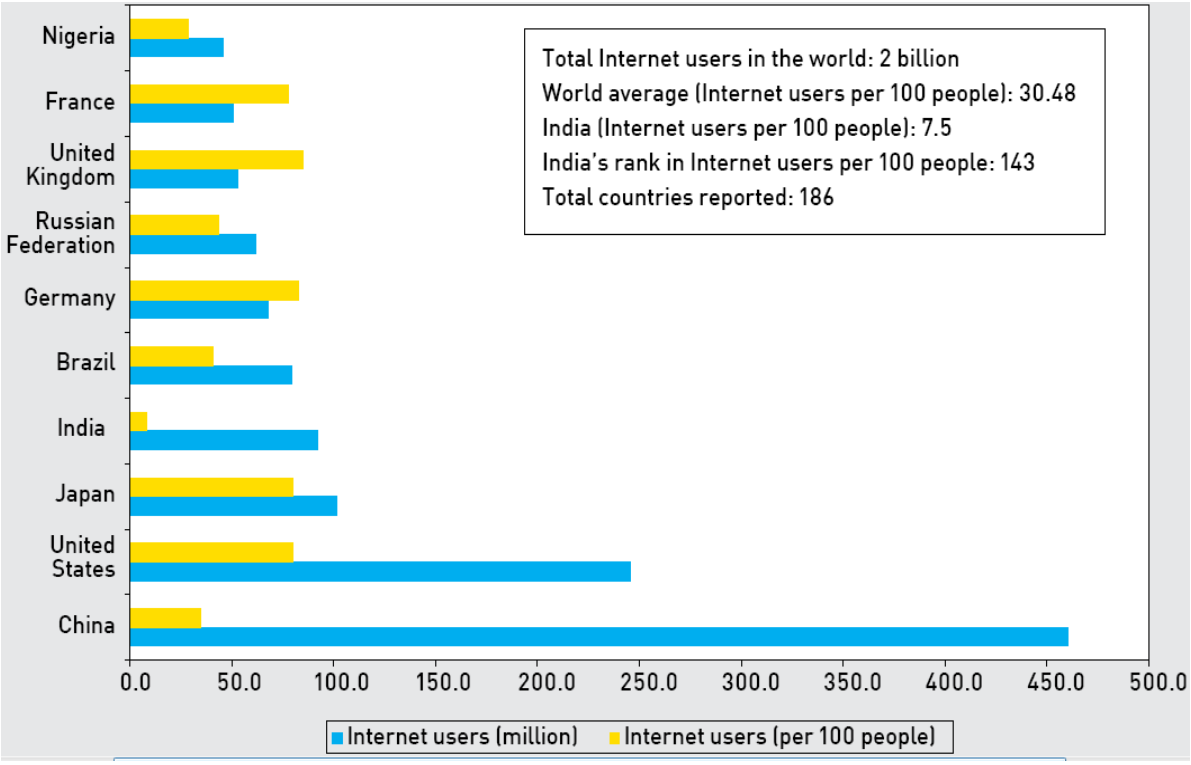


Source: World Development Indicators. Available online at www.worldbank.org

INTERNET USERS:

India is ranked fourth amongst Internet users in the world, accounting for 4.56 per cent of the world's total Internet users in 2010 as shown in Figure 4.3. Internet users in India expanded at a significantly high CAGR of 32.27 per cent during the period 2000–10 while those in the world expanded at an average rate of 17.46 per cent. However, India ranks low in terms of Internet users per 100 people in the world (143 out of 186) with only 7.5 per 100 people using Internet, compared to the world average of 30.48. The growth numbers in terms of users are dazzling but as the next section will show, India is still far behind in Internet subscriptions.

FIGURE 4.3: INTERNET USERS IN INDIA AND IN THE WORLD, 2010



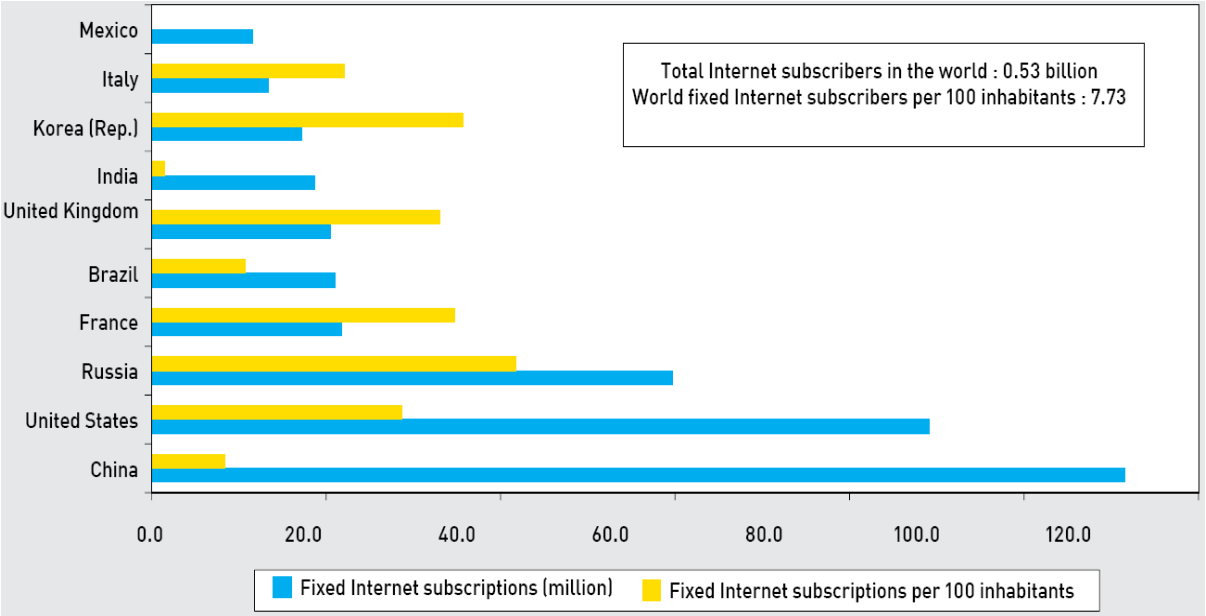
Source: World Development Indicators, World Bank. Available online at www.worldbank.org

INTERNET SUBSCRIPTIONS:

Out of the 91.8 million people using Internet in India, there were only 18.7 million fixed Internet subscribers in 2010 as shown in Figure 4.4. India was ranked the seventh

highest (out of 214 countries) in this category in 2010. The country accounted for 3.54 per cent of the world's total fixed Internet subscribers in 2010. The number of fixed internet subscribers per 100 inhabitants in 2010 was 1.53.

FIGURE 4.4: INDIA'S POSITION IN FIXED INTERNET SUBSCRIPTIONS IN THE WORLD, 2010



Source: International Telecommunication Union. Available online at www.itu.int

Notes: The 2009 numbers have been used for the China and Russia figures.

GROWTH OF TELECOMMUNICATION SERVICES IN INDIA:

Telecom services in India can be basically divided into two major segments: (a) telephones, wireline and wireless, and (b) Internet services. In addition, it also comprises of other smaller segments including radio paging services, VSATs, PMRTS and global mobile personal communication by satellite (GMPCS). As mentioned earlier, wireless phones and Internet services have registered the highest growth in the last few years.

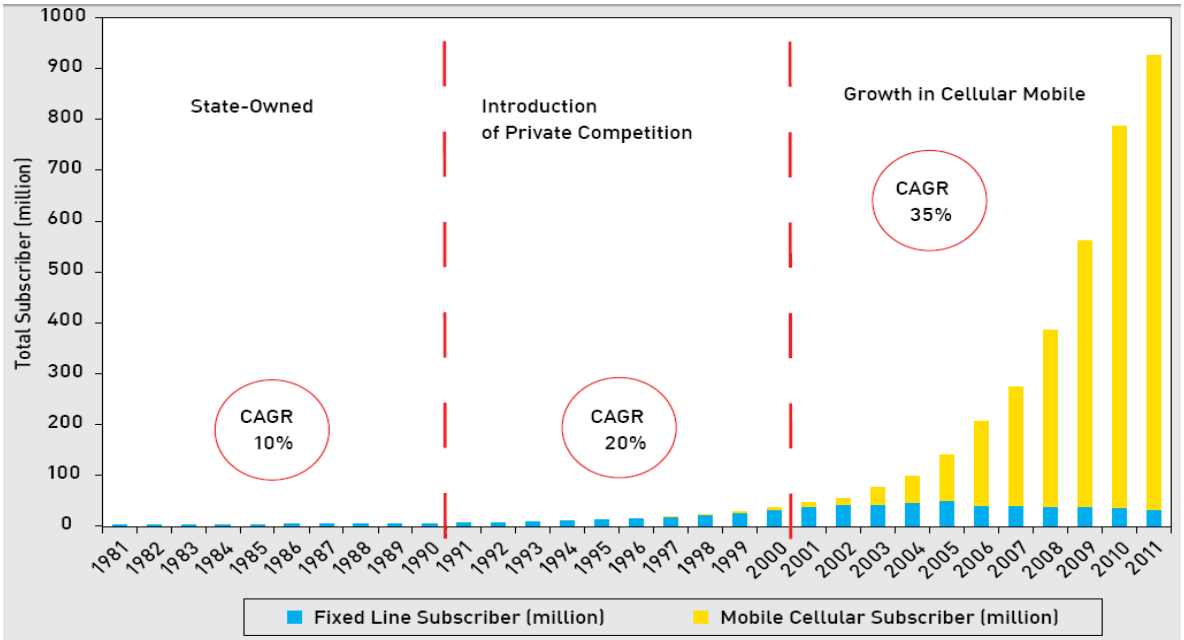
TOTAL SUBSCRIPTIONS OF TELEPHONES:

Growth of telephones sector can be summarised in three stages (Figure 4.5). Stage I: Before 1990. This refers to the period when the telecom sector was mainly state owned; Stage II: 1991–2000. This refers to the period between the onset of reforms but the absence of wireless phones; and Stage III: post-2001. This refers to mainly the era of wireless.

As can be seen in Figure 4.5, the total subscriptions of telephones witnessed a sluggish growth (CAGR of 10 per cent) in the state owned era corresponding to the period 1981–90. The foundation of growth of this sector was laid with the introduction of reforms in 1992 mainly in the form of increased competition due to opening up of the sector to private players. This facilitated easy market access for telecom equipment and a fair regulatory framework for offering telecom services to the Indian consumers at affordable prices. As a result, telephone subscriptions grew at a CAGR of 20 per cent during 1991–2000.

The introduction of wireless phone in mid-1990s coupled with increased competition has completely changed the picture. The number of mobile phone connections crossed fixed line connections in September 2004. As a result, the number of telephone subscriptions grew at a CAGR of 35.3 per cent during the period 2001–11. Total telephone subscribers in India increased from 28.53 million in March 2000 to 943.49 million in February 2012. Wireless subscriptions increased from 1.88 million in March 2000 to 911.17 million in February 2012 and wireline subscriptions increased from 26.65 million in March 2000 to 32.33 million in February 2012.

FIGURE 4.5: TOTAL NUMBER OF TELEPHONE SUBSCRIBERS IN INDIA, 1981-2011 (Million)

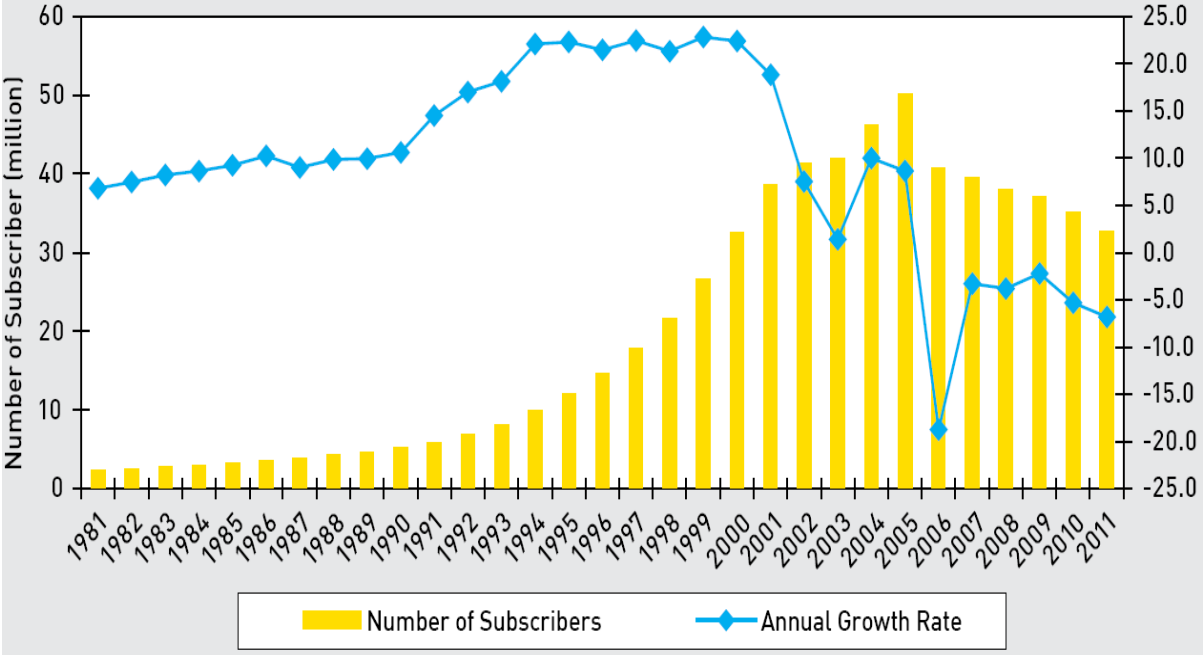


Sources: World Development Indicators. Available online at www.worldbank.org
Telecom Regulatory Authority of India.
Note: These are subscriptions at the end of each calendar year.

WIRELESS SUBSCRIPTIONS:

Wireline subscriptions increased from 2.3 million in 1981 to 32.44 million in 2000 to reach its peak at 50.18 million in 2006. Thereafter, it started registering negative growth (Figure 4.6). By the end of February 2012, wireline subscriptions came down to 32.33 million. India has followed the worldwide trend where the mobile phone is a substitute to fixed line phone, through competition has forced the landline services to become more efficient in terms of quality of services. The landline network quality has improved and landline connections are now usually available on demand.

FIGURE 4.6: TOTAL NUMBER OF WIRELINE SYBSCRIBERS AND GROWTH RATE IN INDIA, 1981-2011



Sources: World Development Indicators. Available online at www.worldbank.org

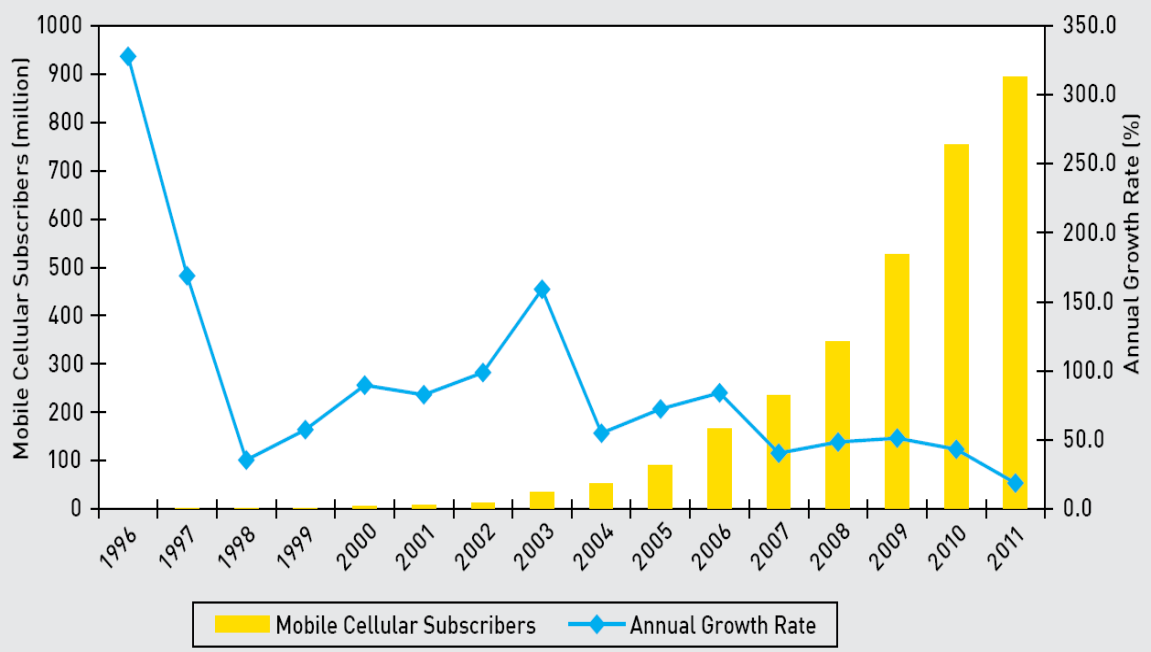
Telecom Regulatory Authority of India

WIRELESS / CELLULAR / MOBILE PHONE SUBSCRIPTION:

Cellular or mobile segment has been the key contributor to record growth in telephone subscriptions with its wide range of offers of services. It has led the growth wave of telecom sector in the country. After triple digit growth rate in the first two years, growth rate reduced to 35.6 per cent in 1998. The annual growth rate of wireless phones increased again till 2003 and peaked at 159.2 per cent. Since then. the growth rate has tapered down and has averaged

around 51.8 per cent during 2004–11. In 2011, growth rate significantly came down to 18.8 per cent (Figure 4.7). Mobile phones accounts for nearly 96.6 per cent of the total telecom subscriptions as of February 2012.

FIGURE 4.7: TOTAL NUMBER OF WIRELESS SUBSCRIBERS AND GRWOTH RATE IN INDIA, 1996-2011



Sources: World Development Indicators. Available online at www.worldbank.org, Telecom Regulatory Authority of India (2011).

More than 95 per cent of wireless connections are prepaid. In India GSM mobile system is pre-dominant. There is a clear distinction between the Global System for Mobile Communications (GSM) and Code Division Multiple Access (CDMA) technologies. At the end of December 2011, GSM accounted for 87.9 per cent of the wireless subscriptions and was growing at a faster rate.

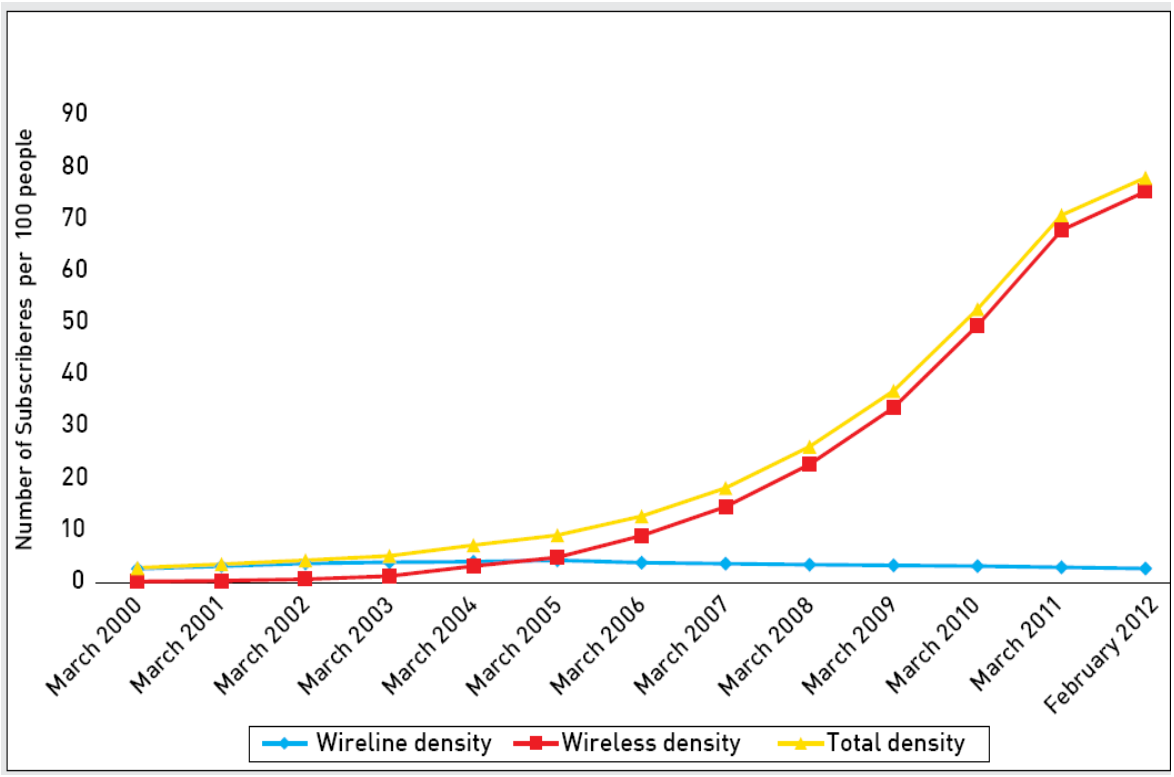
The number of wireless subscribers is based on Home Location Register (HLR) which presents the number of users registered on the network. When compared with the Visitor Location Register (VLR) which shows only those subscribers who make calls or send SMSs or use data regularly and are active over a continuous period, HLR presents a somewhat overstated figure. There is also no double counting of subscribers because each base station in the network is served by exactly one VLR, hence a subscriber cannot be present in more

than one visitor location. As per this method, only 73.6 per cent of the total wireless subscribers (670.65 million) were found to be regular users as of February 2012. Even then the growth in telephone subscribers is spectacular given where India was in 2000.

TELEDENSITY:

With the increase in the number of telecom subscriptions, the total teledensity has increased from 2.81 in 2000 to 78.10 on February 2012, a CAGR of 31.9 per cent. This is mainly driven by the increase in wireless density (Figure 4.8). Wireline density was higher than wireless till 2004 and then declined after peaking in 2005. During the period March 2000–February 2012, wireline density increased at the CAGR of 0.19 per cent. Wireless density increased at the CAGR of 64.65 per cent during the period March 2000 to February 2012.

FIGURE 4.8: TELEDENSITY, MARCH 2000- FEBRUARY 2012



Source: Telecom Regulatory Authority of India.

WHY WIRELESS:

There is no recent data which can inform us directly about the expenditure of households on communication items in India. However, the 61st round of National Sample Survey (NSS) data for 2004–05 informs us that the monthly per capita expenditure of a household on telephone charges in rural areas was Rs 5.54 out of the total expenditure (food and non-food, except durables) of Rs 558.78. In urban areas the corresponding figures were Rs 37.8 and Rs 1,052.36. This means that in rural areas, households spent approximately 1 per cent of their total expenditure on telephones whereas for households in urban areas this figure was 3.59 per cent. Share of expenditure on mobile phones from other studies is shown in Table 4.1.

Table 4.1: Estimates of Share of Expenditure on Mobile Phones

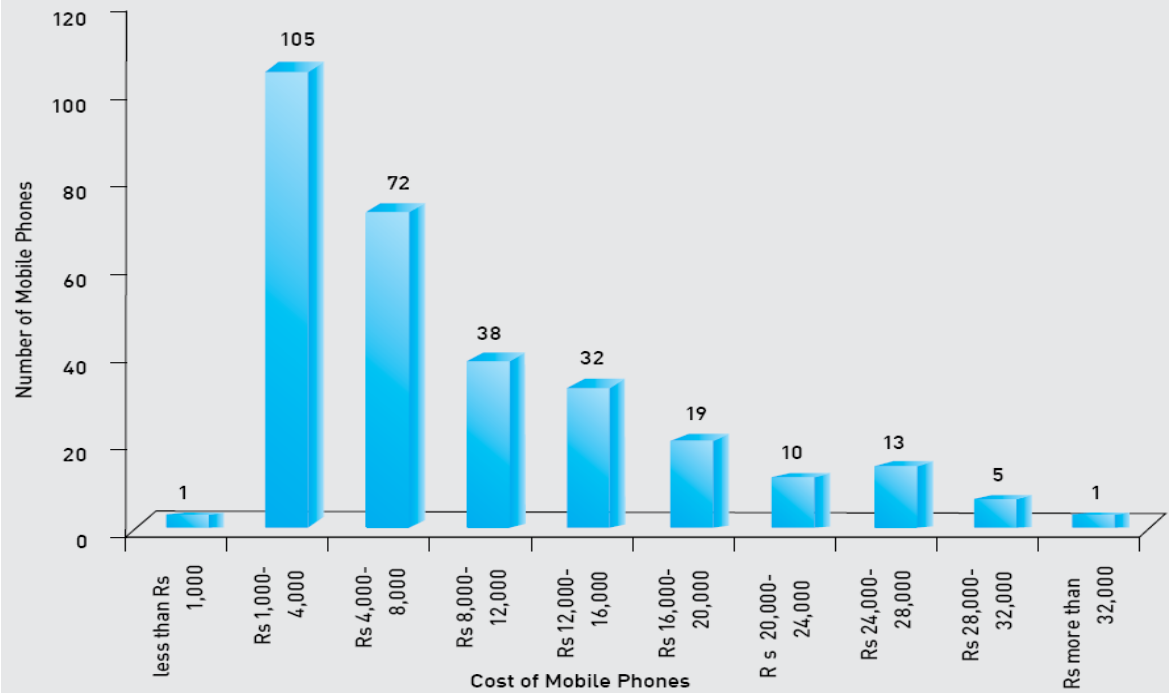
Name of the study	Expenditure on mobile phones
Rashid, A.T. and L. Elder (2009), Mobile Phones and Development: An Analysis of IDRC- Supported Projects, Electronic Journal on Information Systems in Developing Countries,36(2), 1–16. www. ejisdc.org. Accessed on January 6, 2011.	Expenditures on mobile phones range from four to eight per cent of income per month.
Sarin, A. and R. Jain (2009), Effects of Mobiles on socioeconomic Life of Urban Poor. Indian Institute of Management, Ahmedabad Working Paper No. 2009-02-05. Available online at http://www.iimahd.ernet.in/. Accessed on November 3, 2010.	More than 70 per cent of the urban poor households spend around 3 per cent of their total household earnings on their mobile every month.
Agüero, A. and H. de Silva (2010), Bottom of the Pyramid: Expenditure Patterns on Mobile Phone Services in Selected Emerging Asian Countries,LIRNEasia Teleuse@BOP3 Working Paper Series. Available online at http://lirneasia.net/. Accessed on January 19, 2011.	Monthly expenditure on mobile varies between each quintile for the period 2008–09 (bottom-most – 24.3 per cent, second bottom-most – 11.3 per cent, Middle – 8.4 per cent, second topmost – 5.7 per cent and top-most – 4.4 per cent).

Source: Review of Literature

The above estimates show that mobile phones may be a significant part of expenditures for households especially for the bottom half. Mobile phones substitute for fixed lines in developing countries and complements fixed lines in developed countries. Vodafone (2009) finds similar results for India where there is a complementary relationship between wireline and wireless in high mobile penetration states and they act as substitutes in low mobile penetrated states. There has been a lot of literature in the last decade which has examined the question of popularity of the mobile phones in developing countries like India.

The popularity of mobile phones is due to their personal, portable, and digital nature enabling people to be always "connected". Further, the budget telecom network model and the ultra low cost of handsets (Figure 4.9) has made mobiles ubiquitous. More than a quarter of all handsets sold in India are second-hand i.e., re-sold and recycled within India. These factors lower the barrier to entry. On the supply side, it is relatively cheaper to extend mobile connections than fixed line telephony.

FIGURE 4.9: MOBILE PHONE PRICES IN INDIA



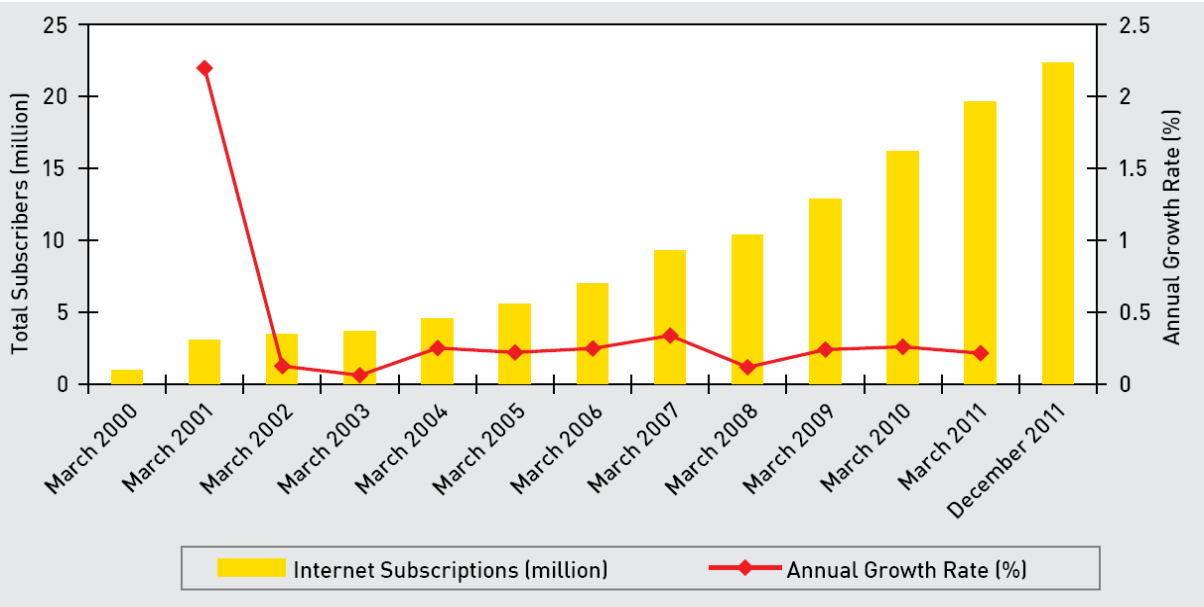
Source: Mobile phone prices in India. Available online at www.fonearena.com

Note: Mobile phone prices are as of February, 2011.

INTERNET-DATA TRENDS:

The number of Internet subscribers increased from 0.95 million in March 2000 to 22.39 million in December 2011, grown at a CAGR of 33.3 per cent (Figure 4.10). As of December 2011, this comprises of 13.35 million broadband (>=256 kbps) connections and 9.08 million narrowband (<256 kbps) connections. Latest statistics available till February 2012 indicate that broadband subscribers have increased to 13.42 million.

FIGURE 4.10: INTERNET SUBSCRIPTIONS AND GROWTH RATE, MARCH 2000- DECEMBER 2011



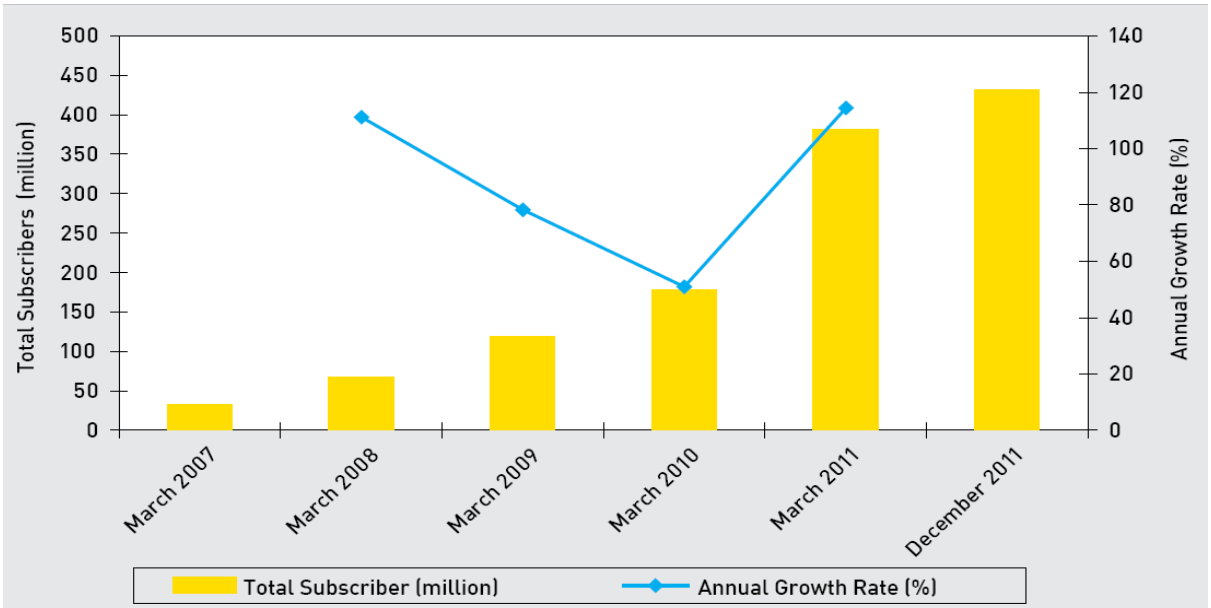
Source: Telecom Regulatory Authority of India.

Despite such impressive growth, the share of Internet users remains a negligible fraction of India's total population. Lack of accessibility, lack of information, lack of literacy, inconsistent power supply, and high maintenance cost of personal computers (PCs) are some of the major reasons for this phenomenon. This implies that mobile Internet access may have a substantial impact on Internet users in the country.

Mobile broadband is getting increasingly popular in India similar to China, especially accessing broadband over the mobile phone. There were 431.37 million wireless subscribers in India who had subscribed to data services as of December 2011. This implies that 48.26 per cent of total wireless subscribers were capable of accessing data services/Internet at the end of December 2011. The number of wireless subscribers who have subscribed to data

services has increased at the CAGR of 93.1 per cent between March 2007 and December 2011 (Figure 4.11). This growth rate is much higher than the growth in traditional Internet subscribers.

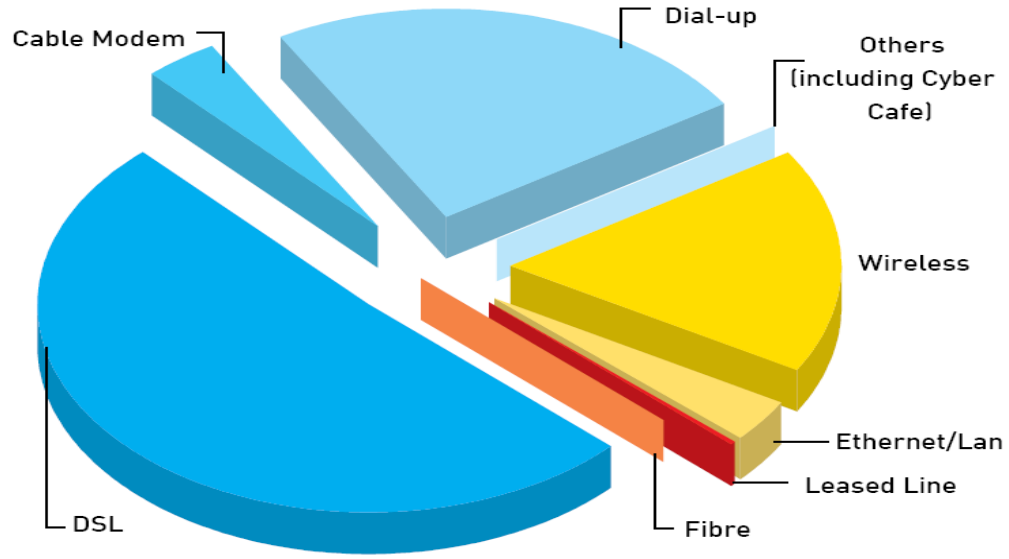
FIGURE 4.11: WIRELESS SUBSCRIBERS CAPABLE OF ACCESSING DATA SERVICES/ INTERNET, MARCH 2007- DECEMBER 2011



Source: Telecom Regulatory Authority of India.

Broadband subscription is 59.6 per cent of total Internet subscription as of December 2011. Dial-up is the most popular narrowband technology with 24.2 per cent of total Internet connections (Figure 4.12).

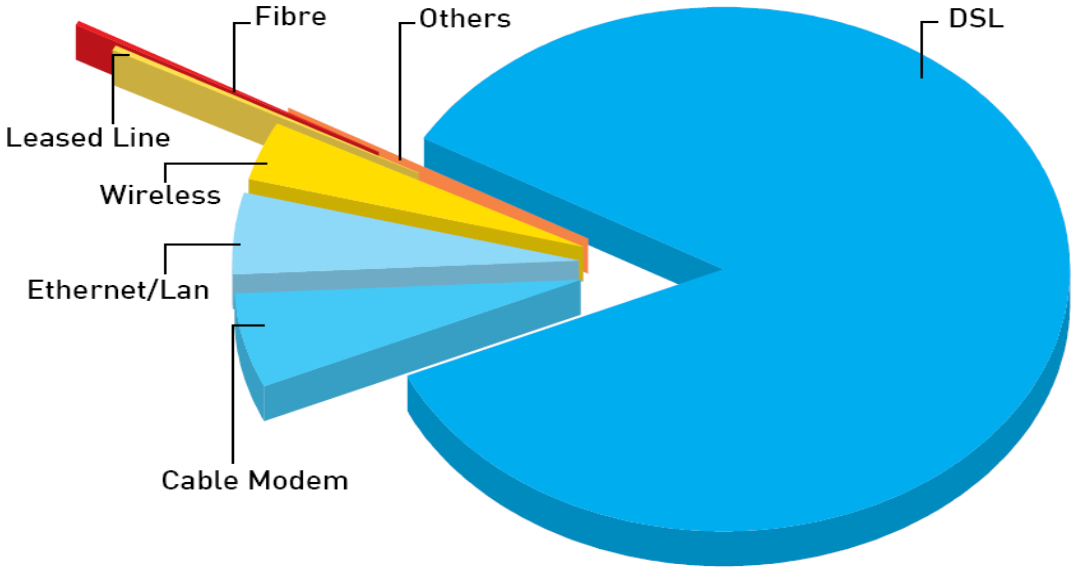
FIGURE 4.12: MARKET SHARE OF INTERNET ACCESS TECHNOLOGIES INCLUDING BROADBAND, DECEMBER 2011



Source: Telecom Regulatory Authority of India.

Digital Subscriber Line (DSL) is the most preferred technology used by the service providers to provide broadband services, which constitutes 50 per cent of total Internet subscribers and 85.1 per cent of total broadband subscribers (Figure 4.13).

FIGURE 4.13: BROADBAND ACCESS, TECHNOLOGIES AND MARKET SHARE, DECEMBER 2011



Source: Telecom Regulatory Authority of India.

OTHER SERVICES

PUBLIC CALL OFFICES AND VILLAGE PUBLIC TELEPHONES:

Total number of Public Call Offices (PCOs) in the country as of December 2011 was 2.37 million as compared to 0.65 million in 2000, showing an increase of 12.5 per cent (CAGR). However, the numbers declined as compared to the previous year (Table 4.2). The declining trend in PCOs could be attributed to the increasing penetration of mobile connections due to reduction in entry level costs and availability of customised tariff schemes in the market. The number of Village Public Telephones (VPTs) increased from 0.41 million in 2000 to 0.58 million in December 2011. per cent of inhabited villages connected in India is 98.2.

Table 4.2: PCO AMD VPT, March 2000 – December 2011 (million)

Year	PCO	VPT
March 2000	0.65	0.41
March 2001	0.86	0.37
March 2002	1.08	0.47
March 2003	1.49	0.51
March 2004	1.92	0.52
March 2005	2.77	0.53
March 2006	4.20	0.55
March 2007	5.55	0.56
March 2008	6.19	0.56
March 2009	6.20	0.56
March 2010	4.59	0.57
March 2011	3.33	0.58
December 2011	2.37	0.58

Source: Telecom Regulatory Authority of India.

OTHER VALUE ADDED SERVICES: PMRTS AND VSAT:

The number of PMRTS subscribers has increased from 0.019 million in March 2000 to 0.036 million in March 2008 before declining to 0.033 million in December 2011. The

number of VSAT subscribers have gone up steadily from 0.017 million in 2003 to 0.15 million in 2011 (Table 4.3).

Table 4.3: Number of Subscribers for Other Value Added Services, March 2000 – December 2011 (million)

Year	PCO	VPT
March 2000	0.019	-
March 2001	0.023	-
March 2002	0.028	-
March 2003	0.026	0.017
March 2004	0.025	0.028
March 2005	0.026	0.038
March 2006	0.030	0.050
March 2007	0.032	0.061
March 2008	0.036	0.081
March 2009	0.032	0.102
March 2010	0.033	0.124
March 2011	0.034	0.14
December 2011	0.033	0.15

Source: Telecom Regulatory Authority of India.

PUBLIC VERSUS PRIVATE:

Telecom service was initially state owned in India. Two state-owned public sector incumbents, namely Bharat Sanchar Nigam Limited (BSNL) and Mahanagar Telephone Nigam Limited (MTNL), have till date dominated the fixed line service. However, facilitated by reforms, role of the private sector has increased in the telecom sector since 1992. From the days of a state monopoly with very limited growth, the sector has grown manifold with a number of private players driving growth.

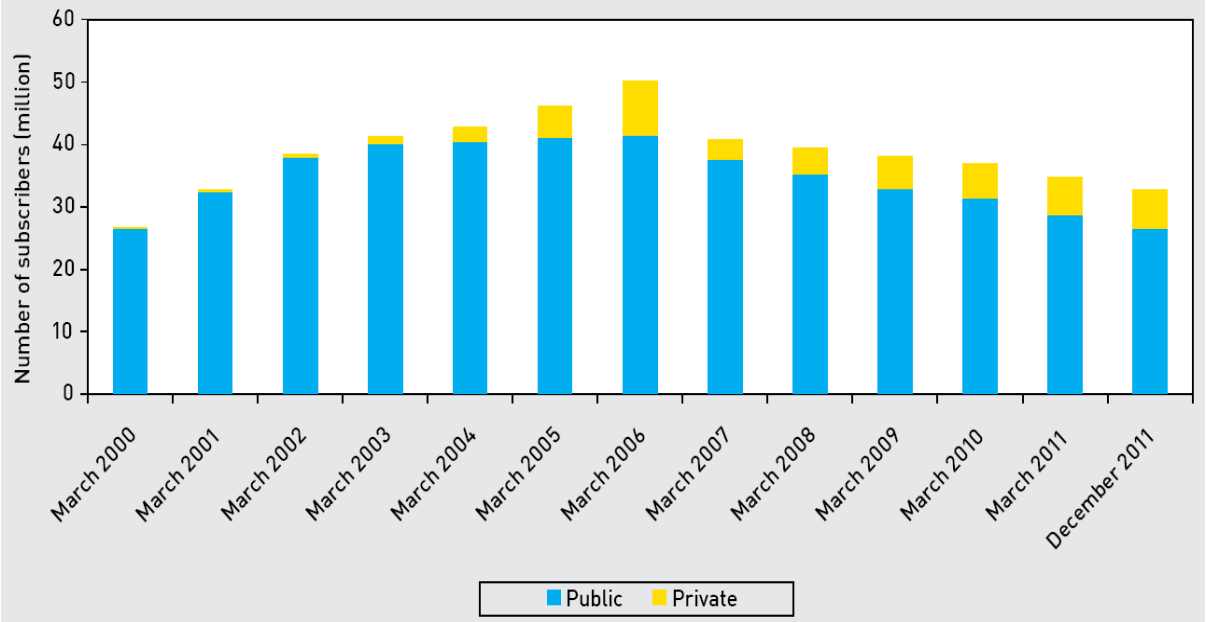
TELEPHONES:

The public and private players share the fixed line and the mobile segments, with the public sector dominating the wireline and private sector dominating the wireless segments. The major players of the telecom sector are currently experiencing fierce competition in both

the segments. As a result, players are coming up with new tariffs and discount schemes to gain competitive advantage.

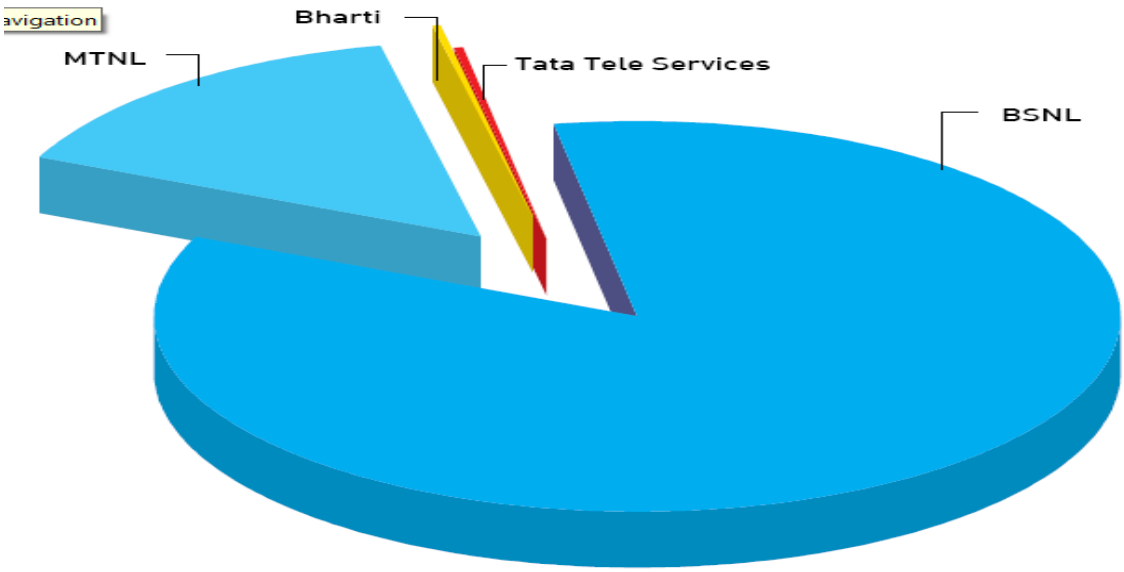
Figures 4.14, 4.15A and 4.15B show the dominance of the public sector in the delivery of fixed line services, which has changed only a little in the last decade. In the wireline segment, the state-owned public sector incumbents, namely BSNL and MTNL have been the dominant players. However, private companies such as Bharti, Reliance and Tata Tele Services have also marked their presence. As a result, share of BSNL and MTNL have come down from 100 per cent in March 2000 to 81 per cent in December 2011. Further, the number of players in the private sector has increased signalling higher competition in this sector.

FIGURE 4.14: PUBLIC- PRIVATE WIRELINE SUBSCRIPTIONS, MARCH 2000- DECEMBER 2011 (Million)



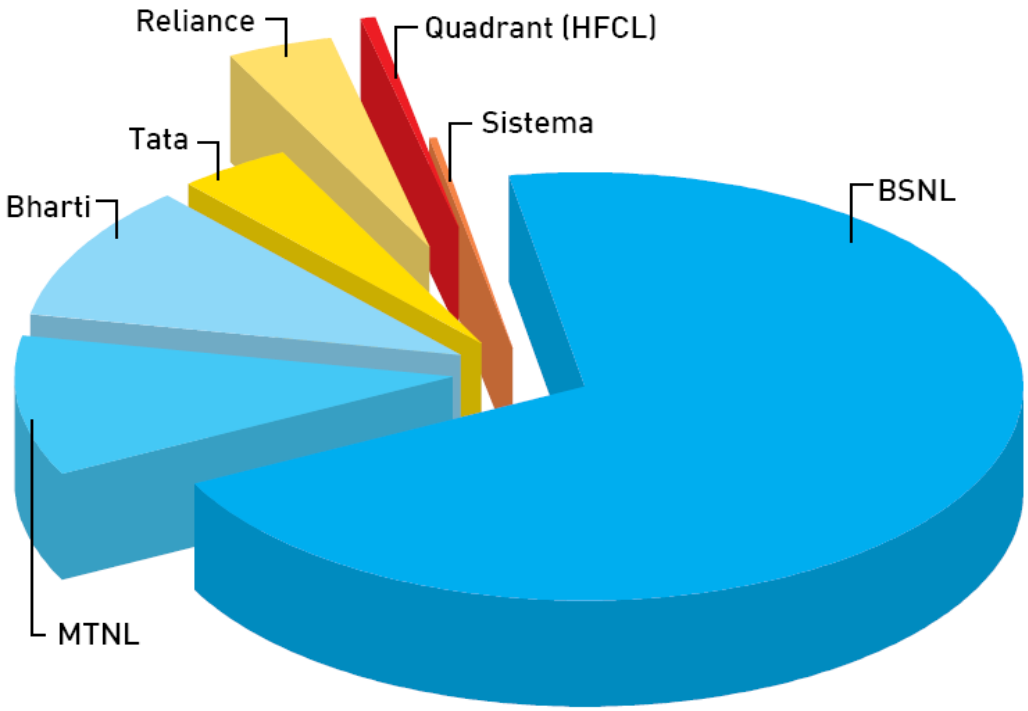
Source: Telecom Regulatory Authority of India.

FIGURE 4.15A: SHARE OF SERVICE PROVIDER IN WIRELINE SUBSCRIPTIONS, 2001 (%)



Source: Telecom Regulatory Authority of India.

FIGURE 4.15B: SHARE OF SERVICE PROVIDER IN WIRELINE SUBSCRIPTIONS, DECEMBER 2011 (%)



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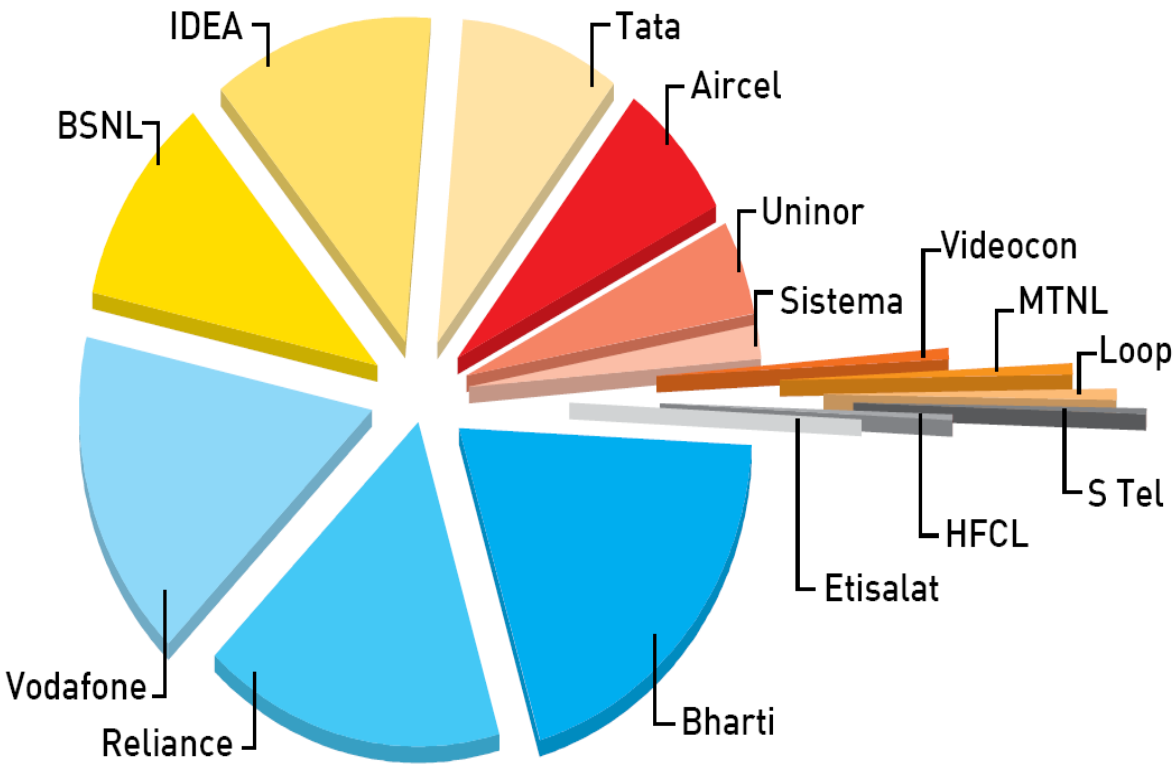
Source: Telecom Regulatory Authority of India

Figure 4.16 shows the share of service providers in wireless subscriptions in February 2012. The two public sector enterprises (PSEs), BSNL and MTNL, were allowed belated entry into the cellular segment in the beginning of the present decade. The sector is dominated by Bharti, Reliance, Vodafone, BSNL, Tata Tele Services, and Idea. There are many smaller players, with operations in only a few states. International roaming agreements exist between most operators and many foreign carriers.

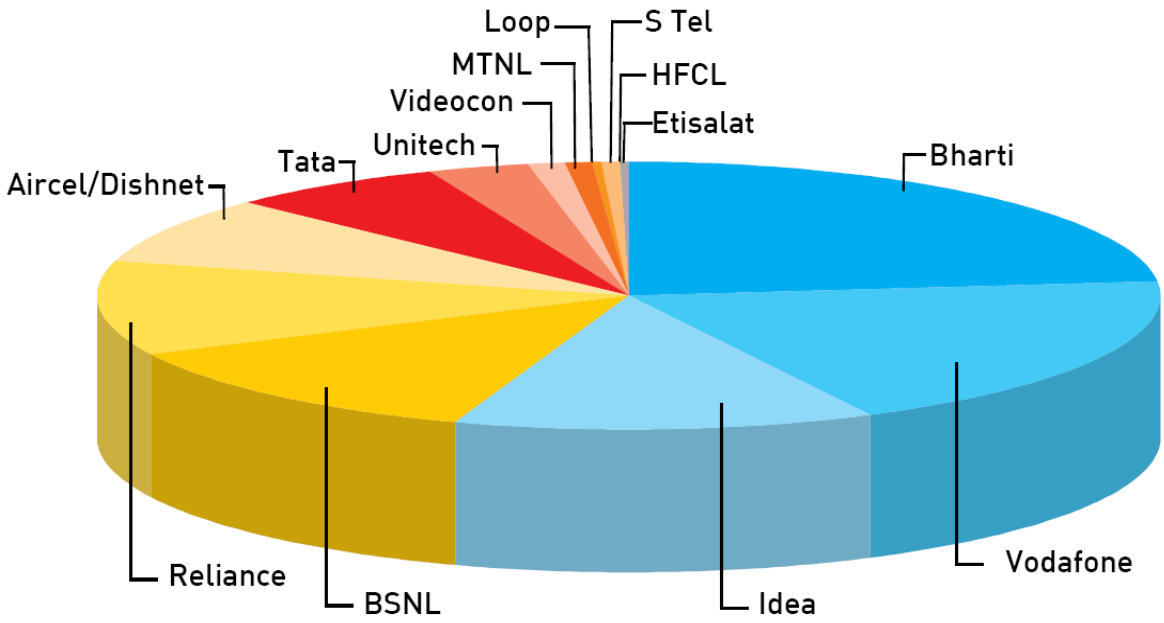
FIGURE 4.16: SHARE OF SERVICE PROVIDER IN WIRELESS SUBSCRIPTIONS, FEBRUARY 2012 (%)



Source: Telecom Regulatory Authority of India

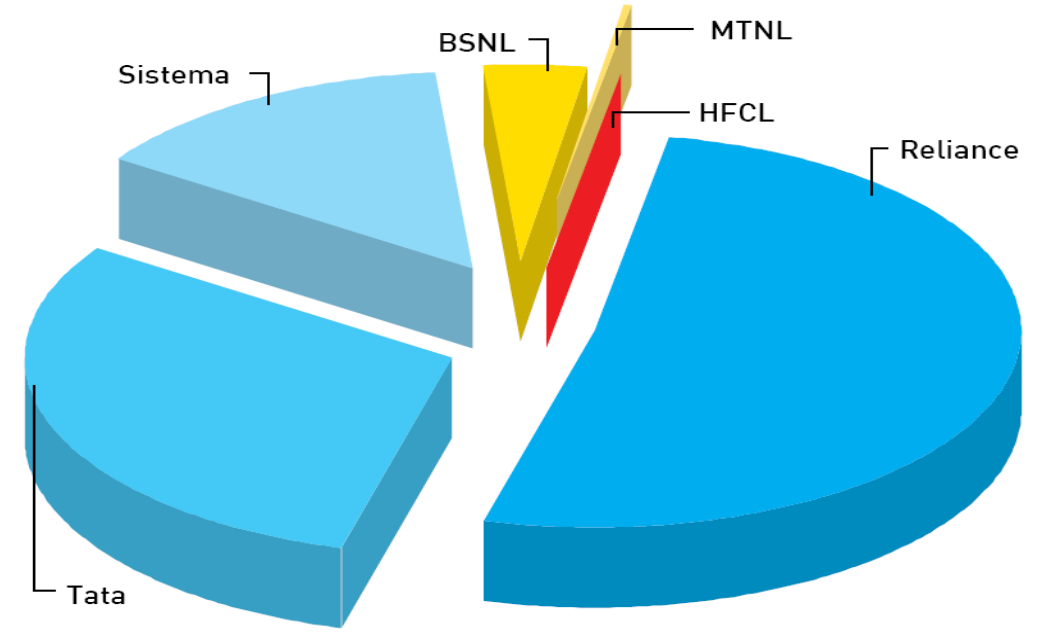
GSM continues to be the dominant technology for wireless phones with 87.9 per cent share. Bharti is the dominant player in GSM segment accounting for 22.35 per cent of the market in terms of market subscriptions followed by Vodafone (18.80 per cent), Idea (13.53 per cent) and Reliance (12.05 per cent) (Figure 4.17). There are as many as 14 operators using GSM technology compared to just six using CDMA. Reliance is the leading player in the CDMA market with 51.32 per cent share (Figure 4.18). Tata is the next big player in this market.

FIGURE 4.17: SHARE OF SERVICE PROVIDER IN WIRELESS SUBSCRIPTIONS BASED ON GSM, DECEMBER 2011 (%)



Source: Telecom Regulatory Authority of India

FIGURE 4.18: SHARE OF SERVICE PROVIDER IN WIRELESS SUBSCRIPTIONS BASED ON CDMA, DECEMBER 2011(%)



Source: Telecom Regulatory Authority of India

INTERNET SERVICES:

Internet service was opened for private participation in 1998 with a view to encourage growth of Internet and increase its penetration. This has resulted in the entry of a number of private Internet service providers (ISP) in the country. However, the market is still dominated by state owned companies, BSNL and MTNL (Table 4.4). These two companies together accounted for around 66.3 per cent of the Internet subscriptions in the country in December 2011.

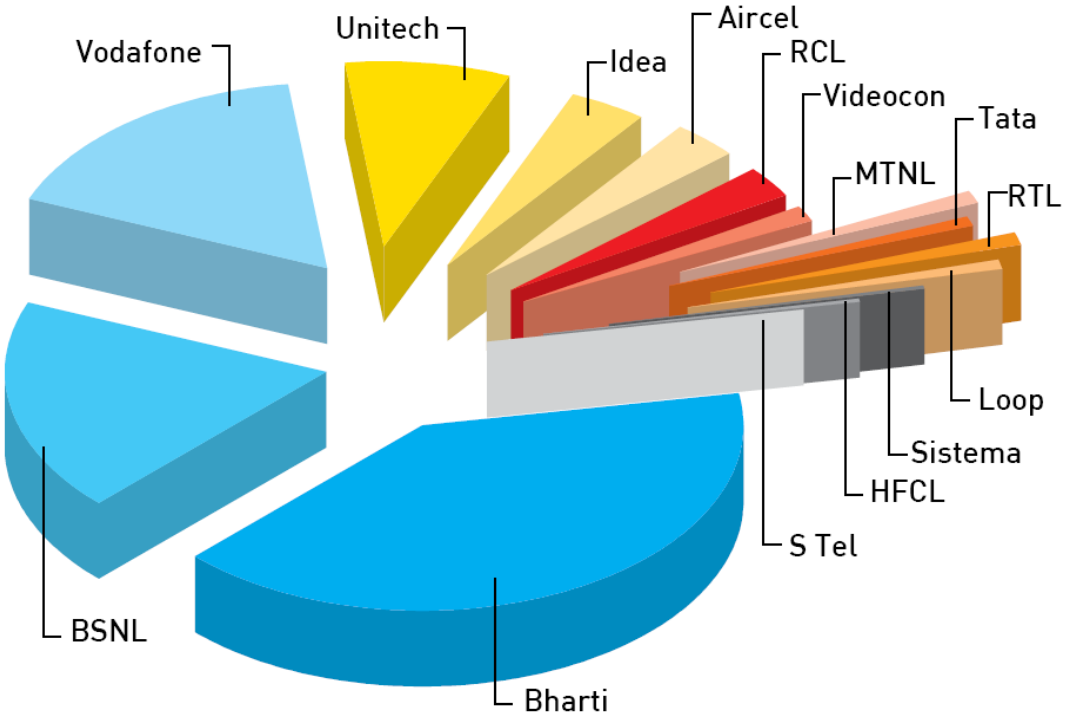
Table 4.4: Market Share of Leading ISPs in Terms of Subscribers, December 2011

Company	Share (%)
BSNL	54.97
Reliance Communications Infrastructure Limited	15.97
MTNL	11.33
Bharti Airtel	6.12
You Broadband and Cable India Private Limited	1.74
Hathway Cable and Datacom Private Limited	1.61
Tikona Digital Networks Private Limited	1.14
Tata Communications Limited	0.84
Beam Telecom Private Limited	0.81
Others	4.96

Source: Telecom Regulatory Authority of India.

Bharti is the leading data service provider, followed by BSNL and Vodafone (Figure 4.19). Thus, the private sector is leading the way in one of the most dynamic areas of the telecom sector.

FIGURE 4.19: SERVICE PROVIDER-WISE DETAILS OF DATA SERVICES, DECEMBER 2011 (%)

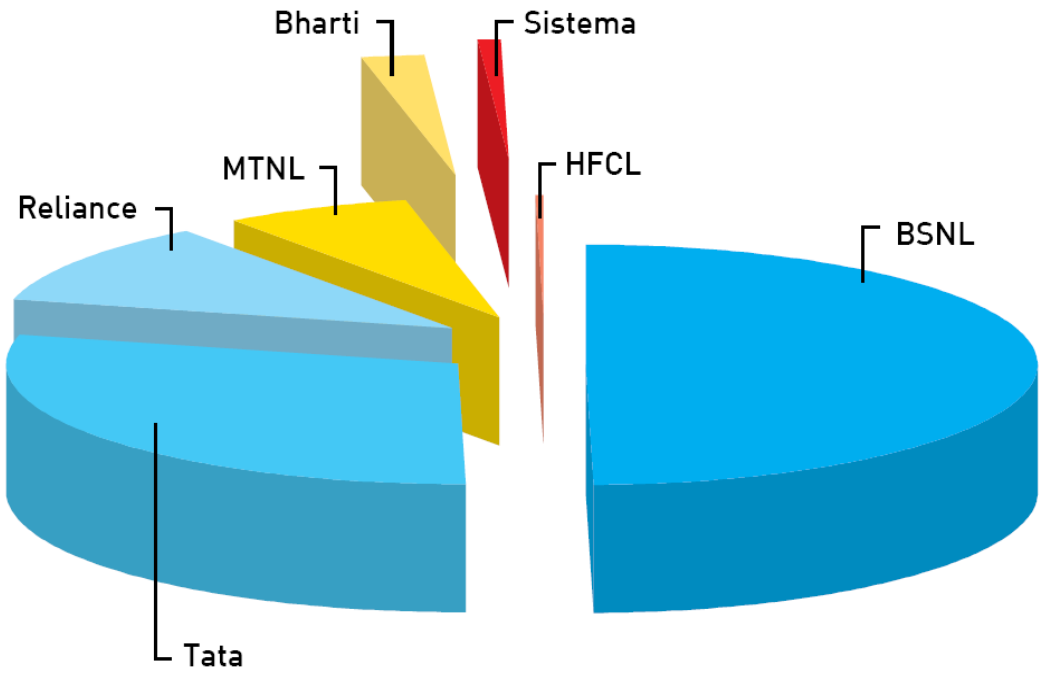


Source: Telecom Regulatory Authority of India

PCOS AND VPTS:

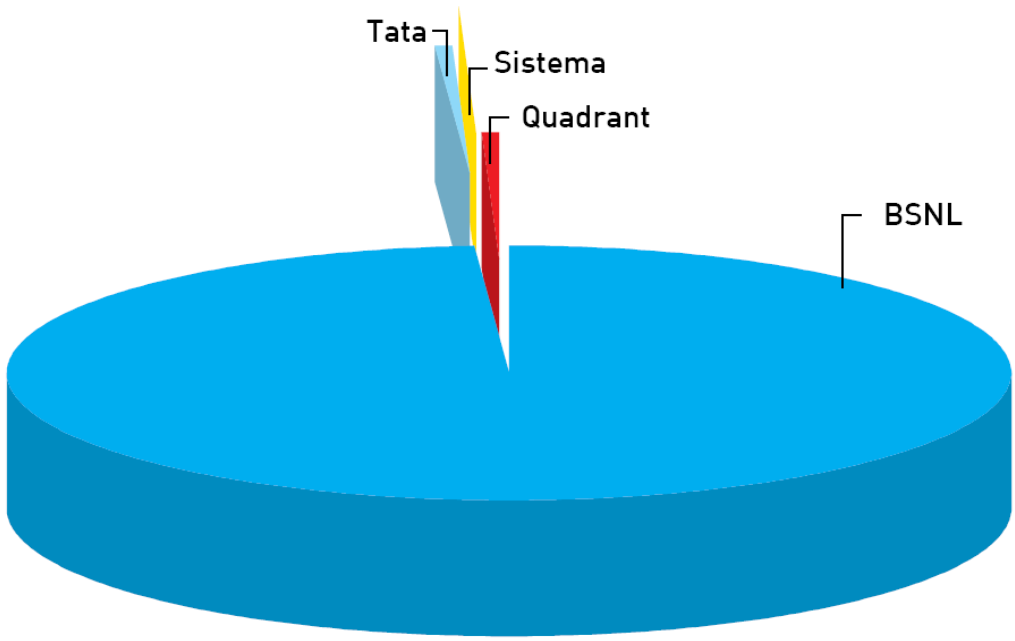
Public sector companies are the leading PCO and VPT service providers in India. As of December 2011, the two public sector companies MTNL and BSNL together accounted for around 56.95 per cent of the PCOs and 98.9 per cent of the VPTs in the country, (Figures 4.20A and 4.20B).

FIGURE 4.20A: SERVICE PROVIDER-WISE SHARES IN PCO, DECEMBER 2011



Source: Telecom Regulatory Authority of India

FIGURE 4.20B: SERVICE PROVIDER-WISE SHARES IN VPT, DECEMBER 2011

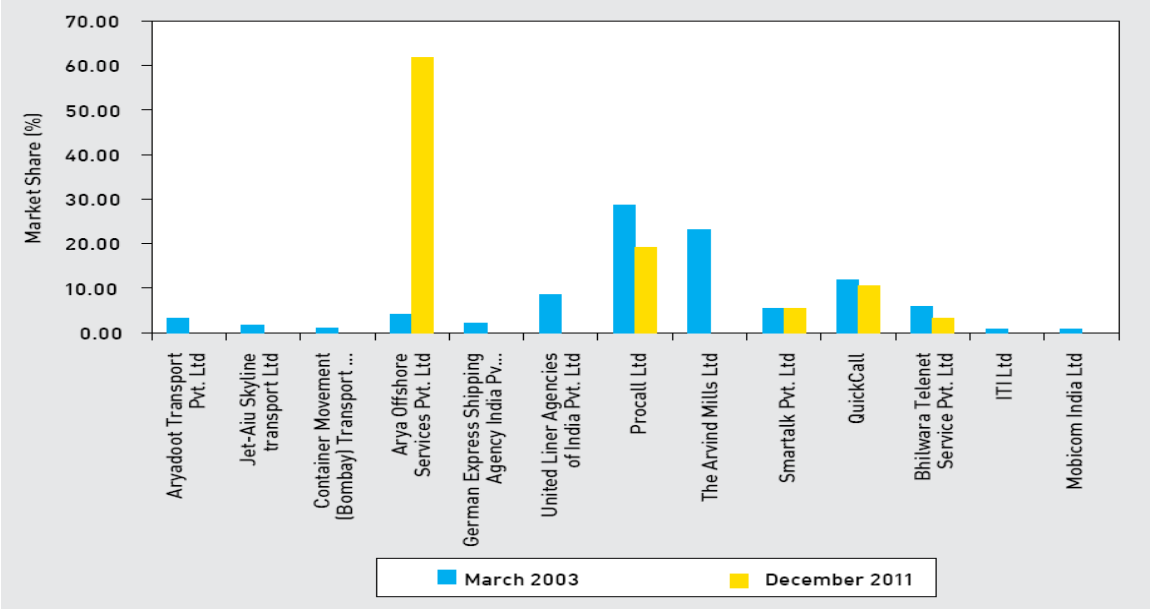


Source: Telecom Regulatory Authority of India

PMRTS AND VSAT:

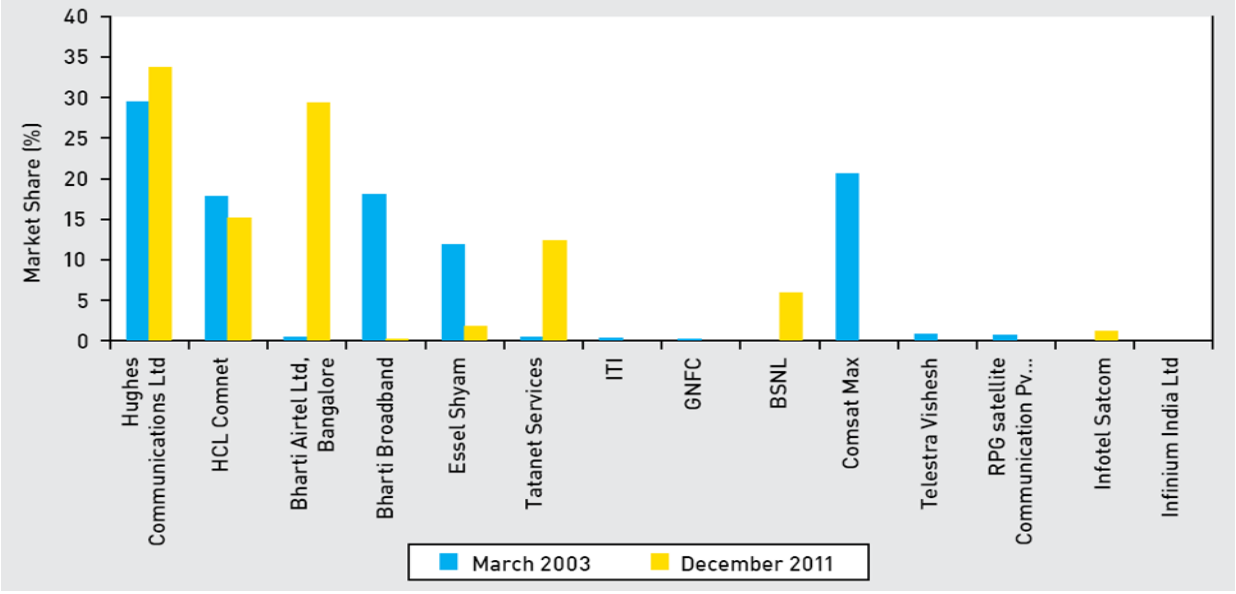
Figures 4.21 and 4.22 show the service provider details of PMRTS and VSAT, respectively. The private sector dominates these sectors. There has also been some consolidation in the market where some companies have dropped out.

FIGURE 4.21: MARKET SHARE OF PMRTS PROVIDERS (%)



Source: Telecom Regulatory Authority of India

FIGURE 4.22: MARKET SHARE OF VSAT SERVICE PROVIDERS (%)



Source: Telecom Regulatory Authority of India

REVENUE AND USAGE- WIRELESS PHONES:

Given the overwhelming importance of wireless phones in the Indian telecommunications sector and the added advantage of data availability on a regular basis, this section focuses on wireless phones. Preliminary analysis suggests that policy and regulatory initiatives induced competition, which in turn led to fall in prices.

All India blended weighted average outgo per outgoing per minute has declined from Rs 1.09 per minute in March 2007 to Rs 0.5 in December 2011, indicating reduction in tariff levels. This rate has declined at a CAGR of 21.5 per cent between March 2007 and March 2011. Prepaid has declined at a faster rate (CAGR 25.3%) than either postpaid (CAGR 8.2%) or blended between March 2007 and March 2011. Not surprisingly, 97 per cent GSM subscriptions and 94 per cent CDMA subscriptions were prepaid. The numbers vary across the circles. In Metros the share of prepaid customers was 91.4 per cent (GSM) and 90.4 per cent (CDMA). In contrast, in Circle B the share goes up to 98.4 per cent (GSM) and 96.2 per cent (CDMA). Prepaid service has been one of the most important innovations in the mobile communications history and one can claim that it arose in South Asia.

REVENUE OF THE TELECOM SECTOR:

The total revenue trend for the last six years is depicted in the total revenue (including other income) of the telecom service sector stood at Rs 1,63,067 crore in 2010–11 as against Rs 87,794 crore in 2005–06 showing an increase of 89 per cent over the last six years. However, revenue from telecom services is Rs 1,56,657 crore in 2010–11 as against Rs 82,687 crore in 2005–06. The total revenue of the public sector companies for 2010–11 is Rs 33,971 crore as against Rs 46,268 crore in 2005–06, showing major decline of 27 per cent over the last six years. The total revenue contribution from the private sector for 2010–11 was Rs 1,29,096 crore as against Rs 41,526 crore in 2005–06 showing a tremendous growth of 211 per cent over the period. The share of the public sector has decreased from 53 per cent to 21 per cent between 2005–06 and 2010–11. Share of the private sector increased from 47 per cent to 79 per cent during the same period.

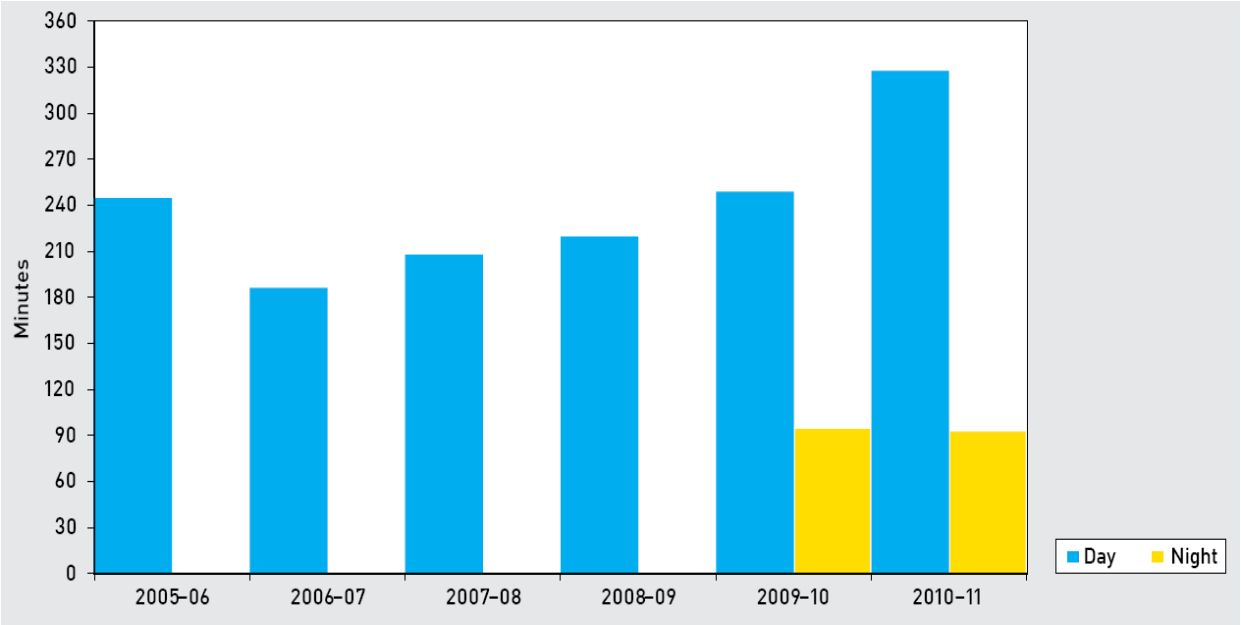
REVENUE OF INTERNET SERVICE PROVIDERS (ISPs)

With increase in subscriptions, revenue of ISPs has increased at a CAGR of 8.8 per cent between December 2008 and December 2011.

DIAL UP ACCESS

Average MoU per subscriber per month for dial-up access is shown in Figure 4.23. The day time MoU has increased at a CAGR of 4.98 per cent between 2005–06 and 2010–11. The night time MoU shows a slight decline.

FIGURE 4.23: MINUTES OF USAGE PER SUBSCRIBER PER MONTH OF DIAL-UP ACCESS, 2005-06 TO 2010-11



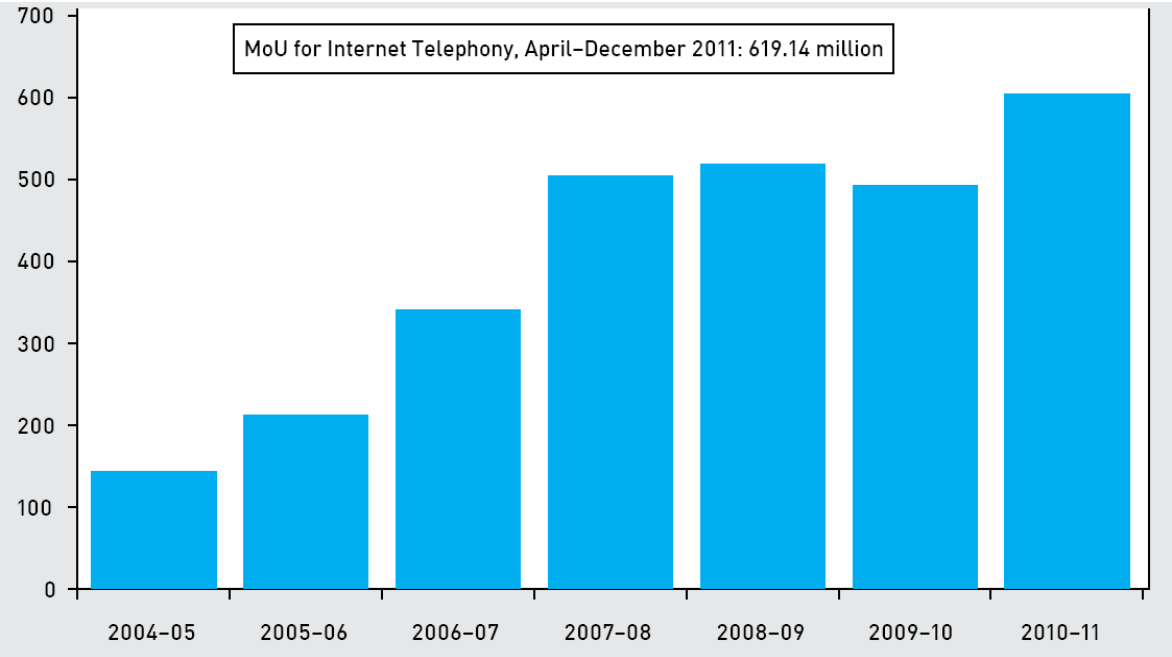
Source: Telecom Regulatory Authority of India

INTERNET TELEPHONY:

The Internet telephony was thrown open for ISPs with effect from April 1, 2002. Under the new license conditions in 2007, a subscriber is allowed to use PC or a device adapter conforming to the standard of any international agencies like ITU or IETF, etc. to dial PSTN/PLMN abroad. However, ISPs are not permitted to have interconnection with PSTN/PLMN exchanges to provide Internet telephony within India. There is a demand from ISPs for opening up of Internet telephony in the National Long Distance sector as well.

Total MoU for Internet telephony increased from 142.56 million in 2004–05 to 604.15 million in 2010–11 at the CAGR of 22.91 per cent (Figure 4.24).

FIGURE 4.24: TOTAL DURATION OF USAGE OF INTERNET TELEPHONY, 2004-05 TO 2010-11 (Million Minutes)



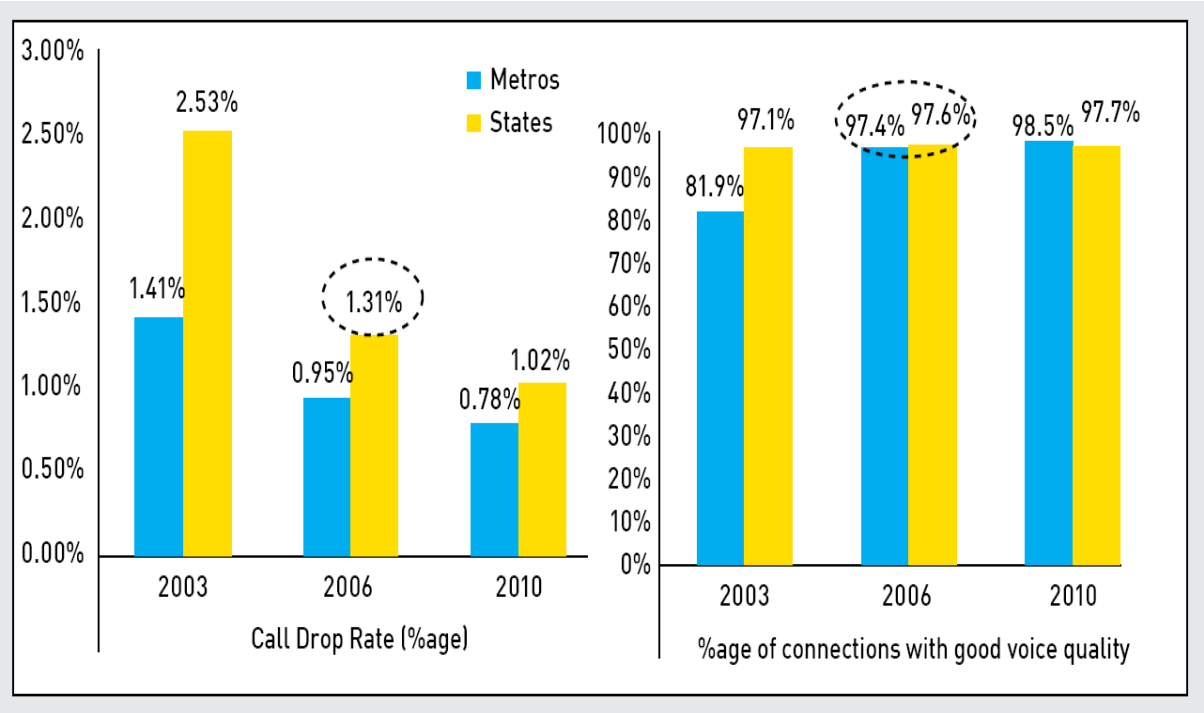
Source: Telecom Regulatory Authority of India

QUALITY OF SERVICES:

WIRELESS PHONES:

Opening up of the telecom sector to private players resulted in increased competition. This had a significant impact on quality of services (QoS). QoS considerably increased for wireless in both states and metros (Figure 4.25) However, QoS is relatively better in metros than in state. Table 4.5 shows the latest state of the quality of services in this sector. Majority of the service providers meet the benchmarks. However, there are certain parameters that still require improvements such as call centres, talking to the operator within sixty seconds, refunds after accounts are closed, etc.

FIGURE 4.25: QUALITY OF SERVICES FOR WIRELESS, 2003-10



Source: Telecom Regulatory Authority of India

Table 4.5: Quality of Service Performance of Wireless Service Providers, December 2011

S. No.	Parameter	Benchmark	Out of 262 (No's)	Out of 262 (%)
I				
1	Network availability			
(i)	BTSs accumulated downtime (not available for service	≤ 2%	1	0.38
(ii)	Worst affected BTSs due to downtime	≤ 2%	8	3.05
2	Connection establishment (accessibility)			
(i)	Call set-up success rate (within licensee's own network)	≥ 95%	1	0.38
(ii)	SDCCH (Stand-alone Dedicated Control	≤ 1%	2	0.76

	Channel)/ paging Congestion			
(iii)	TCH congestion	≤ 2%	3	1.15
3	Connection maintenance (retain ability)			
(i)	Call drop rate	≤ 2%	2	0.76
(ii)	Worst affected cells having more than 3% TCH drop (call drop) rate	≤ 5%	41	15.65
(iii)	Connection with good voice quality	≥ 95%	2	0.76
4	Point of Interconnection (POI) congestion (Number of POIs not meeting the benchmark) (Averaged over a period of quarter)	≤0.5%	12	4.58
II	Customer service quality Parameters			
5	Metering and billing			
(i)	Metering and billing credibility: postpaid	≤0.1%	4	1.53
(ii)	Metering and billing credibility: prepaid	≤0.1%	4	1.53
(iii)	Resolution of billing/charging/validity complaints	100% within 4 weeks	6	2.29
(iv)	Period of applying credit/waiver/adjustment to customers account from the date of resolution of complaints	Within 1 week of resolution of complaint	0	0
6	Response time to the customer for assistance			
(i)	Accessibility of call centre/customer care	≥95%	3	1.15
(ii)	Percentage of calls answered by operators (voice to voice) within 60 seconds	≥90%	50	19.08
7	Termination/closure of service			
(i)	Percentage requests for termination/closure of service complied within 7 days	100% within 7 Days	4	1.53
(ii)	Time taken for refund of deposits after closures	100% within 60 Days	9	3.44

Source: Telecom Regulatory Authority of India.

WIRELINE PHONES:

There has been an improvement in QoS for wireline as well. Average percentage of calls answered by the wireline operators (voice-to-voice) within 60 seconds across states increased from 88.8 per cent in 2006 to 94.3 per cent by March 2010. Table 4.6 shows the latest state of quality in this sector.

Table 4.6: Quality of Service Performance of Wireline Service Providers, December 2011

S. No.	Parameter	Benchmark	Out of 88 (No's)	Out of 88(%)
(i)	Fault incidences per 100 subscribers per month	≤5	10	11.36
(ii)a	Percentage of fault repaired by next working day	≥90%	9	10.23
(ii)b	Percentage of fault repaired within three days (for urban areas)	≥100%	20	22.73
(ii)c	Percentage of fault repaired within five days (for rural and hilly areas)	≥100%	19	21.59
(iii)	MTTR	< 8Hrs	7	7.95
(iv)a	Call Completion Rate (in local network)	≥55 %	2	2.27
(iv)b	Answer to Seizure Ratio (ASR)	≥75 %	1	1.14
(v)	Point of Interconnection (POI) congestion (Number of PoIs not meeting benchmark)	≤0.5%	0	0.00
(vi)	Metering and billing credibility – Postpaid	≤0.1%	13	14.77
(vii)	Metering and billing credibility – Prepaid #	≤0.1%	3	3.41
(viii)	Resolution of billing/charging/credit and validity complaints	100% within 4 weeks	17	19.32
(ix)	Period of applying credit/waiver/adjustment to customer's	Within 1 week	15	17.05

	account from the date of resolution of complaints	of resolution of complaint		
(x)	Response time to the customer for assistance			
(x)a	Accessibility of call centre/customer care15	≥95%	15	17.05
(x)b	Percentage of calls answered by the operators (voice to voice) within 60 seconds	≥90%	7	7.95
(xi)	Termination/closure of service	100% within 7 days	2	2.27
(xii)	Time taken for refund of deposits after closures	100% within 60 days	5	5.68

Source: Telecom Regulatory Authority of India.

INTERNET / BROADBAND SERVICES:

DIAL UP ACCESS SERVICE PROVIDERS:

The TRAI Performance Indicators Report of December 2011 covers only the top 10 of 14 service providers that provides dial up access and finds the following:

- Service Activation Time: All except one ISP had met the TRAI benchmark of six hours.
- Time to Access: All the ISPs except one have met the TRAI benchmark of 30 seconds.
- Probability of Accessing the ISP Node: All the Internet Service Operators have met this benchmark of 80 per cent for first attempt, 90 per cent for second attempt and 99 per cent for third attempt in this quarter.
- ISP Node unavailability: All ISPs have met the TRAI benchmark for the parameter "ISP Node unavailability in a month (30 minutes)" except one which had not provided the data.

- Grade of Service: All ISPs met the benchmark for this parameter except one ISP which had not reported the data.
- Mean Time to Restore (MTTR):As reported by ISPs the Mean Time to Restore (MTTR) the faults varies from five minutes to 24:15 hours. Again one ISP had not provided the data.

BROADBAND SERVICES:

Out of 155 Broadband service providers, 28 have subscriber bases greater than 10,000 and these 26 service providers share 99 per cent of the total subscriber base. This report covers performance of 26 Broadband service providers. Table 4.7 reports the latest statistics on the quality of Broadband services in India. The quality of Broadband services leaves much to be desired.

An independent study reports that majority of the packages tested within India failed to deliver even 80 per cent of the advertised speeds.

Table 4.7 Broad Band Services – Bench Mark

S. No.	Parameter	Benchmark	Name of service provider not meeting the benchmark
1	Service provisioning / activation time		
	Service provisioning/ activation time	100% in ≤15 working days	BSNL: Andhra Pradesh (98.90%), Assam (97.70%), Jammu & Kashmir (99.80%), Karnataka (99.90%), Maharashtra (99.90%), Punjab (99.98%), Uttarakhand (99.99%), Uttar Pradesh (E) (98.70%), West Bengal (95.80%), Andaman & Nicobar Islands (52.70%) MTNL: Delhi (97.07%), Mumbai (94.32%) Hathway: Maharashtra (99.80%) Sify: All India (94.99%) Quadrant Televentures: Punjab (99.86%) Tata Teleservices: Maharashtra & Goa (6.00%)

			Beam Telecom: Hyderabad (97.66%) Tikona: All India (97.07%) Rajesh Multichannel: Mumbai (94.00%) Syscon Infoway: Mumbai (96.00%) You Broadband: All India (99.13%), Maharashtra (98.79%), Gujarat (99.20%), Karnataka (99.04%), Tamil Nadu (99.60%), Andhra Pradesh (99.30%) Spectranet: All India (99.39%) Tata Communications: Andhra Pradesh (99.48%), Mumbai (99.00%), Punjab (99.00%
2	Faults repair/restoration time		
	Percentage of faults repaired by next working day	>90%	BSNL: Assam (82.50%), Kolkatta (88.30%) MTNL: Delhi (71.77%), Mumbai (84.63%) Hathway – Gujarat (87.00%), Maharashtra (88.00%), Goa (86.00%) Sify: All India (73.17%) You Broadband: All India (71.80%), Maharashtra (72.22%), Gujarat (76.58%), Karnataka (60.67%), Tamil Nadu (64.42%), Haryana (82.34%), Andhra Pradesh (61.71%) Tata Communications: Assam (88.00%), Tamil Nadu & Puducherry (88.00%)
	Percentage of faults repaired within 3 working days	≥99%	BSNL: Assam (86.30%), Jammu and Kashmir (98.70%), West Bengal (98.97%), MTNL: Delhi (89.02%), Mumbai (93.61%) Hathway: Delhi (97.00%), Maharashtra (96.40%), Punjab (97.00%), Uttar Pradesh (98.00%), Chhattisgarh (97.00%) Sify: All India (39.47%) You Broadband: All India (95.70%),

			Maharashtra (95.94%), Gujarat (96.50%), Karnataka (89.47%), Tamil Nadu (93.52%), Haryana (98.07%), Andhra Pradesh (94.80%) Tata Communications: Assam (96.00%), Mumbai (95.00%), Tamil Nadu & Puducherry (97.00%), Bihar & Jharkhand (96.00%)
3	Billing performance		
	Percentage of billing complaints resolved within 4 weeks	100% within 4 Weeks	BSNL: Karnataka (99.98%), Uttarakhand (99.90%) MTNL: Delhi 98.01%) Bharti Airtel: AP (93.00%), Delhi (95.00%), Gujarat (96.00%), Haryana (92.00%), Karnataka (88.00%), Kerala (85.00%), Kolkatta (86.00%), Madhya Pradesh & Chhattisgarh (99.00%), Maharashtra (98.00%), Mumbai (97.00%), Punjab (97.00%), Tamil Nadu (92.00%), Uttar Pradesh (E) 96.00%), Uttar Pradesh (W) (92.00%) Tata Teleservices: Maharashtra & Goa (94.00%) Asianet Satellite: Kerala (99.99%)
	Percentage of cases to whom refund of deposits was made within 60 days of closures	100% within 60 Days	BSNL: Uttarakhand (99.90%) Rajesh Multichannel: Mumbai (00.00%) Tata Teleservices: Maharashtra & Goa (97.00%)

4	Response time to customer for assistance		
	Percentage of calls answered by operator (voiceto-voice) within 60 seconds	>60%	Hathway: Maharashtra (51.00%) Tikona Digital: All India (22.33%) Vasai Cable: Mumbai (73.97%)
	Percentage of calls answered by operator (voice-to-voice) within 90 seconds	> 80%	MTNL: Mumbai (73.23%) Tikona Digital Networks: All India (37.67%) Vasai Cable: Mumbai (73.97%)
5	Bandwidth utilisation/throughput		
	Number of intranetwork links having bandwidth utilisation >90% during peak hours (TCBH)	Benchmark 0	Alliance: Kolkata (7 links) Five Networks: All India(12 links) Softeng Computers: All India (5 links)
	Number of upstream links for international connectivity having bandwidth utilization >90% during	Benchmark 0	MTNL: Delhi – (1.33%) Syscon Infoway: Mumbai (4 links) Vasai Cable: Mumbai (1 link) Five Networks: All India (5500)

	peak hours (TCBH)		
	Percentage international bandwidth utilization during peak hours (TCBH) (Enclose MRTG) <90%	Benchmark <90%	Syscon Infoway: Mumbai (98.00%)
	Broadband connection speed available (download) from ISP node to user	Benchmark >80%	BSNL: Andaman and Nicobar Islands (15.00%)
	Service availability/ uptime (for all users) in percentage	Benchmark >98%	Hathway: Delhi (97.00%), Punjab (97.87%) Tata Communications: Kerala & Lakshadweep (97.00%), Tamil Nadu & Puducherry (92.00%) Ortel Communications: Ortel (96.18%) Vasai Cables: Mumbai (97.55%)

Source: Telecom Regulatory Authority of India.

REGIONAL VARIATIONS:

TELEPHONES:

While India has made considerable progress in the telecom sector, there are wide disparities in the penetration of telecom facilities across rural–urban sectors and across states. Therefore, the challenge for the country is to deal with each of these divides and ensure that the telecom services spread to urban poor, rural villagers and neglected states. Table 3.8reports teledensity across states and regions.

Table 4.8 Tele-Density in India

Service area	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total
Andhra Pradesh	1.10	7.06	2.75	36.27	182.66	76.90	37.38	189.71	79.65
Assam	0.19	3.87	0.75	28.01	140.85	45.10	28.21	144.72	45.85
Bihar	0.16	2.43	0.47	24.11	189.50	46.70	24.47	191.93	47.16
Delhi	N.A.	N.A.	15.27			220.27			235.54
Gujarat	1.10	6.03	3.10	49.75	135.55	84.56	50.86	141.57	87.67
Haryana	1.12	4.66	2.33	52.53	143.43	83.48	53.65	148.09	85.80
Himachal Pradesh	4.07	8.94	4.61	70.85	458.16	114.03	74.91	467.10	118.64
Jammu and Kashmir	0.45	5.26	1.75	28.81	110.14	50.77	29.27	115.4	52.52
Karnataka	1.34	9.82	4.52	39.16	174.29	89.78	40.5	184.11	94.30
Kerala	8.20	12.12	9.20	48.43	242.85	98.04	56.63	254.97	107.24
Madhya Pradesh	0.23	3.97	1.23	25.23	123.13	51.34	25.46	127.10	52.57
Maharashtra including Mumbai	1.14	9.18	4.90	48.50	140.32	91.44	49.64	149.5	96.34
North-East	0.63	5.89	1.90	37.29	139.63	62.12	37.91	145.51	64.02
Orissa	0.49	4.35	1.14	32.43	207.86	62.11	32.91	212.20	63.25
Punjab	2.68	8.37	5.05	60.65	173.68	107.64	63.33	182.05	112.69
Rajasthan	0.70	5.04	1.74	41.74	154.64	68.80	42.44	159.77	70.54
Tamil Nadu including Chennai	1.98	7.13	4.85	52.31	155.10	109.44	54.3	162.33	114.28
Uttar Pradesh	0.29	3.62	1.03	30.10	154.64	57.94	30.38	158.27	58.97
West Bengal including Kolkata	0.50	5.93	2.05	41.7	160.01	75.62	42.2	166.71	77.67
All India	0.92	6.85	2.71	36.56	161.01	74.15	37.48	167.85	76.86

Source: Telecom Regulatory Authority of India.

Increase in teledensity has been driven by wireless teledensity. Urban teledensity is approximately 4.4 times higher than rural, showing the digital divide that exists in India. There are wide variations in penetration of telecom services across states. States such as Delhi, Tamil Nadu, Kerala, Himachal Pradesh and Punjab have relatively high teledensity. However, states such as Assam, Bihar, Madhya Pradesh, UP, Jammu and Kashmir and the North-Eastern states have relatively low teledensity. The numbers show that teledensity in Delhi is 5.1 times higher than that of Assam. However, when we divide it even further, we see that Delhi's teledensity is 9.7 times higher than that of rural Bihar.

Himachal Pradesh has the highest total teledensity after Delhi. Assam and Bihar are the worst performing states in terms of total teledensity. Irrespective of their total teledensity, the gap between rural and urban teledensity is quite close to each other for these states– Assam 5.1, Bihar 7.9, and Himachal Pradesh 6.2.

An ASER report finds that 73.4 per cent of rural households in their sample had a mobile, households with a person knowing how to use a computer was 12.6 per the 61st round of NSS data (Table 4.9) shows there exist vast differences across expenditure quintiles. It is the top 40 per cent of households in both rural and urban areas who own more than one mobile.

Table 4.9: Mobile Ownership by Households

Type of households	Percentile Class	Share of households possessing a mobile as percentage of total households possessing durable (non – food) goods
Rural	0 – 20	0.09
	20 – 40	0.40
	40 – 60	0.64
	60 – 80	1.03
	80 – 100	1.46
	Total	0.56
Urban	0 – 20	0.34
	20 – 40	0.74

	40 – 60	0.91
	60 – 80	1.25
	80 – 100	1.49
	Total	1.14
All households	0 – 20	0.12
	20 – 40	0.46
	40 – 60	0.71
	60 – 80	1.12
	80 – 100	1.48
	Total	0.73

Source: Unit Level data, NSSO (2007–08)

INTERNET SERVICES:

Bharat Nirman-II targets covering 100 per cent of the panchayats in the country with Broadband by 2012. There are wide disparities across states in terms of coverage of village panchayats under Broadband. While on the one hand, village panchayats in states like Pondicherry, Kerala and Chandigarh have 90 to 100 per cent broadband coverage, villages in states such as Manipur, Meghalaya, Madhya Pradesh, Arunachal Pradesh, Jharkhand, Jammu and Kashmir, Chhattisgarh, and Mizoram have less than 25 per cent Broadband coverage. Broadband connectivity is particularly low in village panchayats in north-eastern region of the country.

Table 4.10 shows state-wise broadband subscribers. The irony is that although all the villages of Kerala may be covered by broadband, only 6.12 per cent of India's Broadband subscribers reside in that state. Maharashtra leads in the number of Broadband subscribers. Sixty per cent of India's Broadband subscribers live in the five states of Maharashtra, Tamil Nadu, Andhra Pradesh, Delhi and Karnataka.

Table 4.10 State wise Broadband Subscribers as on March 31,2011

State	Number of broadband subscribers	Share of subscriber to India (%)
Andaman & Nicobar	4,893	0.04
North East#	33,652	0.28
Himachal Pradesh	53,357	0.45
Uttarakhand	65,502	0.55
Chhattisgarh	75,003	0.63
Jammu & Kashmir	75,358	0.63
Jharkhand	76,949	0.65
Assam	80,619	0.68
Bihar	87,103	0.73
Odisha	164,399	1.38
Haryana	214,404	1.80
Madhya Pradesh	284,946	2.40
Rajasthan	341,722	2.87
Gujarat @	537,679	4.52
West Bengal*	548,444	4.61
Uttar Pradesh	556,986	4.69
Punjab†	703,161	5.92
Kerala	727,254	6.12
Karnataka	1,100,922	9.26
Delhi	1,140,306	9.59
Andhra Pradesh	1,268,072	10.67
Tamil Nadu ‡	1,535,150	12.91
Maharashtra	2,211,180	18.60
India	11,887,068	100.00

Source: Telecom Regulatory Authority of India.

Includes Manipur, Meghalaya, Arunachal Pradesh, Mizoram, Nagaland and Tripura.

@ Including Dadar and Nagar Haveli, * Including Sikkim, † Including Chandigarh and

‡ Including Puducherry

REGIONAL VARIATIONS: CONSTRAINTS AND PRESENT POLICIES:

The states are making continuous efforts to improve their ICT (Information and Communication Technology) abilities over time as evidenced by e-readiness indices. e-Readiness can be considered as the ability to pursue and realize value creation opportunities facilitated by ICT. Table 4.11 shows the ranking of top ten states during 2003 to 2008 with Karnataka as the consistent leader.

Table 4.11: e-Readiness Index

State	2003	2004	2005	2006	2008
Karanataka	1	1	3	1	1
Maharastra	2	4	6	6	2
Chandigarh	8	5	5	3	3
Tamil Nadu	3	2	2	7	4
Andhra Pradesh	4	3	1	2	5
West Bengal	9	12	15	13	6
Kerala	11	6	4	10	7
Gujarat	5	7	11	12	8
Haryana	15	11	9	4	9
Delhi	7	9	8	5	10

Source: Venkatesan, R., Sen, S. and W. Wadhwa (2010 and various issues), India's e-Readiness Assessment Report 2008 for States/Union Territories, National Council of Applied Economic Research and Department of Information Technology, Government of India, New Delhi.

The cell phone has to provide to the rural subscriber multiple services like education, entertainment, telemedicine, banking, IPTV, etc. for it to be valuable or worth the money. The constraints hindering penetration of the telephony in the rural sector are listed below.

a. Acquisition of land: It takes a long time and many formalities to be completed.

b. Right of way: Laying of optical fibre is problematic because that involves jurisdiction of multiple government agencies. Further, government agencies have started charging exorbitant fees in laying down cables/optical fibre. All these add up to delays.

c. Non-availability of backhaul connectivity: This is a major problem in rural areas as mentioned in point (b) above.

d. Lack of infrastructure sharing in rural areas.

e. Lack of power supply: This is a problem because it is either not available or available only for a few hours.

f. Operation and maintenance costs: These are higher in rural areas because of poor transportation, difficulty in supply of spare parts, lack of power supply and non-availability of skilled labour.

g. Low ARPU: Low ARPU in urban areas is made up by high traffic. Private companies are not attracted due to low revenues in rural areas.

h. Affordability of services: Costs of handsets, Modem, PC, UPS, etc. are quite high when compared to their incomes.

i. Low literacy level: This is a major problem especially in using Broadband. It is also a problem if most of the content is delivered in English.

j. Unavailability of locally relevant applications: Rural subscribers need to access relevant information in a manner that is readily accessible. For example, sending messages to illiterate farmers is useless. Also, the information should be available as and when the farmer needs it and not the other way around.

Given the digital divide in rural and urban India, government has been trying to put various measures to increase rural teledensity. The EFYP aims at bridging the digital divide between the urban and rural areas and extending Broadband connectivity. The Plan envisages providing 200 million rural telephone connections by 2012, that is, to reach a rural teledensity of 25 per cent. Bharat Nirman programme targets to achieve rural teledensity of at least 40 per cent by 2014, and broadband coverage of all 2,50,000 village panchayats. It also envisages setting up of Bharat Nirman Common Service Centres at panchayat level by 2012.

The Universal Service Obligation (USO) policy came into effect in 2002 aiming to widen the reach of telephony services in rural India. The USO Fund (USOF) was established by an Act of Parliament. As per the Act, all telecom operators are bound to contribute 5 per cent of their revenues to this fund. Initially, only basic service providers were under the

purview of USOF. Later, its scope was expanded to include mobile services also. Although, it increases the cost burden for the telecom companies, USOF helps in building the telecommunication infrastructure in the rural areas. In addition, the central government may also give grants and loans.

USOF was established with the fundamental objective of providing access to 'basic' telegraph services to people in the rural and remote areas at affordable and reasonable prices. Subsequently the scope was widened to provide subsidy for enabling access to all types of telecom services including mobile services, Broadband connectivity and creation of infrastructure like OFC (optical fibre cable) in rural and remote areas. Several schemes are being undertaken in the country under USOF.

DIGITAL INCLUSION AND ECONOMIC DEVELOPMENT:

Global experience shows that mobile phone technology is being used from mid-2000 onwards to achieve economic and development goals. The importance of the mobile phone in development has been articulated best in the paper by Jensen (2007). The 'Law of One Price' (that is the price of a good should not differ between any two markets by more than the transportation cost between them) did not work in countries like India characterised by incomplete information. The mobile phone has the ability to transcend this information gap prevailing in the country. Jensen (2007) shows this empirically for the fishing industry in Kerala.Abraham (2007) finds similar results.

Veeraraghavan et al. (2009) discusses an experiment in rural Maharashtra where they replaced a PC-based system with an SMS-based mobile phone system and found the latter to be more successful with the farmers in terms of convenience, popularity and expense. However, the SMS-based mobile phone system had its limitations in the sense that it took a long time to enter long strings of information. Mittal et al. (2010) also finds that "the final leg of delivering connectivity from a communications provider to a customer (last mile)" is served better by a mobile phone than a personal computer for fishermen especially the ones out at sea because of its "low cost, real-time delivery and expanded reach".

Sood (2006), in a comprehensive study across various regions and occupations, finds that mobile phones helped in various ways including accessing market information, coordinating travel and transport, increasing paying work days and managing remote

activities. The ease of use, portability and comfort level of the mobile phone has made it the vehicle of choice for delivery of development programmes.

The above studies emphasise the importance of increasing the teledensity in rural areas and providing wireless broadband.

RURAL INITIATIVES IN DIGITAL INCLUSION:

ITC e-Choupal:

This is a profit-driven project run by ITC Limited. ITC has initiated an e-Choupal effort that places computers with Internet access in rural farming villages. The e-Choupals serve as a social gathering place for exchange of information and an e-commerce hub. Mittal et al. (2010) find that farmers experienced 10 to 40 per cent productivity gains by using ITC services and benefited from being able to sell locally and getting local costs reimbursed.

n-Logue

n-Logue is a profit-driven project. It currently relies on cor-DECT (cordless-Digital Enhanced Cordless Telecommunication), a fixed Wireless Local Loop (WLL) technology, to provide the backbone to its IP network. Its low costs, ease of deployment, and minimal maintenance requirements make cor-DECT ideally suited for rural use.

DakNet11

DakNet uses wireless technology to provide broadband connectivity. Developed by MIT Media Lab researchers, DakNet has been successfully deployed in remote parts of both India and Cambodia at a cost much less than that of traditional landline solutions.

Bhoomi project of Karnataka state government

The Bhoomi project has revolutionized the way people access information of land records. Several of the 7,00,000 land records are available online for banks, judicial courts and hundreds of village kiosks all across the State.

Initiative of Tamil Nadu state government

So far 26 software and hardware offerings have been certified which conform to the standards and have been authorized for use in Tamil Nadu government and its institutions. A

"Tamil Software Development Fund" has been set up to encourage the development of innovative Tamil software. The fund has supported seven projects till date.

Gyandoot in Madhya Pradesh

The Gyandoot project was started with the installation of a low-cost rural Intranet covering 31 village information kiosks in five Blocks of the Dhar district. Villages that function as Block headquarters or hold the weekly markets in tribal areas or are located on major roads (e.g., bus stops) were chosen for establishing the kiosks. Each kiosk caters to about 25 to 30 villages. Each kiosk was expected to earn a gross income of Rs 4,000 per month.

Rural "e-Seva" (in East Godavari District of A.P.)

The project is a tool to bridge the digital divide in the rural areas and has used information technology for providing access to various services to the people living in rural areas. Under this project web enabled rural kiosks termed e-Seva centres have been established at the mandal (a sub-district unit of administration) level. The project is based on BOOT (Build-Operate-Own-Transfer) Model.

Fisher Friend

Qualcomm's Wireless Reach Fisher Friend project is a partnership with MSSRF, TATA Teleservices and Astute that enables fishing communities to earn their livelihood in a safe and proactive manner by leveraging 3G CDMA wireless and ICT technologies. Fisher Friend is an application that runs on 3G CDMA phones and empowers fishing communities with real-time access to market data. It can:

- Save lives by providing timely weather alerts to survive danger at high seas.
- Enhance livelihoods by providing real-time data on fish migration and market prices.
- Increase knowledge base by providing updates on government schemes, policies and developments of interest to fishing communities.

APPLICATION OF TECHNOLOGY:

Globally, consumers are increasingly turning to their mobile devices for a number of activities. According to KPMG Consumer and Convergence IV 2010 almost half of global

consumers conducted banking transactions with their mobile devices in 2010. Nearly three times as many people shopped at a retailer's website in 2010 than in 2008, a 29 per cent increase. An impressive two-thirds of consumers around the world today use cloud computing applications and services.

In Japan, for example, mobile operators KDDI has launched a handset called Mamorino - a mobile phone equipped with location tracking and emergency alert features. Mamorino is a mobile phone for young children, equipped with GPS tracking and a feature that only allows the phone to place outgoing calls and texts to four pre-programmed contacts. The handset, developed by Kyocera for Japanese mobile operator KDDI, has a simple design with an LCD screen, just 3 one-touch keys, a call-end key, front jog wheel and an action key. The location tracking feature allows parents to check the child's location at any time, and it also has a location alert feature that allows the child to easily inform the parents of his/her own location. Furthermore, the handset is equipped with an emergency alert that projects a loud alarm if the child pulls at it. Also, in the event of an emergency, a special service allows the emergency alarm to automatically notify local security service personnel.

In India mobile is still predominantly used for voice calls, but value added services are on the surge. With the advent of next generation technologies these applications will pick up in the world's largest telecom market. Along with demand, supply-side factors also need to be taken care of to meet the demand. Table 4.12 shows the bandwidth required for various applications.

Table 4.12 Increased Use of Mobile Devices (%)

Activities	2007	2008	2010	2007	2008	2010	2007	2008	2010
Chatting or instant messaging	93	94	70	6	5	29	1	1	1
Conversation (e.g., Skype)			70			29			1
Accessing maps/directions		89	75		4	23		7	2
Reading books			63			21			16
Playing games	72	68	77	6	7	17	22	25	6
Accessing news	96	95	83	1	2	13	2	2	4

and information									
Social networking	94	96	88	3	1	11	3	3	1
E-mailing			89			10			1
Banking/personal finance		96	90		2	8		1	2
Browsing the web			93			6			1
Watching TV/movies/videos	58	63	77	7	5	5	35	31	18
Shopping	98	97	90	1	2	5	1	1	5

Source: KPMG (2010),Consumers and Convergence IV. Available online at http://www.kpmg.com/

Table 4.13 Bandwidth Required for Various Applications

Application	Minimum Bandwidth required
Internet surfing	Up to 256 kbps
E-mail	64 kbps
Voice chatting	64 kbps
Video clips	256–512 kbps
Tele-education	256–512 kbps
Tele-Medicine	256 kbps to 4 Mbps
Video streaming per channel	2 Mbps (approx.)
Video gaming	256–512 kbps (high precision games may require higher bandwidth)
High Definition Video per channel	4–8 Mbps
Online gaming/video on demand/video streaming/IPTV	3–4 Mbps

Source: Telecom Regulatory Authority of India.

E – Education:

One of the eight goals of the United Nations' Millennium Development Goals (MDGs) is to achieve universal primary education by 2015. India has committed to meeting the MDGs. India has reported that from the projected trend of Net Enrolment Rate (NER) in India the country is likely to achieve 100 per cent NER well before the 2015 deadline. The Eleventh Five Year Plan places the highest priority on education as a central instrument for achieving rapid and inclusive growth. India has notified the 'Right of Children to Free and Compulsory Education Act 2009' bill for providing free and compulsory education to all children aged 6 to 14 with effect from April 1, 2010. India has various targets for education under different plans and schemes.

There are various initiatives from the government for increasing the use of Information Communications and Technology (ICT) in education. The Sarva Shiksha Abhiyan (SSA) scheme has a component of Computer Aided Learning (CAL), wherein a provision of Rs 50 lakh per district has been made as Innovation Fund. The centrally sponsored scheme "Information and Communication Technology [ICT] in School" was launched in December 2004 to provide opportunities to secondary stage students to develop ICT skills and also for ICT aided learning process. It has a provision that each secondary and higher secondary school will be serviced with broadband connectivity of at least 2 Mbps speed.

Internationally, countries are also emphasizing the various programmes in education through ICTs. In USA virtually every school has Internet access. FCC (Federal Communications Commission) has issued a new order which will help bring affordable and super-fast fibre connections to the United States.

Lectures in the US are now available through podcasts which can be downloaded in iPod and students can listen to these in their own time. Although, extremely useful in the Indian context, iPods are prohibitively expensive here. Perhaps one can think of developing class lessons in MP3 format for India. 3G technology can also make a difference. Mobile Broadband is a key technology in India which can be used for educational purposes.

In India, many states have provisions in their IT policies to encourage the use of IT in schools, colleges, and other educational institutions. Some states like Maharashtra, Kerala, West Bengal, etc. have included the participation of private entities for providing the IT

infrastructure and training. Kerala has launched programmes like IT@school and Akshaya project for encouraging digital literacy in the state.

E – Health:

`Healthcare is potentially one of the most important areas where telecom can make an impact. It has been estimated that at least $5 trillion is spent worldwide on providing healthcare. Savings of between 10 to 20 per cent could be achieved through the use of telemedicine delivered by broadband. A World Health Organization report revealed an estimated shortage of almost 4.3 million medical staff worldwide, with the situation being most severe in the poorest countries. Telemedicine, which has been in operation in India since 1999, can fill the gap of supplying medical help to remote areas without the specialists actually moving to live in these areas.

Medical advice, monitoring, diagnosis and training delivered through broadband can help a great deal to overcome these gaps. Training of professionals in all sectors can be imparted through broadband video and other applications.

Industry players are already taking initiatives in this regard. For example, Aircel has partnered with the Apollo group to launch the first tele-health care delivery, 'Aircel Apollo Mobile Health Care' for consumers in India. This aims to reach out to the masses anytime anywhere with thehelp of products such as tele-medicine and tele-triage to begin with. Tele-medicine provides interactive health care in real-time online utilizing modern technology and telecommunications. This allows the patients to consult physician/specialist over video for immediate health care. Tele-medicine is an invaluable tool in health care as it helps patients to get service from doctors even in remote areas without the need of the patient's physical presence at the doctor's clinic.

M – Governance:

Mobile Governance, or m-Governance, is an upcoming area too with far more potential impact than e-Governance programmes. Table 4.14 lists some of the m-Governance applications.

Table 4.14: Some Applications with Mobile Governance

Project	Applications
Bhoomi, Karnataka	Landowners register with Bhoomi by paying a fee. Will get an SMS whenever there is a transaction on the land.
PDS, Chhattisgarh	Register phone and Fair Price shop (FPS). Access to information on availability and supply of food grains and about times and truck numbers that deliver supplies to the FPS in order to involve the public in enforcing accountability.
SMSONE, Maharashtra	"A Local SMS community Newsletter" service provided to different communities, each comprising 1000 registered users. The community is served with messages that are relevant to them, practically covering all aspects of their daily life from health camps to be held, non-supply of water or electricity, and traffic congestion, to reminders of bill payments.
Mysore City Corporation	Citizens message their problem related to civic services to a pre-assigned number through SMS. An acknowledgment number is sent back with the connected officer's name and numbers.

Source: Thomas, K.T. (2009), Exit PC, Enter Mobile, The Hindu Business Line. Available online at www.thehindubusinessline.com.

M – Banking:

Access to basic financial services continues to be an unrealized dream for millions of our citizens; even more so for those in rural and remote areas. A large percentage of rural population does not have a deposit account which means that they do not have access to even basic financial services. Banks find it difficult to operate large number of tiny accounts and micro transactions profitably. Currently, a bank branch in India serves about 16,000 people, a very high number when compared to developed countries. The Australian Government in its report "Government Role in Business to Business e-Commerce" estimated that in the banking sector cost per transaction is reduced from $3 over the counter to $0.02 over the Internet. It has the potential of furthering financial inclusion by making small ticket retail transactions cheaper, easier and faster for the banking sector as well as for the small customers.

Initiatives in this direction are already happening. Yes Bank has partnered with handset maker Nokia to enable users to pay electricity and water bills and even transfer funds to another person through mobile phones. Soon one will be able to board a train without a penny in one's pocket by wiring a ticket using the mobile.

In developed markets such as Japan and Finland such applications are already a reality. NTT DOCOMO in Japan has developed an application that enables subscribers to use their phone almost like a credit card, through a chip that resides in the phone and a vendor device. You can walk into a burger joint or a five-star hotel, eat all you want and then pay by simply tapping your phone on the vendor's device. The success of MPesa in Kenya is well known. Its implementation would require changes in banking laws in India. However, it has the potential to achieve bank inclusion, a much cherished dream.

The Reserve Bank of India has been actively involved in harnessing technology for the development of the Indian banking sector over the years. The cumulative expenditure on 'computerisation and development of communication networks' by public sector banks from September 1999 to March 2010 aggregated to Rs 22,052 crore. On an annual basis, the expenditure on 'computerisation and development of communication networks' registered a growth of 23.2 per cent in 2009–10.

The computerization of the banking sector, which is regarded as the precursor to other technological initiatives, is almost at completion stage. Government recently approved the framework for providing basic financial services through mobile phones. The framework, developed by an inter-ministerial group, envisages creation of "Mobile-linked No-Frills Accounts" by the banks. The basic transactions permissible over these accounts will include cash deposit, cash withdrawal, balance enquiry, transfer of money from one mobile-linked account to another and transfer of money to a mobile-linked account from a regular bank account. It will also facilitate transfer of funds from various government schemes like NREGS to a "Mobile linked No-Frills Account". The National Sample Survey data reveal that 51.4 per cent of nearly 89.3 million farmer households do not have access to any credit from institutional or non-institutional sources. Only 27 per cent of farm households are indebted to formal sources. Only 13 per cent avail loans from the banks in the income bracket of less than Rs 50,000. With mobile phones reaching 900 million people and more, the government is expecting to enable the population to get access to financial services on mobile device. With the acceptance of the report by the Committee of Secretaries, banks are being

advised to implement the framework on priority. Individual banks have started implementation and may complete the rollout by December 2011.

The system will be linked to the Unique Identity (UID) number once it gets operationalised. A customer will have to present his UID number and biometrics for opening the Mobile-linked No-Frills Account. Initially, since the UID system is still not in place, this will not be mandatory. At around 100–150 million, mobile subscribers far outstrip account holders in rural areas.

The government aims to achieve the twin objectives of tapping this viable and scalable delivery models to allow banking based on micro-payments made by the poor and offering connectivity-driven branchless banking models to a population as yet to have any access to basic financial services.

The model enables persons with mobile phones instantly to deposit in or withdraw cash from their "Mobile-Linked No-Frills" bank accounts through a business correspondent (BC) having a mobile phone in the village. Also, the model enables any two mobile users to transfer money to each other's "no-frills" accounts specifying only their mobile numbers without the necessity of any intermediary including BCs. When fully implemented, the model would enable the same BC in the village to be shared by all the banks for supporting basic deposit and withdrawal transactions.

The detailed process of transfer of funds from the government agency account to the citizen is as follows (explained in respect of NREGS):

1. Centre/state transfers funds to DPC (District Project Coordinator).

2. DPC transfers funds to the account of Programme Officer/Gram or Village Panchayat/Project Implementing Agency.

3. Attendance rolls of the workers are recorded on "Muster Rolls" on a daily basis at the project site. The Muster Rolls are consolidated at the Gram Panchayat on a weekly basis. The Muster Rolls are then forwarded to the Block Development Office (BDO) for entry into the system and approval at the district and the state level.

4. Once approved, BDO issues instructions to the bank to credit the workers' salary into the Mobile-Linked No-Frills Accounts electronically or otherwise.

5. Once the salary is credited, a message is sent by the bank to the worker to inform him of the transaction.

CHAPTER V

DIGITAL INCLUSION IN TAMIL NADU – AN ANALYSIS

PROFILE OF TAMIL NADU

The History of Tamil Nadu dates back to 6000 years. It can be broadly divided into Ancient, Medieval and Modern Tamil Nadu. Many of the historians believe in the theory of the Aryan invasion in the South. The Tamils belonging to the Dravidian race had to move further South due to the invasion by the Aryans.

The history of the area dates back to more than two thousand years ago. Tamil Nadu was originally known as Tamilagam and the proof of the Tamilagam settlements are clear with the existence of ancient ports like Karipattinam, Arikamedu and Korkai. The birth place of Dravidian culture has witnessed several great dynasties. The Pallavas ruled in the 4th century A.D. The Cholas ruled between 1st and 4th centuries. They rose to power again in the 9th century, only to be replaced by the Pandyas in the 14th century. The East India Company started their factory in 1640 at Madras. They fought with the Dutch and the French to establish their supremacy. Tamil Nadu has contributed a lot in the country's struggle for freedom. After India's Independence, the state of Madras came into existence and 1968, the name was changed to Tamil Nadu.

The History of Tamil Nadu consists of the rise of the different kingdoms under the then rulers. History of Tamil Nadu is a witness to the rise and fall of the several dynasties under their able and incompetent rulers. The Chola dynasty rose in power in Tamil Nadu between the 1st and 4th centuries. Karikalan was the first and one of the famous rulers of the Cholas. Later in the 9th century, the Cholas regained power under VijayalayaChola.

RajarajaChola was the greatest ruler among the later Chola rulers. It is during his reign that the architecture reached the pinnacle. RajendraChola I was the successor and the son of the ablest ruler RajarajaChola. He further expanded the kingdom of the Cholas and consolidated the empire as well. He even established a new capital called Gangaikondancholapuram to commemorate a political victory.

The Pandyas that came to prominence after overthrowing a decaying Chola empire. The Cholas were mainly known for their administrative capabilities, for the different constructions in the kingdom and for their aesthetic senses.

ANCIENT

Tamil Nadu, is one of the largest states of India. It is also one of the southern most state. The History of Ancient Tamil Nadu can be traced back to about 6000 years back. The Dravidian Civilization encapsulates the state of Tamil Nadu as well some of its neighbouring states of Kerala, Karnataka and Andhra Pradesh.

The history of Ancient Tamil Nadu can be placed somewhere between 1st to 9th centuries. The civilization of Tamil Nadu is considered to be one of the oldest civilizations of the world. There is much debate regarding the origin of the Tamils. One cannot rule out the theory of the invasion of the Aryans. It is generally believed that it is due to the Aryans that the Dravidians had to stay back in the far south.

During the 1st to the 4th century, the early Cholas ruled the lands of Tamil Nadu. The first and the most important king of this dynasty was Karikalan. This dynasty was mainly known for their military prowess. The dam named Kallanai over the river Cauvery was constructed with the initiative of the king Karikalan.

The Chola Dynasty occupies a major part in the History of Ancient Tamil Nadu. The kings of the dynasty were also known for constructing the different temples. The Brahadeswarer's Temple is such a magnificent example of Chola architecture.

The Pallava Dynasty ruled Tamil Nadu for near about 400 years starting from the latter half of the 4th century. Mahendravarman I and his son Narasimhavarman were the greatest rulers among the Pallavas. Thus, the Ancient Tamil Nadu has the marks of glorious history.

MEDIEVAL

The history of Tamil Nadu is very rich and boasts of the prowess of the rulers of the different dynasties. The Medieval Tamil Nadu spans the 9th to 14th centuries. The Dravidian Civilization of Tamil Nadu is considered to be one of the oldest civilizations of the world.

The history of Medieval Tamil Nadu starts with the Cholas regaining their power in the 9th century. It is mainly under RajarajaChola and his son RajendraChola that the re-establishment of lost power was possible. The Chola rulers defeated the other rising powers like Cheras, Pandyas and the Mahipalas. To celebrate the victory over the Mahipalas of Bihar and Bengal, a new capital called GangaikondaCholapuram was established by RajendraChola. The Cholaempire spread far and wide with the winning battles.

In the 14th century, the power of the Cholas declined gradually. The power was over taken by the Pandyas. But soon they were over powered by the Muslim invaders. This invasion of 1316 completely destroyed the power of the Cholas and Pandyas of South India.

As a reaction to the Muslim invasion, the Hindus took the initiative of building Vijaynagaraempire. The empire also assembled the remaining Chola rulers as well to confront the Muslims. The capital of Vijaynagaraempire was Hampi. It occupies an important and prosperous place in the Medieval Tamil Nadu. This Hindu empire couldnot survive for long as it has to surrender in the hands of the Sultans of the Deccan in the Battle of Talikota. The fragmented Vijaynagaraempirewas later ruled by the Nayaks.The History of Medieval Tamil Nadu prospered under the Nayakas of the South. Their rule proved to be a very peaceful one, compared to the prior periods of turmoil in the Medieval Tamil Nadu.

MODERN TAMIL NADU

The history of Tamil Nadu is enriched by the prowess and deeds of the rulers of different dynasties in the earlier periods. The Modern Tamil Nadu has an equally glorious history to share with the rest of the world. The southernmost state of India, Tamil Nadu's Dravidian culture is one of the oldest of the world.

The rise of the British regime in Tamil Nadu marks the advent of the Modern Tamil Nadu. They established their settlement in the southern India. The British settlers grew strong under the East India Company. They took the advantage of the conflicts and quarrels among the existing rulers in South India.

During the same time, other European powers tried to establish their power in South India as well. The Dutch settlement was formed in India along with the French colonies. But

the British power emerged more powerful, as they defeated the French army and completely drove out the Dutch power from South India. Gradually the British power consolidated their firm hold in the Southern Indian states including Tamil Nadu.

Modern Tamil Nadu is also marked by the nationalistic movement. The anti-colonial feeling against the British started of these movements in the 18th century. In this state the movement was carried under the chieftains of Shivgana and Tirunelveli.

After India gained independence in 1947, the state of Madras was renamed as Tamil Nadu in the year 1968. The History of Modern Tamil Nadu is fascinating and records the bravery of the sepoys fighting against the British hegemony.

FIGURE 5.1: TAMIL NADU MAP

TABLE 5.1: TAMIL NADU STATE INFORMATION

Capital	Chennai
Date of formation	26 January 1950
Governor	BanwarilalPurohit
Chief Minister	EdappadiPalaniswami
Tourist attractions	Marina Beach, Mahabalipuram Beach, Ooty
Festivals	Pongal, Vaikasi, Visakam, AvaniMoolam,
Major dance and music forms	Bharatnatyam, ParaviAttam, NeyyandiMelam
Arts and crafts	Tanjore style of painting; Kanchipuram silk; Toda women embroider geometrical patterns on shawl, called poothkuli
Language	Tamil and English
Size	130,060 km2
Population (Census 2011)	77,881,463
Rivers	Kaveri, Palar, Pniyar, Bhavani
Forests and wildlife sanctuaries.	Mudumalai NP, Mukurthi NP, Annamalai NP
State animal	Nilgiritahr
State bird	Emerald dove
State flower	Gloriosa lily
State tree	Palmera palm
Major crops	Paddy, Jowar, Ragi, Tea
Factoids	Mamallapuram is a group of rock cut monuments and temples carved between 7th and 8th centuries AD in Mahabalipuram.
	The magnificent Meenakshi temple at Madurai was built by the Pandyas.
No. of District	32

Source: https://www.tn.gov.in/

TABLE 5.2: DISTRICTS IN TAMIL NADU

District	Area	Population
Ariyalur	1,949.31 square kilometres	7,52,481
Chennai	178.2 sq km	4,681,087,
Coimbatore	4,850 sq.km	3472578
Cuddalore	3,564 sq km	2600880
Dharmapuri	4497.77 Sq km	1502900
Dindigul	6,058 sq km.	2161367
Erode	5,692 Sq km	22,59,608
Kanchipuram	4,432 sq km	3990897
Kanniyakumari	1,684 Sq Km	1863174
Karur	2901 sq.km	10,76,588
Krishnagiri	5143 sq km	1883731
Madurai	3,741.73 sq km	3041038
Nagapattinam	2417 sq.km	1614069
Namakkal	130,058 sq km	1721179
Nilgiris	2,452.5 sq km	735071
Perambular	1,752 sq km	564511
Pudukkottai	4663 sq km	1618725
Ramnathapuram	4123 sq km	1337560
Salem	5245 sq km	3480008
Sivaganga	4,189 Sq km	1341250
Thanjavur	3476 sq km	2402781
Theni District	2,889 sq km	1243684
Thoothukodi District	4621 Sq km	1738376
Tiruvarur	2161 sq km.	1268094
Tirunelveli	6,823 Sq km	3072880
Tiruchirappalli	4,404 sq km	2713858
Tiruvallur	3,422 Sq km	3725697

Tiruppur	516.12 Sq km	2471222
Tiruvannamalai	6191 sq km	3468965
Vellore	6077 sq km	3928106
Villupuram	7217 sq km	3463284
Virudhnagar	3445.73. sq km	1943309

Source: https://www.tn.gov.in/

DIGITAL INCLUSION IN TAMIL NADU- ANALYSIS

NUMBER OF HOUSEHOLDS AVAILING COMPUTER/LAPTOP – WITH INTERNET:

Table 5.3 deals with the number of households availing computers or laptops with internet facility in Tamil Nadu. The entire population is divided into two categories i.e., Rural and Urban. So, this division gave a clear cut idea about the internet as well as the availability of computers or laptops in these two areas. The Table revealed that majority of the urban households are having availability of laptops or computers with internet facility (87.31%) and the percentage is very less in the rural areas (12.69%). It is interested to note that out of the 32 districts of Tamil Nadu, there is no rural households availing computers or laptops with internet facility in Chennai District. There, the entire population is belonging to urban area with cent percent availability of internet with computers or laptops. Another fact revealed by the Table is that, among the 32 districts, three districts namely Vellore, Dharmapuri and Perambalur is having a greater number of households in rural area with the availability of computers and laptops with internet than urban households. In all the remaining districts the number of urban households' availing computers or Laptops with internet is more than the number of rural households. On an average, in Tamil Nadu 3063 rural households are availing computers or laptop with internet and the number of urban households with same facility is approximately 7 times more than the rural households (21070).

TABLE 5.3 NUMBER OF HOUSEHOLDS AVAILING COMPUTER/LAPTOP – WITH INTERNET

SI NO	District	Rural (%)	Urban (%)	Total (%)
1.	Thiruvallur	5,750	69,884	75,634
2.	Chennai	0	2,17,368	2,17,368
3.	Kancheepuram	8,021	92,301	1,00,322
4.	Vellore	5,055	15,568	20,623
5.	Thiruvannamalai	2,953	3,492	6,445
6.	Viluppuram	4,507	3,965	8,472
7.	Salem	3,522	17,138	20,660
8.	Namakkal	3,468	5,492	8,960
9.	Erode	5,041	13,563	18,604
10.	The Nilgiris	1,013	3,548	4,561
11.	Dindigul	2,870	6,285	9,155
12.	Karur	1,072	3,843	4,915
13.	Thiruchirappalli	4,122	25,924	30,046
14.	Perambalur	887	620	1,507
15.	Ariyalur	1,279	470	1,749
16.	Cuddalore	3,875	11,521	15,396
17.	Nagappattinam	2,816	2,769	5,585
18.	Thiruvarur	2,400	2,016	4,416
19.	Thanjavur	3,949	9,546	13,495
20.	Pudukkotai	1,926	2,568	4,494
21.	Sivaganga	2,109	3,664	5,773
22.	Madurai	3,184	30,913	34,097
23.	Theni	1,292	3,375	4,667
24.	Virudhunagar	2,369	7,850	10,219
25.	Ramanathapuram	2,486	2,686	5,172
26.	Thoothukkudi	2,100	9,355	11,455
27.	Thirunelveli	5,150	13,920	19,070
28.	Kanniyakumari	1,914	13,759	15,673

29.	Dharmapuri	1,924	1,727	3,651
30.	Krishnagiri	3,236	6,383	9,619
31.	Coimbatore	3,931	59,342	63,273
32.	Thiruppur	3,785	13,396	17,181
	Total	**98,006**	**6,74,251**	**7,72,257**
	Percentage	**12.69%**	**87.31%**	**100%**
	Average	**3,063**	**21,070**	**24,133**

Source: census of India, 2011

NUMBER OF HOUSEHOLDS AVAILING COMPUTER/LAPTOP –WITHOUT INTERNET:

Table 5.4 revealed that in Tamil Nadu 30.25 Per cent households are availing laptops or computers without internet and that of urban household is 69.74 per cent. The number of households availing computers or laptops without internet is more than that of rural households having computers or laptops with internet and the number of urban people without internet is less than that of urban households with internet. In 12 districts namely, Thiruvannamalai, Viluppuram, Dindigul, Perambalur, Ariyalur, Nagapattinam. Tiruvarur, Pudukkottai, Sivaganga, Ramanathapuram, Dharmapuri and Krishnagiri are having more number of households in rural area than urban area with availability of laptops or computers without access to internet. In all the other districts, the number of urban households with availability of laptops and computers with compute access to internet is more than the rural areas. Chennai is the only district where all the households in urban area availing computers or laptops without internet followed by Coimbatore, Salem and Tiruchirappilly. Over all the number of urban households with computers and laptops without internet facility is more (25812) than the rural households (11199) in Tamil Nadu.

TABLE 5.4: NUMBER OF HOUSEHOLDS AVAILING COMPUTER/LAPTOP –WITHOUT INTERNET

SI NO	District	Rural (%)	Urban (%)	Total (%)
1.	Thiruvallur	17,772	80,873	98,645
2.	Chennai	0	1,38,470	1,38,470
3.	Kancheepuram	18,824	81,592	1,00,416
4.	Vellore	17,915	31,374	49,289
5.	Thiruvannamalai	13,143	7,941	21,084
6.	Viluppuram	25,075	9,764	34,839
7.	Salem	12,714	30,493	43,207
8.	Namakkal	11,104	11,517	22,621
9.	Erode	14,488	25,769	40,257
10.	The Nilgiris	4,380	8,994	13,374
11.	Dindigul	15,344	14,178	29,522
12.	Karur	4,603	8,477	13,080
13.	Thiruchirappalli	14,443	35,099	49,542
14.	Perambalur	4,305	1,933	6,238
15.	Ariyalur	5,386	1,236	6,622
16.	Cuddalore	15,375	20,167	35,542
17.	Nagappattinam	8,328	5,779	14,107
18.	Thiruvarur	7,206	3,913	11,119
19.	Thanjavur	11,248	18,169	29,417
20.	Pudukkotai	8,373	5,405	13,778
21.	Sivaganga	9,618	9,065	18,683
22.	Madurai	14,154	47,060	61,214
23.	Theni	5,025	9,138	14,163
24.	Virudhunagar	9,724	17,414	27,138
25.	Ramanathapuram	9,803	7,404	17,207
26.	Thoothukkudi	8,156	16,180	24,336
27.	Thirunelveli	16,871	27,649	44,520
28.	Kanniyakumari	5,597	31,673	37,270

29.	Dharmapuri	10,438	4,838	15,276
30.	Krishnagiri	15,101	13,519	28,620
31.	Coimbatore	12,371	74,276	86,647
32.	Thiruppur	11,499	26,631	38,130
	Total	**3,58,383**	**8,25,990**	**11,84,373**
	Percentage	**30.25%**	**69.74%**	**100%**
	Average	**11,199**	**25,812**	**37,011**

Source: census of India, 2011

NUMBER OF HOUSEHOLDS AVAILING LANDLINE ONLY:

The details of household's availing the only facility of landline in Tamil Nadu is depicted in Table 5.5. The Table revealed that in Tamil Nadu, 44.73 per cent of rural households are availing landlines only where in urban area it is 55.26%. it means urban people are availing landline facility than rural households in Tamil Nadu. It indicates the fact that the communication facility in rural area is lower than that of urban area. Here also Chennai is the only district which consists of urban households only and all the households are availing landline facility. It is interesting to note that among the 32 districts, in majority of the district's the number of rural households availing landline facility are more than urban households. These 20 districts cover most of the rural districts of Tamil Nadu. Among them, Ariyalur district is having lease number of urban households having landline facility only. In total, the average number of rural households having landline facility is 14711 and that of urban household is 18172.

TABLE 5.5: NUMBER OF HOUSEHOLDS AVAILING LANDLINE ONLY

SI NO	District	Rural (%)	Urban (%)	Total (%)
1.	Thiruvallur	15,654	47,339	62,993
2.	Chennai	0	1,14,191	1,14,191
3.	Kancheepuram	15,293	48,690	63,983
4.	Vellore	24,090	21,337	45,427
5.	Thiruvannamalai	17,734	5,862	23,596
6.	Viluppuram	28,694	6,746	35,440

7.	Salem	17,952	20,808	38,760
8.	Namakkal	13,377	8,881	22,258
9.	Erode	25,727	19,309	45,036
10.	The Nilgiris	3,565	5,163	8,728
11.	Dindigul	13,925	9,912	23,837
12.	Karur	7,000	6,922	13,922
13.	Thiruchirappalli	14,355	20,445	34,800
14.	Perambalur	5,188	1,490	6,678
15.	Ariyalur	4,747	620	5,367
16.	Cuddalore	18,038	12,791	30,829
17.	Nagappattinam	23,578	6,193	29,771
18.	Thiruvarur	28,338	5,389	33,727
19.	Thanjavur	18,707	11,368	30,075
20.	Pudukkotai	12,518	5,231	17,749
21.	Sivaganga	12,849	7,144	19,993
22.	Madurai	12,287	29,011	41,298
23.	Theni	4,746	7,161	11,907
24.	Virudhunagar	11,820	10,084	21,904
25.	Ramanathapuram	12,226	6,159	18,385
26.	Thoothukkudi	11,834	9,935	21,769
27.	Thirunelveli	27,414	21,414	48,828
28.	Kanniyakumari	9,361	39,950	49,311
29.	Dharmapuri	16,088	3,771	19,859
30.	Krishnagiri	14,026	6,350	20,376
31.	Coimbatore	10,607	40,810	51,417
32.	Thiruppur	19,018	21,055	40,073
	Total	**4,70,756**	**5,81,531**	**10,52,287**
	Percentage	**44.73%**	**55.26%**	**100%**
	Average	**14,711**	**18,172**	**32,883**

Source: census of India, 2011

NUMBER OF HOUSEHOLDS AVAILING MOBILE PHONE ONLY:

Mobile phone is the one of the easiest communication devices between people. It is easy to carry and use. The introduction of mobile phone reduces the demand for landline connection among the households. Table 5.6 depicted that in Tamil Nadu 48 per cent of rural households and 52 per cent urban households are availing mobile phones. There is only around two times difference between the number of households availing mobile phones between rural and urban area. In Vellore, Thiruvannamalai, Viluppuram, Namakkal, Dindigual, Perambalur, Cuddalore, Nagapattinam, Tiruvarur, Tanjavore, Pudukkottai, Sivaganga, Ramanathapuram, Dharmapuri and Krishnagiri is having more number of rural households availing mobile phones than urban hoseholds. The number of uraban hoseholds with mobile phone facility is highest in Chennai followed by Kanchipuram, Madhurai, Kanyakumari and Coimbatore. The average number of rural households availing mobile in Tamil Nadu is 171161 where as that of urban household is 187676. This means that there is not much difference in the number of people having mobile phone in the urban and rural households. In Tamil Nadu, both households are having better communication facility.

TABLE 5.6: NUMBER OF HOUSEHOLDS AVAILING MOBILE PHONE ONLY

SI NO	District	Rural (%)	Urban (%)	Total (%)
1.	Thiruvallur	1,92,120	4,38,458	6,30,578
2.	Chennai	0	6,88,857	6,88,857
3.	Kancheepuram	2,25,858	4,39,476	6,65,334
4.	Vellore	3,01,463	2,60,959	5,62,422
5.	Thiruvannamalai	2,66,621	79,129	3,45,750
6.	Viluppuram	3,98,226	85,908	4,84,134
7.	Salem	2,56,002	3,08,664	5,64,666
8.	Namakkal	1,70,718	1,30,192	3,00,910
9.	Erode	1,66,721	2,16,902	3,83,623
10.	The Nilgiris	50,651	76,326	1,26,977
11.	Dindigul	1,95,619	1,39,836	3,35,455
12.	Karur	98,941	84,265	1,83,206
13.	Thiruchirappalli	2,13,773	2,33,450	4,47,223

14.	Perambalur	74,295	16,302	90,597
15.	Ariyalur	1,07,378	14,397	1,21,775
16.	Cuddalore	2,60,610	1,49,088	4,09,698
17.	Nagappattinam	1,60,676	56,216	2,16,892
18.	Thiruvarur	1,19,705	40,113	1,59,818
19.	Thanjavur	2,25,644	1,48,410	3,74,054
20.	Pudukkotai	1,95,843	53,741	2,49,584
21.	Sivaganga	1,46,082	72,691	2,18,773
22.	Madurai	1,84,636	3,45,516	5,30,152
23.	Theni	77,009	1,10,349	1,87,358
24.	Virudhunagar	1,40,001	1,68,361	3,08,362
25.	Ramanathapuram	1,47,970	69,379	2,17,349
26.	Thoothukkudi	1,37,711	1,53,774	2,19,485
27.	Thirunelveli	2,18,411	2,49,764	4,68,175
28.	Kanniyakumari	50,986	2,51,755	3,02,741
29.	Dharmapuri	1,80,291	42,499	2,22,790
30.	Krishnagiri	2,06,219	77,268	2,83,487
31.	Coimbatore	1,41,542	4,93,684	6,35,226
32.	Thiruppur	1,65,433	3,09,916	4,75,349
	Total	**54,77,155**	**60,05,645**	**1,14,82,800**
	Percentage	**48%**	**52%**	**100%**
	Average	**1,71,161**	**1,87,676**	**3,58,837**

Source: census of India, 2011

NUMBER OF HOUSEHOLDS AVAILING BOTH -LANDLINE AND MOBILE PHONE:

Table 5.7 explained the number of households having both mobile phones and landline. When individually taken there is not much difference in the number of households in rural and urban area having these facilities. In Tamil Nadu majority of urban households are having both mobile phone and land line (70 per cent) but it is only 30 per cent in rural area. Out of the 32 districts, majority of the districts data revealed that the number of rural households having both land phone and mobile phone facility is very much lower in rural

area than urban area. Over all 12302 numbers of rural households are having both land phone and mobile phone facility and this is 28814 among urban households in Tamil Nadu.

TABLE 5.7: NUMBER OF HOUSEHOLDS AVAILING BOTH -LANDLINE AND MOBILE PHONE

SI NO	District	Rural (%)	Urban (%)	Total (%)
1.	Thiruvallur	9665	69162	78827
2.	Chennai	0	214074	214074
3.	Kancheepuram	12263	91136	103399
4.	Vellore	16950	28882	45832
5.	Thiruvannamalai	11676	8307	19983
6.	Viluppuram	18934	9337	27731
7.	Salem	16544	30094	46638
8.	Namakkal	16516	12755	29271
9.	Erode	24904	29867	54771
10.	The Nilgiris	4843	8721	13564
11.	Dindigul	8644	11903	20547
12.	Karur	6268	7352	13620
13.	Thiruchirappalli	14314	41077	55391
14.	Perambalur	4018	1823	5841
15.	Ariyalur	5493	1723	7216
16.	Cuddalore	10988	18506	29494
17.	Nagappattinam	25757	9998	35755
18.	Thiruvarur	23412	8672	32084
19.	Thanjavur	21433	21420	42853
20.	Pudukkotai	11273	7723	18996
21.	Sivaganga	9104	10967	20071
22.	Madurai	6284	41188	47472
23.	Theni	3774	6417	10191
24.	Virudhunagar	8479	15164	23643
25.	Ramanathapuram	8787	7479	16266
26.	Thoothukkudi	10957	20763	31720

27.	Thirunelveli	22948	31244	54192
28.	Kanniyakumari	8093	38403	46496
29.	Dharmapuri	11136	4967	16103
30.	Krishnagiri	8871	8755	17626
31.	Coimbatore	13044	77660	90704
32.	Thiruppur	18846	26517	45363
	Total	**393678**	**922056**	**1315734**
	Percentage	**30%**	**70%**	**100%**
	Average	**12302**	**28814**	**41116**

Source: census of India, 2011

DISTRICTWISE COMPUTER/LAPTOP DENSITY – WITH INTERNET IN TAMIL NADU:

The district wise density of laptops/computers with internet facility is more in Chennai followed by Kancheepuram and Coimbatore. When look in to the density separately among rural and urban households it is revealed that the density is more among urban households than rural households. The density is least among the rural households of Tiruvannamalai, Viluppuram, Pudukottai and Dharmapuri. It could be concluded from Table 5.8 that density of computer or laptops with internet facility is very much high in urban households of Tamil Nadu.

TABLE 5.8: DISTRICTWISE COMPUTER/LAPTOP DENSITY – WITH INTERNET IN TAMIL NADU

SI NO	District	Rural (%)	Urban (%)	Total (%)
1.	Thiruvallur	0.44	2.87	2.03
2.	Chennai	-	4.64	4.64
3.	Kancheepuram	0.55	4.00	3.00
4.	Vellore	0.22	0.91	0.52
5.	Thiruvannamalai	0.14	0.70	0.26

6.	Viluppuram	0.15	0.77	0.24
7.	Salem	0.20	0.96	0.59
8.	Namakkal	0.33	0.79	0.52
9.	Erode	0.45	1.17	0.82
10.	The Nilgiris	0.33	0.81	0.62
11.	Dindigul	0.21	0.77	0.42
12.	Karur	0.16	0.88	0.45
13.	Thiruchirappalli	0.29	1.93	1.10
14.	Perambalur	0.18	0.64	0.26
15.	Ariyalur	0.19	0.56	0.23
16.	Cuddalore	0.22	1.30	0.59
17.	Nagappattinam	0.22	0.76	0.34
18.	Thiruvarur	0.23	0.77	0.34
19.	Thanjavur	0.25	1.12	0.56
20.	Pudukkotai	0.14	0.81	0.27
21.	Sivaganga	0.22	0.88	0.43
22.	Madurai	0.26	1.67	1.12
23.	Theni	0.22	0.50	0.37
24.	Virudhunagar	0.24	0.80	0.52
25.	Ramanathapuram	0.27	0.62	0.38
26.	Thoothukkudi	0.24	1.07	0.65
27.	Thirunelveli	0.33	0.91	0.62
28.	Kanniyakumari	0.58	0.89	0.84
29.	Dharmapuri	0.15	0.66	0.24
30.	Krishnagiri	0.22	1.48	0.51
31.	Coimbatore	0.46	2.25	1.82
32.	Thiruppur	0.39	0.88	0.69

Source: census of India, 2011

DISTRICTWISE COMPUTER/LAPTOP DENSITY – WITHOUT INTERNET IN TAMIL NADU:

The Table depicts the density of computers/ laptops without internet facility in Tamil Nadu. Compared to Table 5.9 i.e., density of computers/ laptops with internet facility, the density of computers/laptops without internet facility is more in Tamil Nadu. The density is very much high in Chennai followed by Thiruvallur, and Coimbatore. Among the rural households, the density more in Kanyakumari and Coimbatore. But overall, the density is more in urban households of Tamil Nadu than rural households.

TABLE 5.9: DISTRICTWISE COMPUTER/LAPTOP DENSITY – WITHOUT INTERNET IN TAMIL NADU

SI NO	District	Rural (%)	Urban (%)	Total (%)
1.	Thiruvallur	1.37	3.32	2.64
2.	Chennai	-	2.95	2.95
3.	Kancheepuram	1.29	3.21	2.51
4.	Vellore	0.80	1.85	1.25
5.	Thiruvannamalai	0.70	1.59	0.85
6.	Viluppuram	0.84	1.91	1.00
7.	Salem	0.74	1.71	1.24
8.	Namakkal	1.08	1.66	1.31
9.	Erode	1.31	2.22	1.78
10.	The Nilgiris	1.46	2.06	1.81
11.	Dindigul	1.13	1.75	1.36
12.	Karur	0.71	1.95	1.21
13.	Thiruchirappalli	1.04	2.62	1.82
14.	Perambalur	0.92	1.99	1.10
15.	Ariyalur	0.80	1.47	0.88
16.	Cuddalore	0.89	2.28	1.36
17.	Nagappattinam	0.66	1.58	0.87
18.	Thiruvarur	0.71	1.51	0.87
19.	Thanjavur	0.72	2.13	1.22

20.	Pudukkotai	0.64	1.72	0.85
21.	Sivaganga	1.03	2.18	1.39
22.	Madurai	1.18	2.55	2.01
23.	Theni	0.87	1.36	1.13
24.	Virudhunagar	1.00	1.77	1.39
25.	Ramanathapuram	1.07	1.73	1.28
26.	Thoothukkudi	0.94	1.85	1.39
27.	Thirunelveli	1.08	1.81	1.44
28.	Kanniyakumari	1.71	2.06	2.00
29.	Dharmapuri	0.84	1.85	1.01
30.	Krishnagiri	1.03	3.15	1.51
31.	Coimbatore	1.47	2.82	2.49
32.	Thiruppur	1.20	1.75	1.54

Source: census of India, 2011

DISTRICTWISE LANDLINE DENSITY IN TAMIL NADU:

Table 5.10 depicted that the land line density among rural households and urban households of Tamil Nadu are almost equal. The density is more among the urban households of Chennai district followed by Kanyakumari. But it is interested to note that in Kanyakumari district the density of landline is more in rural households than urban households. Over all among the 32 districts the density is least in Krishnagiri district and it is only 0.10%.

TABLE 5.10: DISTRICTWISE LANDLINE DENSITY IN TAMIL NADU

SI NO	District	Rural (%)	Urban (%)	Total (%)
1.	Thiruvallur	1.21	1.94	1.69
2.	Chennai	-	2.43	2.43
3.	Kancheepuram	1.05	1.91	1.60
4.	Vellore	1.07	1.25	1.15
5.	Thiruvannamalai	0.89	1.18	0.95
6.	Viluppuram	0.97	1.32	1.02

7.	Salem	1.05	1.17	1.11
8.	Namakkal	1.30	1.28	1.29
9.	Erode	2.33	1.66	1.99
10.	The Nilgiris	1.19	1.18	1.18
11.	Dindigul	1.02	1.22	1.10
12.	Karur	1.08	1.59	1.29
13.	Thiruchirappalli	1.04	1.52	1.28
14.	Perambalur	1.10	1.53	1.18
15.	Ariyalur	0.70	0.74	0.71
16.	Cuddalore	1.04	1.44	1.18
17.	Nagappattinam	1.88	1.70	1.84
18.	Thiruvarur	2.80	2.08	2.65
19.	Thanjavur	1.20	1.33	1.25
20.	Pudukkotai	0.95	1.66	1.09
21.	Sivaganga	1.38	1.71	1.49
22.	Madurai	1.02	1.57	1.35
23.	Theni	0.82	1.06	0.95
24.	Virudhunagar	1.22	1.02	1.12
25.	Ramanathapuram	1.34	1.44	1.37
26.	Thoothukkudi	1.36	1.13	1.25
27.	Thirunelveli	1.76	1.40	1.58
28.	Kanniyakumari	2.86	2.59	2.64
29.	Dharmapuri	1.29	1.44	1.32
30.	Krishnagiri	0.96	1.48	0.10
31.	Coimbatore	1.26	1.54	1.48
32.	Thiruppur	1.99	1.38	1.62

Source: census of India, 2011

DISTRICTWISE MOBILE PHONE DENSITY IN TAMIL NADU:

Table 5.11 portraits that, compared to the density of landline, the density of mobile phone is more in Tamil Nadu. The density is more among the rural households of Tiruppur

district followed by Namakkal and The Nilgiris. In the case of urban households, the density is more in Thoothukkudi district followed by Tiruppur district. Over all among the districts, Thoothukkudi is having the highest density of mobile phone and in the remaining districts the density is almost same.

TABLE 5.11: DISTRICTWISE MOBILE PHONE DENSITY IN TAMIL NADU

SI NO	District	Rural (%)	Urban (%)	Total (%)
1.	Thiruvallur	14.86	18.00	17.00
2.	Chennai	-	15.00	15.00
3.	Kancheepuram	16.00	17.00	16.60
4.	Vellore	13.00	15.00	14.00
5.	Thiruvannamalai	13.50	16.00	14.00
6.	Viluppuram	13.00	17.00	14.00
7.	Salem	15.00	17.00	16.00
8.	Namakkal	17.00	19.00	17.40
9.	Erode	15.00	19.00	17.00
10.	The Nilgiris	17.00	18.00	17.20
11.	Dindigul	14.00	17.00.	15.50
12.	Karur	15.00	19.00	17.00
13.	Thiruchirappalli	16.00	17.00	16.4
14.	Perambalur	16.00	17.00	16.04
15.	Ariyalur	16.00	17.00	16.18
16.	Cuddalore	15.00	17.00	16.00
17.	Nagappattinam	13.00	15.00	13.43
18.	Thiruvarur	12.00	16.00	13.00
19.	Thanjavur	15.00	17.00	16.00
20.	Pudukkotai	15.00	17.00	15.41
21.	Sivaganga	16.00	17.00	16.31
22.	Madurai	15.00	19.00	17.00
23.	Theni	13.00	16.00	15.00
24.	Virudhunagar	15.00	17.00	16.00
25.	Ramanathapuram	16.24	16.26	16.24

26.	Thoothukkudi	15.89	28.64	26.93
27.	Thirunelveli	14.07	16.42	15.23
28.	Kanniyakumari	15.61	16.38	16.24
29.	Dharmapuri	15.00	16.00	14.80
30.	Krishnagiri	14.17	18.03	15.04
31.	Coimbatore	16.86	18.74	18.29
32.	Thiruppur	17.38	20.39	19.23

Source: census of India, 2011

DISTRICTWISE TELEDENSITY IN TAMIL NADU:

The tele density in Tamil Nadu showed that, the density is more among urban households than the rural households. In almost all the districts the tele density among rural households are below one percent where in urban households it is more than one per cent. But in Theni district the density is very low followed by Krishnagiri district. Kanyakumari district marked the highest tele density in rural households and Chennai and Kancheepuram are the toppers in tele density among the urban households. Over all, Chennai stands first in the tele density followed by Kancheepuram.

TABLE 5.12: DISTRICTWISE TELEDENSITY IN TAMIL NADU

SI NO	District	Rural (%)	Urban (%)	Total (%)
1.	Thiruvallur	0.74	2.84	2.11
2.	Chennai	-	4.57	4.57
3.	Kancheepuram	0.84	3.59	3.00
4.	Vellore	0.75	1.70	1.16
5.	Thiruvannamalai	0.59	1.61	0.80
6.	Viluppuram	0.64	1.83	0.80
7.	Salem	0.97	1.69	1.34
8.	Namakkal	1.60	1.84	1.70
9.	Erode	2.25	2.58	2.42
10.	The Nilgiris	1.61	2.00	1.84

11.	Dindigul	0.63	1.47	0.95
12.	Karur	0.97	1.69	1.26
13.	Thiruchirappalli	1.03	3.07	2.04
14.	Perambalur	0.85	1.88	1.03
15.	Ariyalur	0.82	2.05	0.95
16.	Cuddalore	0.63	2.09	1.13
17.	Nagappattinam	2.06	2.74	2.21
18.	Thiruvarur	2.31	3.35	2.53
19.	Thanjavur	1.38	2.51	1.78
20.	Pudukkotai	0.86	2.46	1.17
21.	Sivaganga	0.98	2.63	1.49
22.	Madurai	0.52	2.23	1.56
23.	Theni	0.65	0.95	0.81
24.	Virudhunagar	0.87	1.54	1.21
25.	Ramanathapuram	0.96	1.75	1.21
26.	Thoothukkudi	1.26	2.38	1.82
27.	Thirunelveli	1.47	2.05	1.76
28.	Kanniyakumari	2.47	2.49	2.49
29.	Dharmapuri	0.89	1.90	1.07
30.	Krishnagiri	0.60	2.04	0.93
31.	Coimbatore	1.55	2.94	2.61
32.	Thiruppur	1.97	1.74	1.83

Source: census of India, 2011

CHAPTER VI

SUMMARY OF FINDINGS, SUGGESTIONS AND CONCLUSION

Major findings of the study are as follows:

SUBSCRIPTIONS

The number of total telephone subscribers in India increased from 28.53 million in March 2000 to 943.49 million in February 2012. Wireless subscriptions increased from 1.88 million in March 2000 to 911.57 million in February 2012 and wireline subscriptions increased from 26.65 million in March 2000 to 32.33 million in February 2012.

INTERNATIONAL COMPARISON:

The total number of telephone subscriptions in the world including fixed line and cellular sector grew at a Compound Annual Growth Rate (CAGR) of 17.43 per cent between 2000 and 2010. A total of more than US$ 3,670 billion (6 per cent of the world's GDP) was spent on telecommunication services by governments across the world in 2008. India's expenditure on telecommunication services in 2008 was to the tune of US$ 52 billion. This was 4.3 per cent of the country's total GDP. Government's expenditure on telecommunications in India increased at the rate of 14 per cent during 2005–08.

TELEPHONE SUBSCRIPTION:

Available international comparisons till 2010 show that India has the second largest number of telephone subscribers in the world (222 countries), accounting for 12 per cent of the world's total telephone subscribers.

It is also one of the fastest growing in terms of telecom subscribers. Total telephone subscribers in India have increased at a CAGR of 32 per cent in 2000–10 against the world average growth rate of 17.34 per cent. However, India's teledensity, 64, is still lower compared to the world average of 108 (Teledensity as on February 2012 is 78.1). This indicates low penetration of telephones in the rural areas.

Teledensity has increased in India and around the world especially in the developing countries due to the rise of mobile phones. As of 2010, the ratio of mobile phones to fixed lines in the world ranged from 0.4:1 to 386.5:1. The average ratio of mobile phones to fixed

lines in the world stood at 21.5:1 in 2010. In India the same ratio is 21.4:1 in 2010 whereas the comparable numbers for China and U.S. are 2.9:1 and 1.8:1, respectively.

TARIFFS:

Mobile cellular prepaid tariffs ranged between US$ 1.3 and 37 per month across countries in 2008. Mobile tariffs are the lowest in countries such as Bangladesh, India, Pakistan, Sri Lanka, Nepal, Bhutan, and so on. Mobile tariffs in India are the second lowest (US$1.6 per month) in the world after Bangladesh.

INTERNET USERS:

India is ranked fourth amongst Internet users in the world, accounting for 4.56 per cent of the world's total Internet users in 2010. Internet users in India expanded at a significantly high CAGR of 32.27 per cent during the period 2000–10 while those in the world expanded at an average rate of 17.46 per cent. However, India ranks low in terms of Internet users per 100 people in the world (143 out of 186) with only 7.5 per 100 people using Internet, compared to the world average of 30.48. The growth numbers in terms of users are dazzling but as the next section will show, India is still far behind in Internet subscriptions.

INTERNET SUBSCRIPTIONS:

Out of the 91.8 million people using Internet in India, there were only 18.7 million fixed Internet subscribers in 2010. India was ranked the seventh highest (out of 214 countries) in this category in 2010. The country accounted for 3.54 per cent of the world's total fixed Internet subscribers in 2010.

TOTAL SUBSCRIPTIONS OF TELEPHONES:

Growth of telephones sector can be summarised in three stages. Stage I: Before 1990. This refers to the period when the telecom sector was mainly state owned; Stage II: 1991–2000. This refers to the period between the onset of reforms but the absence of wireless phones; and Stage III: post-2001. This refers to mainly the era of wireless.

WIRELESS SUBSCRIPTIONS:

Wireline subscriptions increased from 2.3 million in 1981 to 32.44 million in 2000 to reach its peak at 50.18 million in 2006. Thereafter, it started registering negative growth. By the end of February 2012, wireline subscriptions came down to 32.33 million. India has followed the worldwide trend where the mobile phone is a substitute to fixed line phone, through competition has forced the landline services to become more efficient in terms of quality of services. The landline network quality has improved and landline connections are now usually available on demand.

WIRELESS / CELLULAR / MOBILE PHONE SUBSCRIPTION:

Cellular or mobile segment has been the key contributor to record growth in telephone subscriptions with its wide range of offers of services. It has led the growth wave of telecom sector in the country. After triple digit growth rate in the first two years, growth rate reduced to 35.6 per cent in 1998. The annual growth rate of wireless phones increased again till 2003 and peaked at 159.2 per cent. Since then, the growth rate has tapered down and has averaged around 51.8 per cent during 2004–11. In 2011, growth rate significantly came down to 18.8 per cent. Mobile phones accounts for nearly 96.6 per cent of the total telecom subscriptions as of February 2012.

TELEDENSITY:

With the increase in the number of telecom subscriptions, the total teledensity has increased from 2.81 in 2000 to 78.10 on February 2012, a CAGR of 31.9 per cent. This is mainly driven by the increase in wireless density. Wireline density was higher than wireless till 2004 and then declined after peaking in 2005. During the period March 2000–February 2012, wireline density increased at the CAGR of 0.19 per cent. Wireless density increased at the CAGR of 64.65 per cent during the period March 2000 to February 2012.

INTERNET-DATA TRENDS:

The number of Internet subscribers increased from 0.95 million in March 2000 to 22.39 million in December 2011, grown at a CAGR of 33.3 per cent. As of December 2011, this comprises of 13.35 million broadband (>=256 kbps) connections and 9.08 million narrowband (<256 kbps) connections. Latest statistics available till February 2012 indicate that broadband subscribers have increased to 13.42 million.

PUBLIC CALL OFFICES AND VILLAGE PUBLIC TELEPHONES:

Total number of Public Call Offices (PCOs) in the country as of December 2011 was 2.37 million as compared to 0.65 million in 2000, showing an increase of 12.5 per cent (CAGR). However, the numbers declined as compared to the previous year. The declining trend in PCOs could be attributed to the increasing penetration of mobile connections due to reduction in entry level costs and availability of customised tariff schemes in the market. The number of Village Public Telephones (VPTs) increased from 0.41 million in 2000 to 0.58 million in December 2011. per cent of inhabited villages connected in India is 98.2.

OTHER VALUE ADDED SERVICES: PMRTS AND VSAT:

The number of PMRTS subscribers has increased from 0.019 million in March 2000 to 0.036 million in March 2008 before declining to 0.033 million in December 2011. The number of VSAT subscribers have gone up steadily from 0.017 million in 2003 to 0.15 million in 2011.

TELEPHONES:

In the wireline segment, the state-owned public sector incumbents, namely BSNL and MTNL have been the dominant players. However, private companies such as Bharti, Reliance and Tata Tele Services have also marked their presence. As a result, share of BSNL and MTNL have come down from 100 per cent in March 2000 to 81 per cent in December 2011. Further, the number of players in the private sector has increased signalling higher competition in this sector.

INTERNET SERVICES:

Internet service was opened for private participation in 1998 with a view to encourage growth of Internet and increase its penetration. This has resulted in the entry of a number of private Internet service providers (ISP) in the country. However, the market is still dominated by state owned companies, BSNL and MTNL. These two companies together accounted for around 66.3 per cent of the Internet subscriptions in the country in December 2011.

PCOS AND VPTS:

Public sector companies are the leading PCO and VPT service providers in India. As of December 2011, the two public sector companies MTNL and BSNL together accounted for around 56.95 per cent of the PCOs and 98.9 per cent of the VPTs in the country.

PMRTS AND VSAT:

The private sector dominates PMRTS and VSAT. There has also been some consolidation in the market where some companies have dropped out.

REVENUE AND USAGE- WIRELESS PHONES:

All India blended weighted average outgo per outgoing per minute has declined from Rs 1.09 per minute in March 2007 to Rs 0.5 in December 2011, indicating reduction in tariff levels. This rate has declined at a CAGR of 21.5 per cent between March 2007 and March 2011. Prepaid has declined at a faster rate (CAGR 25.3%) than either postpaid (CAGR 8.2%) or blended between March 2007 and March 2011. Not surprisingly, 97 per cent GSM subscriptions and 94 per cent CDMA subscriptions were prepaid. The numbers vary across the circles. In Metros the share of prepaid customers was 91.4 per cent (GSM) and 90.4 per cent (CDMA). In contrast, in Circle B the share goes up to 98.4 per cent (GSM) and 96.2 per cent (CDMA). Prepaid service has been one of the most important innovations in the mobile communications history and one can claim that it arose in South Asia.

TELEPHONES:

While India has made considerable progress in the telecom sector, there are wide disparities in the penetration of telecom facilities across rural–urban sectors and across states.

Increase in teledensity has been driven by wireless teledensity. Urban teledensity is approximately 4.4 times higher than rural, showing the digital divide that exists in India. There are wide variations in penetration of telecom services across states. States such as Delhi, Tamil Nadu, Kerala, Himachal Pradesh and Punjab have relatively high teledensity. However, states such as Assam, Bihar, Madhya Pradesh, UP, Jammu and Kashmir and the North-Eastern states have relatively low teledensity. The numbers show that teledensity in Delhi is 5.1 times higher than that of Assam. However, when we divide it even further, we see that Delhi's teledensity is 9.7 times higher than that of rural Bihar.

Himachal Pradesh has the highest total teledensity after Delhi. Assam and Bihar are the worst performing states in terms of total teledensity. Irrespective of their total teledensity, the gap between rural and urban teledensity is quite close to each other for these states– Assam 5.1, Bihar 7.9, and Himachal Pradesh 6.2.

INTERNET SERVICES:

There are wide disparities across states in terms of coverage of village panchayats under Broadband. While on the one hand, village panchayats in states like Pondicherry, Kerala and Chandigarh have 90 to 100 per cent broadband coverage, villages in states such as Manipur, Meghalaya, Madhya Pradesh, Arunachal Pradesh, Jharkhand, Jammu and Kashmir, Chhattisgarh, and Mizoram have less than 25 per cent Broadband coverage. Broadband connectivity is particularly low in village panchayats in north-eastern region of the country.

Although all the villages of Kerala may be covered by broadband, only 6.12 per cent of India's Broadband subscribers reside in that state. Maharashtra leads in the number of Broadband subscribers. Sixty per cent of India's Broadband subscribers live in the five states of Maharashtra, Tamil Nadu, Andhra Pradesh, Delhi and Karnataka.

DIGITAL INCLUSION IN TAMIL NADU

- Majority of the urban households are having availability of laptops or computers with internet facility (87.31%) and the percentage is very less in the rural areas (12.69%).
- Vellore, Dharmapuri and Perambalur is having more number of households in rural area with the availability of computers and laptops with internet than urban households
- On an average, in Tamil Nadu 3063 rural households are availing computers or laptop with internet and the number of urban households with same facility is approximately 7 times more than the rural households (21070).
- 30.25 Per cent households are availing laptops or computers without internet and that of urban household is 69.74 per cent.
- In 12 districts namely, Thiruvannamalai, Viluppuram, Dindigul, Perambalur, Ariyalur, Nagapattinam. Tiruvarur, Pudukkottai, Sivaganga, Ramanathapuram, Dharmapuri and Krishnagiri are having more number of households in rural area than urban area with availability of laptops or computers without access to internet

- Over all the number of urban households with computers and laptops without internet facility is more (25812) than the rural households (11199) in Tamil Nadu.
- 44.73 per cent of rural households are availing landlines only where in urban area it is 55.26%.
- The average number of rural household having landline facility is 14711 and that of urban household is 18172.
- in Tamil Nadu 48 per cent of rural households and 52 per cent urban households are availing only mobile phones
- The average number of rural households availing mobile in Tamil Nadu is 171161 where as that of urban household is 187676
- There is not much difference in the number of people having mobile phone in the urban and rural households.
- In Tamil Nadu majority of urban households are having both mobile phone and land line (70 per cent) but it is only 30 per cent in rural area.
- Over all 12302 numbers of rural households are having both land phone and mobile phone facility and this is 28814 among urban households in Tamil Nadu.
- The District wise density of laptops/computers with internet facility is more in Chennai followed by Kancheepuram and Coimbatore
- Density of computer or laptops with internet facility is very much high in urban households of Tamil Nadu.
- The density of computer/ laptop without internet is very much high in Chennai followed by Thiruvallur, and Coimbatore.
- In Kanyakumari district the density of landline is more in rural households than urban households. Over all among the 32 districts the density is least in Krishnagiri district and it is only 0.10%.
- Thoothukkudi is having the highest density of mobile phone in Tamil Nadu
- Kanyakumari district marked the highest tele density in rural households and Chennai and Kancheepuram are the toppers in tele density among the urban households.
- Over all, Chennai stands first in the tele density followed by Kancheepuram.

SUGGESTIONS

STRATEGIES TO PROMOTE ACCESS:

- Non-profit organizations and government agencies can work together to find funding for public-access computer stations.
- Publicly funded schools and universities could look at ways to expand free Wi-Fi access to surrounding neighborhoods.
- Policymakers could work toward bringing fast, reliable internet access to rural areas. Multiple channels are important for service designers to engage socially disadvantage groups.
- Access quality, locations of access and attitudes towards technologies remain important barriers so government can take steps to improve access quality through next generation broadband policy.

STRATEGIES TO PROMOTE ADOPTION:

- The overall challenge is not how to overcome the digital divide but how to expand access to and use of ICTs to promote social inclusion.
- Assessment on the barriers of digital equality and digital needs particularly vulnerable populations must be considered while incorporating public programmes such as Digital India.
- Designers and developers should follow WCAG and ADA guidelines to create accessible sites, so that users with disabilities can interact with content. Inclusive content elements such as gesture-operated navigation and alternative text ("alt text") for people who use screen-readers enhance the online experience.
- User experience designers can simplify site navigation and make call-to-action features more prominent (improvements that benefit all users, not just users who have a disability or are new to the internet).
- Public officials could offer incentives for broadband providers to offer discounted service based on factors such as income, disability, or geographic area.

STRATEGIES TO PROMOTE APPLICATION:

- Government should take steps to ensure that government online initiatives reach the most excluded.

- Schools, libraries, and government agencies could work toward expanding training — both in-person for new internet users, and online, for people who wish to further their basic skills.
- Community leaders could look into partnerships with organizations that refurbish computers and equipment, and launch awareness campaigns that help digitally excluded populations connect with resources.

NET NEUTRALITY

Network neutrality is the principle that all internet traffic should be treated equally. Net Neutrality implies that subscribers of internet access service can access the online content of their choice without the telecommunications service provider (TSP) blocking or throttling of content, or creating "fast lanes" through paid prioritization. Adherence to this principle of net neutrality is necessary for maintaining the open and non-discriminatory character of the internet, features that are responsible for the phenomenal growth of the internet in the past decades.

PRICING OF DATA

If some TSPs, in India, are willing to provide, as part of some social objective free/discounted data to their customers (in a way that does not violate the core net neutrality principles of not permitting TSPs to block or throttle content, or create "fast lanes" through paid prioritization) there is no reason it should be discouraged. Such services can actually help in faster proliferation of internet and may provide a fillip for the social-economic development.

TECHNOLOGY INCLUSION

Like the right to education and food security in the modern world, there is a right to internet access. Such legislation has been adopted in some Scandinavian countries and India should not think itself behind the curve. Digital India talks of digitizing services and not reach of the services. We need a technology inclusion programme where people can have access to internet for essential services.

INFORMATION SECURITY

The Government of India needs to enact strong data security policies. We have not been proactive in terms of educating people on data protection and cyber security, which is a key step to helping empower citizens to control and safeguard their personal information. India should become more proactive in ensuring that citizens have the tools they need to protect their data, through a combination of sensible laws and regulation, digital literacy initiatives, and market incentives for corporations to protect people's privacy. Strong data privacy is a pre-requisite for building and sustaining a strong data driven economy, including a robust e-commerce ecosystem. The government should enact regulations for data privacy and security and any attempt to weaken the encryption protection should be discouraged.

CONCLUSION

In the contemporary picture there is conjoint consensus amongst all the policy makers from across the sphere that devoid of ICT and digital inclusion; the growth of an individual is stalled. Specially in developing economy like India, where poverty eradication and employment generation are foremost objectives; digital inclusion is a must. Considering factors like lack of infrastructure, primary education and availability affordable technologies and others, the strategic intervention and collaborative efforts by government and non-government organizations is indispensable.

Present study has provided an analysis of secondary data in order to investigate the current status of digital inclusion and digital divide of Indian population with special reference to Tamil Nadu. Further it has also suggested few strategies to eradicate the digital divide for improving digital inclusion in India.

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A STUDY ON DIGITAL INCLUSION IN TAMILNADU- INTERVIEW SCHEDULE

1. Into which age group do you fall?

A. 15-19
B. 20-24
C. 25-34
D. 35-44
E. 45-49
F. 50-54
G. 55-64
H. Above 65

2. What is the highest level of education your personality has achieved?

A. No Schooling
B. Primary School Completed
C. High School
D. Matric
E. Artisian's certificate obtained
F. PostMatric(Degrees/diploma/certificate)
G. Technical diploma/ degree completed)
H. University degree completed
I. Professional
J. Secretarial
K. Other (STATE)

3. Please give me the letter which best describes the Total Monthly Household Income before tax and other deductions. Please include all sources of Income (i.e) Salaries, Pension, Government grants, Income from Investments etc.,

A. Below 2,000
B. 2,000-5,000
C. 5,000-10,000
D. 10,000- 15,000
E. 15,000-20,000
F. 20,000-25,000
G. 25,000-30,000
H. Above 30,000

4. Which one of these statements best describes your working life?

A. Working-Full time
B. Working –Part time
C. Not Working

i. Student
ii. House wife
iii. Retired
iv. Unemployment

5. What is your Occupation?

A. Professional and Technical
B. Administrative and Managerial
C. Clerical and sales
D. Transport and communication
E. Service
F. Agriculture
G. Artisans and related
H. Production and Mining
I. Not active
J. Other

6. Gender

A. Male
B. Female

7. Geographical Regions

A. Metropolitans
B. Urban
C. Semi-Urban
D. Rural

8. Television Access

- How many, if any television sets in working order are there in your household.

9. Satellite Television Access

- How do you access to television channels?
  A. Cable Operators
  B. DTH Services

10. DVD Access

- Large appliances in household: DVD Player

11. Mobile Phone Access

- Do you have a cell phone?

12. Digital Camera Access

- Do you have a digital camera?
- Have you used the digital camera?

13. Personal Computer Access

- Large appliances in household: Desk top computer in home?
- Large appliances in household: Laptop computer in home.
- Use of a computer at home: please indicate your personal frequency of each activity if at all.
- Use of a computer at work Please indicate your personal frequency of each activity, if at all.

14. Advanced Digital Devices Access

- And which of the following if any, do you personally own(or) have access to?
    A. Computer games
    B. Car TV/Car DVD Player.
    C. Handheld Portable Tv(With live feed)
    D. Ipod
    E. IRiver
    F. Mp3 Player
    G. Portable DVD Player
    H. PSP
    I. Sony Diskman
    J. Sony Playstation(1,2,3)
    K. Walkman/Portable CD Player
    L. X-Boxhe internet/ world wide web in the past 4 Weeks?

15. Internet Access

- Have you personally accessed the internet/ world wide web in the past 4 Week?

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DIGITAL INCLUSION - A CONCEPTUAL FRAMEWORK

Dr. K. Alamelu*

Abstract: *For decades, information and communication technologies (ICT) have been driving profound changes in the way in which individuals, organizations and governments interact. In particular, the internet has been a major force behind the development towards a more globalizes knowledge-based economy. However, in terms of access to the internet, a digital divide between the 'haves' and the 'have not's has long been recognized. The applications of ICTs have now developed far beyond just computing hardware and the internet towards a much wider realm of digital technologies. As such, the digital equality agenda must capture the disparity of access and functional usage for both the traditional communications technologies such as the internet, mobile phones and interactive digital television, and support new ways of working, managing information, improving the delivery of public services or enabling personal development through electronic gaming. The benefits of digital technologies are numerous and far-reaching. Moreover, certain types of digital technologies can have a huge impact on the quality of life and range of opportunities available to socially vulnerable individuals and groups. As such, digital equality matters because it can help to mitigate some of the deep social inequalities derived from low incomes, poor health, limited skills or disabilities. Against this background this paper throws light on the conceptual framework of digital inclusion, a fertile area for extensive research.*

Keywords: *digital inclusion, digital opportunity, digital equity, technology literacy, digital pace setters, digital inclusion risk index.*

*Professor, Department of Bank Management, Alagappa University, Karaikudi, Tamilnadu, India.

INTRODUCTION

Digital Inclusion aims at creating an informed society by including the digitally excluded as we proceed on the road of development. Accessing technology is an imperative to the whole process of bridging the digital divide and fomenting a digital cohesion that secures opportunity through internet, mobile services and computerization of processes, bringing in a new era of a connected nation and using technology better on behalf of citizens and communities. This is a challenge relating to access and the ability to effectively use information and communications technologies (ICTs) to address the needs of people disadvantaged due to education, age, gender, caste or location and enable improved service planning and delivery.In Microsoft's Digital Inclusion White Paper (Microsoft 2009, p.3) Karen Archer Perry (Founder and Principal Consultant, Karacomm) explains how Digital Inclusion is not just a matter of being connected to the technology:

The problem is not a binary one. It is not a question of being connected or disconnected. As such, the best initiatives address more than inclusion; they address Digital Empowerment, Digital Opportunity, Digital Equity, and Digital Excellence. These programs recognize that technology is a tool, but more and more it's a central tool for education, economic development, and social well-being. People may start as very basic users who simply need access to resources at a community technology center or a library. Digital Empowerment refers to the ability to use the wealth of resources in computing and the Internet to learn, communicate, innovate, and enhance wealth—to move from being a digital novice to a digital professional or innovator. An effective Digital Inclusion strategy provides a path to full participation in a digital society.

Therefore there is a broader concept of digital inclusion: citizens empower citizens to go beyond being 'users and choosers' of technology to become 'makers and shapers of the technologies available to them and the rest of society. In a truly inclusive digital society, citizens need to be "actively engaged in the creation of socio technical systems".

These ideas suggest a hierarchical framework for progress in 'Digital Inclusion' (akin to Maslow's hierarchy of needs) which might comprise the following stages:

Level 1: the technical infrastructure as the essential and fundamental foundation for inclusion which provides access to ICTs.

Level 2: digital awareness programmes and campaigns to increase awareness of what is available and to improve take up,

Level 3: development of 'know how'', understanding and basic IT skills training for citizens.

Level 4: Digital opportunity: access to ICTs and the ability to influence their design

Level 5: Digital Empowerment: enabling people to tailor technology to meet their needs and aspirations, to innovate and to participate in planning and design decisions.

The different levels identified above are incremental stages enabling progression from Level 1 provision of access to infrastructure for connecting to the internet, through to Level 5 where people are empowered to influence the design and shaping of digital technologies.

Grass roots engagement as well as leadership from Government and major corporations will be key to the successful delivery of digital inclusion at all levels - eventually empowering citizens to meet their needs and aspirations through full engagement in the Digital Economy and Digital Society. This vision needs to be clearly articulated, widely promulgated and shared for it to filter down through businesses and organisations and to individual citizens. Only then can the citizen be regarded as really 'included' – and not simply as a consumer of good and services and the passive target of policies, strategies and projects.

Analysis (HM Government, 2008) suggests that digital inclusion should be categorized in two general ways:

i) **Direct access to** technologies such as computers and the Internet, mobile phones, personal digital assistants (PDAs) and digital TV. These devices can help people gain access to:

- employment and skills
- social, financial, informational and entertainment benefits of the Internet
- improved services, including public services
- wider choice and empowerment around the major areas of their lives

This requires people to have the motivation, skills and opportunity to engage in technology. Until they become self-sufficient users, they may initially be supported through an intermediary, such as a school or UK online centre, or community volunteer.

ii) Indirect use of technologies, where greater use of digital technology to plan, design and deliver services leads to significant improvements through:

- better service integration so that multiple services across sectors work together (often an issue for socially excluded people)
- better and quicker service planning (through better mapping of overlapping services, needs, and tackling problems in deprived communities, including crime and security)
- equipping frontline staff to support complex needs, for example, using mobile networked technology which can provide immediate access to information and allow an immediate delivery of services while in the field

KEY ELEMENTS OF DIGITAL TECHNOLOGY:

Three key factors are identified as the elements necessary for using technology effectively – access, motivation, skills and confidence.

- **Access –** whether an individual has some means to access the technology in terms of affordability, time, training or support, literacy levels, disabilities and usability of interfaces.
- **Motivation –** whether the individual sees the benefit from or has interest in accessing these technologies.
- **Skills and confidence –** whether the individual is able to, and feels able to, make affective use of technologies. Concerns about security also fall into this category. In the following section we take each of these drivers in turn and consider the extent to which they have contributed to the recent rise in individuals using the internet.

Components of Digital Inclusion:

Digital Inclusion encompasses three areas: Access, technology literacy, and relevant content and services. Inclusion seeks equity for all residents, as well as small businesses and community-based (non-profit) organizations. The three areas include these components:

i) Access

a. Connectivity to the Internet

b. End user equipment: hardware and software, including tools for people with disabilities.

c. Access to technical support?

ii) Technology literacy

a. Skills required utilizing the equipment and Internet effectively for essential services, education, employment, civic engagement and cultural participation.

iii) Relevant online content and services

a. Services available for those in need

b. Culturally and educationally appropriate design

c. Marketing and placement appropriate to reach underserved communities

d. Enabling of content production and distribution by lower capacity residents, businesses and organizations.

BENEFITS OF DIGITAL TECHNOLOGIES:

The benefits of digital technologies can be categorized in two ways:

• **Direct:** where they immediately impact upon the user

• **Indirect:** where greater 'back office' efficiency leads to indirect savings through, for example, the freeing up of public resources for improved frontline delivery. Access to quality public services is of particular importance for those people with greater social needs. Those who have more social needs – and so require more interaction with public services – are less likely to be digitally included. However, the benefits of digital inclusion for vulnerable social groups are extensive and include:

- Enhanced self-sufficiency for vulnerable adults
- Increased access to public services through e-government channels
- Enhanced community cohesion
- Improved education, attainment and life/work chances
- Greater value for taxpayers' money through enhanced public service efficiency
- Improved quality of public services
- Time and monetary savings
- Enhanced working and environmental savings through more stimulating and flexible remote work practices

MEASURING DIGITAL INCLUSION:

Benchmarking Global Digital Inclusion:

Several methods for measuring Digital Inclusion have been developed and applied over recent years to enable comparisons to be made of progress towards digital inclusion. Three of the most widely used bases of comparison are: Maplecroft's Digital Inclusion Risk Index Map; the Digital Opportunity Index and the ICT Development Index. Other methods of measuring Digital Inclusion include:

Government for the Third Millennium (Gov3 n.d.) has produced a White Paper entitled 'Benchmarking Digital Inclusion' which sets out the results of their 2005 analysis. Gov3 is an international public sector consultancy business. They have the following categories (Gov 3 n.d.):

- Digital Leapfroggers - countries which currently have below average levels of Internet use, but are catching up due to above average growth rates.
- Digital Pacesetters - countries which are both above average in current levels of Internet use and also are enjoying above average growth levels.
- Slow Starters - countries which have below average levels of Internet use, and also below average growth rates.
- Successful but slowing - countries which have above average levels of Internet use, but which are growing at less than the average rate.

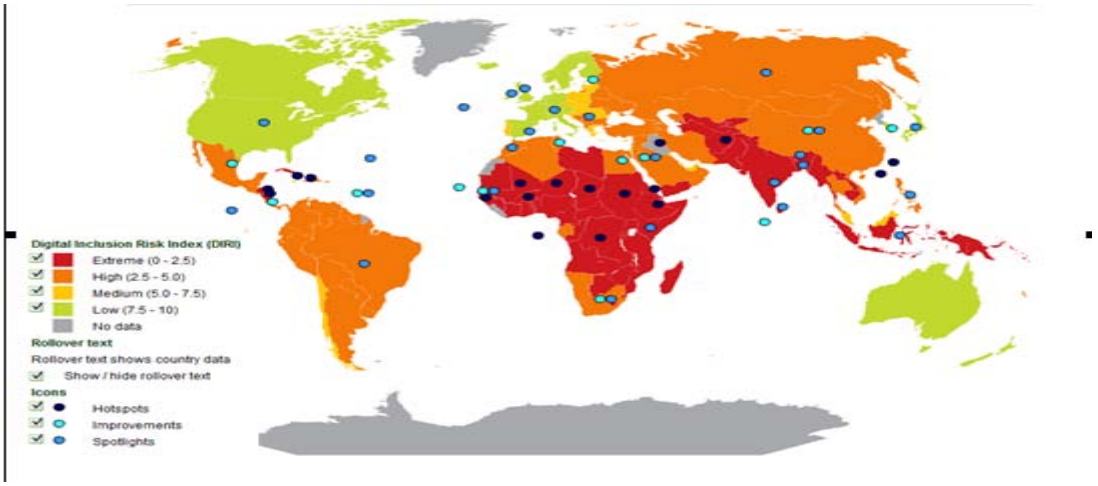
Digital Inclusion Risk Index Map:

Maplecroft (2009) have developed the Digital Inclusion Risk Index (DIRI) as the basis for a system of benchmarking progress towards Digital Inclusion across the world. The results are used to compile the ***Digital Inclusion Risk Index (DIRI) Map*** and are based upon data from the International Telecommunication Union's (ITU) ICT Opportunity Index (ICT-OI) 2007.

The ICT Opportunity Index is a composite of 10 core ICT indicators, which cover access to computers, internet and broadband access, mobile telephony and fixed line telephony. It also places specific emphasis on mobile technologies which are a key driver of ICT access in developing countries. The four sub-indices (on networks, skills, uptake and intensity of use) allow the identification of the specific strengths and weaknesses of the countries studied.

The DIRI map (see below) serves to demonstrate pictorially the position of various countries categorised according to whether they represent: **Extreme risk** (concentrated in Africa and parts of Asia); **High risk** (most of South America, Russia and other parts of Asia); **Medium risk** (includes Eastern Europe and Chile) and **Low risk** (North America, Western Europe and Australia).

Figure 1: Global Map of Digital Inclusion Risk



Source: www.Maplecroft.com

The coloured circles on the map are used to demonstrate the following:

- **Hotspots** - profile countries where the digital divide is especially significant
- **Improvements** - profile countries or regions whose actions are improving e-readiness and inclusiveness and where there are opportunities for future business engagement
- **Spotlights** - profile countries where business is currently engaging with other stakeholders to facilitate digital inclusion

The **'Hotspot'** circles draw attention to the following risk areas:

- South America- highest risk countries being Haiti, Honduras, Nicaragua and Cuba (low mobile phone access).
- Africa – highest risk countries being Guinea-Bissau, Congo (lowest score on the index), Mali, Niger, Chad, Burkina Faso, Sudan (conflict zones), Eritrea (low mobile phone access), Ethiopia (low mobile phone access)
- Middle East – Iraq and Afghanistan (conflict zones)
- Asia – Hong Kong and Taiwan

The **'Improvements'** circles denote the following areas of progress:

- South America – Mexico (widespread digital community centres), Costa Rica (increasing access to ICTs), Caribbean Nations (offshore software developments).
- Africa – Tunisia (Internet access in schools), Cape Verdi (privatised Telecomms operators), Senegal (transferring telephone services to the private sector), Egypt (free Internet access), South Africa (mobile phones facilitate black economic empowerment).

The **'Spotlights'** identify initiatives established to proactively promote inclusion:

- The Americas – Hewlett Packard (Inventor centres, microenterprise development programme), Nokia (accessibility for disabled and hearing impaired, connecting Native Americans), Reuters (adopt a school programme), Microsoft (involved in education and technology in South America), Motorola Foundation and ISTEC, World Economic Forum's Internet Access For Everyone Project - ITAFE (pilot project in Brazil)
- Europe – Alcatel (supports scientific collaboration), Ireland (Skills for life), Switzerland (World Economic Forum's Internet Access For Everyone Project – ITAFE), Spain (Telefonica EducaRed Programme, Vodaphone technology in healthcare), Serbia and Montenegro (Microsoft and UNHCR)
- Africa – Senegal (Alcatel Digital Bridge initiative dedicated to the rural sector), Morocco (ST Digital Unify Programme), Kenya (Reuters Adopt a School programme), South
- Africa (ABB link employees to the Internet, Alcatel Digital Bridge initiative dedicated to the rural sector, Microsoft Digital Villages, Vodaphone community service)
- Middle East – Jordan (Cisco empowering women, Jordan education initiative)
- Asia – Sri Lanka (Ericsson Response involved in Tsunami reconstruction), India (Hewlett Packard i-community and Tsunami rebuilding, Rajasthan Education Initiative, Simputer Trust and computer access for all), Bangladesh (Mobile telephony and microfinance through the Grameen Bank), Japan (Fujitsu education and international exchange, Microsoft IT skills programme for battered women), Philippines (Ayala Partnerships for youth education in schools, Smart Education and the Digital Dividend).

The DIRI map above makes clear that while there is significant progress towards the goal of universal access, there are still major disparities in provision across the globe. Moreover, the primary focus of many of the projects is on the provision of infrastructure to provide connection to the internet to growing numbers of people. Some of the initiatives go beyond this and provide training and opportunities to develop ICT related skills. Much of the activity is driven 'top-down' from Governments. However there is significant grass-roots engagement in the smaller projects and evidence of the empowering impact of ICTs such as mobile phones in some of the poorest nations.

Digital Opportunity Index (DOI):

The Digital Opportunity Index is an e-index based on internationally-agreed ICT indicators. This makes it a valuable tool for benchmarking the most important indicators of ICT opportunity. The DOI is a standard tool that governments, operators, development agencies, researchers and others use to measure the digital divide and compare ICT performance within and across countries.

The scoring ranges between 0 and 1, "where 1 would be complete digital opportunity" (ITU 2007). The table which follows gives world rankings for 2007 (ITU 2007) – this being the current data on the site:

Figure 2: Digital Opportunity, Top 25 Economies, 2007

Source: www.Maplecroft.com

ICT Development Index (IDI):

The ITU (2009c) website also hosts a publication giving a league table ranked according to the ICT Development Index (IDI). As the ITU state, "the overall objective of the IDI is to benchmark ICT progress among countries at the global level". The top 20 countries according to this ranking scheme are given in Table 1.

TABLE- 1

ICT PROGRESS RANKING

Economy	Rank 2007	IDI 2007	Rank 2002	IDI 2002
Sweden	1	7.50	1	6.05
Korea (Rep.)	2	7.26	3	5.83
Denmark	3	7.22	4	5.78
Netherlands	4	7.14	6	5.43
Iceland	5	7.14	2	5.88
Norway	6	7.09	5	5.64
Luxembourg	7	7.03	21	4.62
Switzerland	8	6.94	7	5.42
Finland	9	6.79	8	5.38
United Kingdom	10	6.78	10	5.27
Hong Kong, China	11	6.70	12	5.10
Japan	12	6.64	18	4.82
Germany	13	6.61	14	5.02
Australia	14	6.58	13	5.02
Singapore	15	6.57	16	4.83
New Zealand	16	6.44	19	4.79
United States	17	6.44	11	5.25
Ireland	18	6.37	26	4.36
Canada	19	6.34	9	5.33
Austria	20	6.32	20	4.64

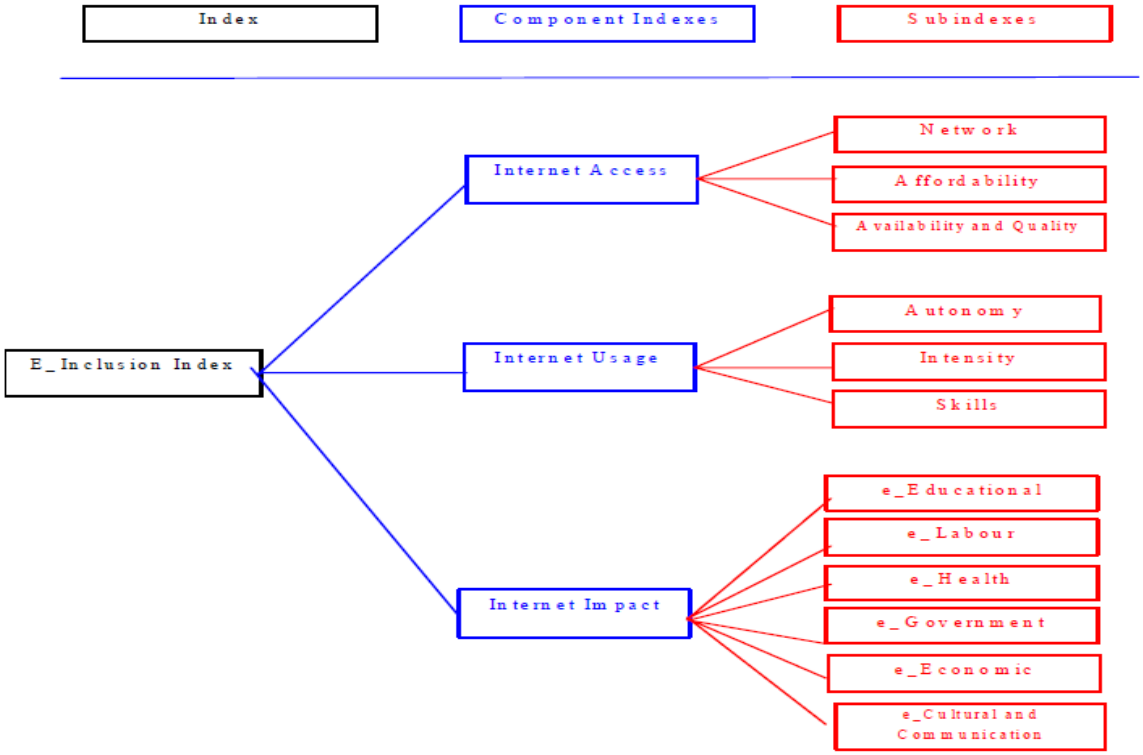
Source: www.Maplecroft.com

In order to define and measure e-Inclusion Sara Bentivegna & Paolo Guerrieri (2010) have proposed a multi-focal approach to this complex concept in continual evolution. The analytical framework underlying the construction of the e-Inclusion index is structured into three components (dimensions of the general concept: access, usage, impact on quality of life) and into twelve sub-indexes. Obviously, the sub-indexes, the dimensions and the final index are strongly interdependent. So, without Internet infrastructure and access, there is no Internet usage.

The e-readiness Assessment Report 2008 (2010) has measured digital inclusion with the composite index derived thorough the PCA has a mean of 0 and a standard deviation of 1. This being the case, the states have been divided in 6 levels. The states have been classified in terms of their e-Readiness on the basis of index value as follows:

- Leaders (L1): Index value above 1.0
- Aspiring leaders (L2): 0.5 to 1.0
- Expectants (L3): 0 to 0.5
- Average achievers (L4): -0.5 to 0
- Below-average achievers (L5): -1.0 to –0.5
- Least achievers (L6): below –1.0

Figure 3: Digital Inclusion Index



Source: e-Inclusion impact Report of European Commission, January 2010.

IMPORTANCE OF DIGITAL INCLUSION:

The relationship between digital exclusion and social and economic outcomes is deeply entrenched and, as such, complex. It is when we relate the benefits to individuals and communities that we can see how it matters most to people's daily lives. The effect of digital inclusion on four core groups in worth mentioning here; young people, adults, older people, and communities. The under-pinning benefits derived through the delivery of effective public services for everybody through digital inclusion is also important to be observed.

Learning about computers and the internet can help improve the lives of disadvantaged groups, according to a research report from UK Online Centres and Ipsos Mori. The probable link between digital and social inclusion has long been recognized as connecting people to technology connects them to new information and skills, to communities, each other, services, savings and employment opportunities. The UK Online Centres and Ipsos Mori report, 'Digital inclusion, social impact', goes one step further in an effort to prove the link both qualitatively and quantitatively. (e-learning age, 2008)

Based on 20 UK Online Centre-led projects involving hundreds of local partners, the research tracked the impact of informal learning about technology on the lives of different groups, including those with mental health issues, families in poverty, isolated older people and teenage parents. More than 12,000 people took part in the social impact demonstrator projects between January 2007 and March 2008. By the end of the projects, participants were more likely to feel confident and 40% had progressed into further training, employment, advice and guidance. The study found that working with computers helped to improve people's maths and English. It also suggested that people with a greater digital understanding are more likely to spend time with friends and family, and more likely to connect with and help out in their communities. The demonstrator projects and research were funded by the Department for Innovation, Universities and Skills. David Lammy, Mirùster for Skills, said: "The aim of these projects was to help the most socially excluded in our communities and they've done exactly what was said on the tin. Understanding how digital inclusion can help curtail social exclusion is incredibly important if we're to maximize the potential of technology to improve individual lives."

Recent studies (Rodrigo Baggio, 2006) show how hard digital inclusion will be. In Brazil alone, fewer than 16% of households own computers and a mere 12.2% of them have access to the Internet. The vast majority of computer technology is concentrated in just three regions — the federal capital, the south and south-east — according to a 2004 study of 183 nations by the International Telecommunications Union. The study also revealed that Brazil ranked 65th in terms of Internet connectivity, The high cost of personal computers, poor computer training in the classroom and inconsistent public policies are the main reasons why middle- and lower-income Brazilians are still outsiders in modern information society.

According to U.S. Department of Commerce (2000) more and more Americans have computers and use the Internet. If current trends continue, we expect more than half of all U.S. households will be connected to the Internet by the end of 2000, and more than half of all individuals will be using the Internet by the middle of 2001. We are approaching the point where not having access to these tools is likely to put an individual at a competitive disadvantage and in a position of being a less-than-full participant in the digital economy. Most groups, regardless of income, education, race or ethnicity, location, age, or gender are

making dramatic gains. Nevertheless, some large divides still exist and groups are going online at different rates. The report also measures the extent of digital inclusion by looking at households and individuals that have a computer and an Internet connection. We measure the digital divide, as we have before, by looking at the differences in the shares of each group that is digitally connected. For the first time, we also provide data on high-speed access to the Internet, as well as access to the Internet and computers by people with disabilities.

STAKEHOLDERS IN DIGITAL INCLUSION:

Maplecroft (2009) identifies the following categories of stakeholders:

- **Governments** – who have a leading role to play in developing and implementing comprehensive, forward looking and sustainable national e-strategies.
- **The private sector** – who are the key to the development and diffusion of ICTs, for infrastructure, content and applications?
- **Civil society** – the engagement of citizens is important in implementing ICT-related initiatives for development.
- **International and regional institutions** (including financial institutions) –these have a key role in providing resources, including innovative micro finance.

DIGITAL INCLUSION: LITERATURE SURVEY

The e-readiness Assessment Report 2008 (2010) has given the percentage share of computer-related services and communication services sector in overall GDP.

Table- 2

PERCENTAGE SHARE OF COMPUTER-RELATED SERVICES AND COMMUNICATION SERVICES SECTOR IN OVERALL GDP

	(at constant 1999-2000 prices)								
	1999-2000	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Computer-related Services	1.0%	1.4%	1.6%	1.8%	2.1%	2.4%	2.7%	3.0%	3.3%
Communication	1.6%	1.9%	2.2%	2.6%	3.1%	3.6%	4.2%	4.9%	5.7%
Total Share of Computer-related Services and Communication	2.6%	3.3%	3.8%	4.4%	5.2%	6.1%	6.9%	7.9%	8.9%

Note: Total may not match due to rounding off.
Source: CSO.

The report also provides Percentage share of computer-related services in business services sector 1999-2000 through 2007-08.

TABLE 3

PERCENTAGE SHARE OF COMPUTER-RELATED SERVICES IN BUSINESS SERVICES SECTOR 1999-2000 THROUGH 2007-08

Business services sector	1999-2000	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Renting of Machinery	4.1%	3.3%	3.0%	2.7%	2.3%	2.0%	1.7%	1.5%	1.3%
Computer-related services	50.3%	59.8%	63.6%	66.6%	71.2%	75.0%	77.9%	80.9%	82.9%
Legal services	9.0%	7.3%	6.7%	6.2%	5.4%	4.7%	4.2%	3.7%	3.3%
Accounting	5.0%	4.2%	4.0%	3.8%	3.4%	3.1%	2.8%	2.5%	2.4%
Research and development	31.6%	25.4%	22.8%	20.7%	17.7%	15.3%	13.3%	11.4%	10.2%
Total business services	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Note: Total may not match due to rounding off.
Source: CSO

India has been one of the fastest growing economies of the world since the 1980s. Not only has the growth been relatively stable, it has also been accompanied by poverty decline. This phenomenon has been primarily led by the Services sector – it has grown faster than others and is the dominant sector of the economy.

Services exports, both technologies embedded and technology enabled services are becoming a key factor in India's economic development currently. Prior to the advent of ICT enabled services, service Exports comprised mainly of additional services exports i.e. finance, transportation & travel associated with merchandise exports. In ICT Enabled Services Exports, the focus is on all Commercial Services exports i.e. financial, insurance, commercial, R&D, legal accounts, etc. Such services sector led growth is not constrained by domestic demand conditions. Within Services, the fastest growing sectors are computer-related services and communications, both of which have been growing at rates in excess of 20 per cent since 1999-2000. The share of computer-related services in GDP has also grown exponentially – from a mere 1 per cent in 1999-2000 to 3.3 per cent in 2007-08. The output multiplier of this industry is 2.1. The importance of the computer-related industry is further

brought out by its contribution to the external sector. Exports of software and services account for 80 per cent of all IT exports and 46 per cent of all services exports. The development of communication technologies that allow offshore development of software and the emergence of professional and more flat organizations in the post-liberalization scenario, partly explain the Indian software industry's success.

According to Shirin, M. et. al. (2009) digital inclusion projects are the processes of institutionalization in three ways;

A first, institutionalization process for digital inclusion projects involves getting symbolic acceptance by the community who are the targets of the project. This was achieved in the e-literacy projects in Kerala by the linking of the projects to Kerala's development philosophy, partly through vigorous grassroots campaigning. However, acceptance became more problematic later when the goals shifted towards stimulating entrepreneurial activity.

A related process is stimulating valuable social activity in the relevant social groups. The e-literacy projects in Kerala were very successful in this respect; there was a widespread participation of groups, such as Muslim women who are often part of the socially excluded.

A third process of great importance in sustaining digital inclusion projects over time is generating linkage to viable revenue streams. The later attempts to do this in Kerala have been problematic, with limited success in generating entrepreneurial revenue, and some concern that the expansion of the entrepreneurial symbolism approach to districts outside Malapurram may compromise social inclusion goals. The Siyabuswa project has, in the end, become self-financing, but it is worth noting that this would probably not have been achieved without the continuous long-term backing of outside agencies such as the University of Pretoria. Revenue remains a problem for the S˜ao Paulo Tele-centers aimed at the digitally excluded, including those under the auspices of the City government. However, some innovative models are being tried, including partnerships with NGOs and, in the case of the CDI projects, donations in cash and kind from commercial organizations.

A final process that was important, and often crucial, in all the case studies was enrolling government support. This process is an example of the strongly political nature of the institutional processes of digital inclusion projects in developing countries. Government support was achieved successfully in the Kerala case in the e-literacy phase through the strong symbolic linking of the project to the state government's espoused development

goals. It is currently more problematic in the entrepreneurship phase with some potential conflict between the state government's approach and wider social inclusion goals. The linkage to government was not that important during the development of the Siyabuswa project due to its relative small scale and the backing of other agencies. However, a key reason for failure of the later deep rural project was inadequate government backing, and the project initiators recognize that more effort should have been devoted to achieving government support. The enrolment of political forces in the S˜ao Paulo case study has been a crucial feature throughout, but this can be something of a mixed blessing. For example, the political views of the current center-right government of the City of S˜ao Paulo often conflict with those of local community activists, resulting in disagreement concerning the goals and methods for digital inclusion projects. Various partnership models between outside agencies, government, and NGOs are being tried, but the outcomes of these experiments are yet to be clear.

Ronaldo Lemos (2010) has concluded that the majority of Brazilians who access the Internet today do so through LAN houses. LAN stands for local area network, i.e., computers assembled together to allow people to play multi-player games. Popular in Korea and elsewhere in Asia, and previously existing only in the rich neighborhoods of Brazil, they have now become a phenomenon proliferating in poor communities, especially the *favelas.* One of the biggest *favelas* in the world, located in Rio de Janeiro, Rocinha has approximately 130 LAN houses. Charging from US$0.40 to $1.50 for each hour surªng the Web (or playing online games), those shops often have queues of people waiting for an available computer. The Brazilian Association of Digital Inclusion Centers (ABCID) estimates that 108,000 LAN houses are active in the country.

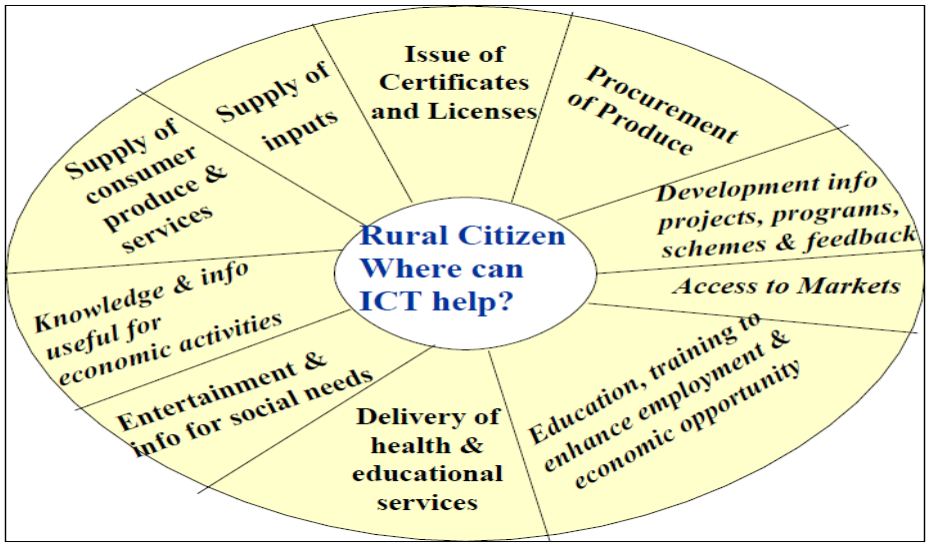
Maplecroft reports that new research developed to identify countries whose populations and economies are stifled by a lack of 'digital inclusion'- the ability to use and access information communication technologies (ICTs), such as computers, the internet and mobile phones- has revealed that India is trailing behind the other BRICs nations of Brazil, Russia and China.

In India, for example, the wealthier, more affluent segment of the population, primarily based in urban areas, has embraced the use of modern communications technology. The growth of the middle classes in the country, which now sits at around 30% of the

population, has driven demand for consumer goods, including ICTs. The vast majority of the population has, however, been excluded from this process. Most cannot afford ICTs (only 3% of households own PCs), lack the education required to use it effectively (India has secondary school enrolment rates of 55% and adult literacy rates of just under 63%) and are located in geographical areas that have little or no connectivity to ICT services. Although the division between those who can access ICT and those who cannot is less severe in the other BRICs nations, this trend is reflected throughout them all.

Subash Bhatnagar in his presentation titled "Strategy for Digital Inclusion: Experience from India" has identified the benefits derived by rural citizens through ICT initiatives. The following picture depicts those benefits;

Figure 4: Role of ICT in Empowering Rural Citizens



Source: Presentation on "Strategy for Digital Inclusion: Experience from India" by Subhash Bhatnagar

According to www.digitallearning.in (2009), the policy challenges for developing countries like India and for the international community as a whole are daunting and complex. Bridging the digital divide is not simply about giving people access to tools. It is about creating policy and regulatory environments, institutional frameworks, and human capacities that foster information flows, innovation, and effective use of the world's knowledge resources in every dimension of sustainable development, from health, agriculture, medicine and education to trade and economic development, effective governance. Coming to India, John sees Internet as the game changer for the country. The

country, where 2 lakh railway tickets are sold on the website of Indian Railway, 40% of legal queries are getting addressed through blogs, farmers get latest equipments and fertiliser tips from e-Choupals, etc., he said, the change is already happening through technology.

According to www.microsoft.com, India moves into its next phase of growth in the global knowledge economy, Microsoft continues to work in close partnership with all the stakeholders, including governments, Indian IT industry and academia, to ensure that technology is leveraged as a catalyst for enabling more businesses, individuals and communities to realize their full potential. In this endeavor to create a digitally inclusive society, Microsoft India ensures that the benefits of information technology are accessible to everyone at the grassroots level. This involves reaching out to those communities in rural and semi-urban India which are marginalized and are on the wrong side of the 'Digital Divide'.

In its latest Performance Indicators reports (October - December 2010), Telecom Regulatory Authority of India (TRAI) has unfold the digital inclusion Scenario in India.

TABLE - 4

DIGITAL INCLUSION - INDIAN SCENARIO (DECEMBER 2010)

Telecom Subscribers (Wireless +Wireline)	
Total Subscribers	787.28 Million
% change over the previous quarter	8.85%
Urban Subscribers	527.50 Million (67.00%)
Rural Subscribers	259.78 Million (33.00%)
Market share of Private Operators	84.60%
Market share of PSU Operators	15.40%
Tele-Density	66.16
Urban Tele-Density	147.88
Rural Tele-Density	31.18
Wireless Subscribers	
Total Wireless Subscribers	752.19 Million
% change over the previous quarter	9.38%
Urban Subscribers	501.30 Million (66.65%)
Rural Subscribers	250.89 Million (33.35%)
GSM Subscribers	641.73 Million (85.32%)
CDMA Subscribers	110.46 Million (14.68%)
Market share of Private Operators	87.75%
Market share of PSU Operators	12.25%
Tele-Density	63.22
Urban Tele-Density	140.53
Rural Tele-Density	30.11

Wireline Subscribers	
Total Wireline Subscribers	35.09 Million
% change over the previous quarter	-1.34%
Urban Subscribers	26.21 Million (74.68%)
Rural Subscribers	8.88 Million (25.32%)
Market share of Private Operators	17.02%
Market share of PSU Operators	82.98%
Tele-Density	2.95
Urban Tele-Density	7.35
Rural Tele-Density	1.07
Village Public Telephones (VPT)	0.58 Million
Public Call Office (PCO)	3.34 Million
Internet & Broadband Subscribers	
Total Internet Subscribers	18.69 Million
% change over the previous quarter	4.43%
Broadband Subscribers	10.99 Million
Broadcasting & Cable Services	
Total Number of Registered Channels with I&B Ministry	604
Number of Pay Channels	155
Number of private FM Radio Stations	245
DTH Subscribers registered with Pvt. SPs	32.05 Million
Number of Set Top Boxes in CAS areas	786,422

Source: The Indian Telecom Services Performance Indicators (October-December 2010)

Reasons for sustainability of technology embedded services/software exports are the focus on an appropriate market segment. This is mainly users of software in developed economies where bulk of value added employment opportunities exists rather than software products dependent development.

Proactive public policy also has been the driving force in sustaining growth of technology enabled services; policies have been the major factors such as:

- e-Governance program
- Interstate competition in e-Readiness status
- Technology Embedded (Software) and Technology Enabled Services Exports
- Communication Reforms
- Favorable Environment
- Entrepreneurship and openness
- PPP facilitation.

In terms of digital usage there is a significant improvement in the scenario. New research developed to identify countries whose populations and economies are stifled by a lack of 'digital inclusion'- the ability to use and access information communication technologies (ICTs), such as computers, the internet and mobile phones- has revealed that India is trailing behind the other BRICs nations of Brazil, Russia and China.

The Digital Inclusion Index, released by risk analysis firm, Maplecroft, uses 10 indicators to calculate the level of digital inclusion found across 186 countries. These include numbers of mobile cellular and broadband subscriptions; fixed telephone lines; households with a PC and television; internet users and secure internet servers; internet bandwidth; secondary education enrolment; and adult literacy.

Of the BRICs nations, India (39) is the only country to be classified as 'extreme risk', meaning that the country's population suffers from a severe lack of digital inclusion. China (103) Brazil (110) and Russia (134) are rated 'medium risk'. Despite huge economic growth, the BRICs nations are still significantly outperformed by developed nations in the Digital Inclusion Index.Trends suggest that the BRICs nations may not lag behind for much longer however.

The BRICs have witnessed huge growth in demand for ICTs, which is currently driving global spending for the sector. China has the highest total number of internet users in the world (420 million), accounting for just over half of Asia's internet users and is set to become the world's largest ICT market, whilst India, Brazil and Russia have all seen huge expansion in demand and market size for ICT's in recent years. The distribution of ICT use in these nations and other developing countries is cause for concern however.

In India, for example, the wealthier, more affluent segment of the population, primarily based in urban areas, has embraced the use of modern communications technology. The growth of the middle classes in the country, which now sits at around 30% of the population, has driven demand for consumer goods, including ICTs. The vast majority of the population has, however, been excluded from this process. Most cannot afford ICTs (only 3% of households own PCs), lack the education required to use it effectively (India has secondary school enrolment rates of 55% and adult literacy rates of just under 63%) and are located in geographical areas that have little or no connectivity to ICT services.

To sum up, digital inclusion is still in its transition stage in India, including Tamilnadu. It throws open lot of research opportunities so as to create a well developed digital economy.

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CONSUMER RISKS IN DIGITAL SOCIAL PAYMENTS - DANGER TO FINANCIAL INCLUSION POTENTIAL

Dr. K. Alamelu[1]

Digital social payments (DSPs) recipients are a fast-growing, yet often overlooked, digital financial services (DFS) segment. Acknowledging and addressing the most common and consequential consumer risks they face should be a priority for the policy makers so as to unlock the potential benefits of DSPs for the poor.

Low-income recipients of cash transfers—whether government to person (G2P) or donor to person (D2P), and whether conditional or unconditional—increasingly receive their payments digitally. This digitization trend is expected to continue. The value of electronic transfers that are delivered into store-of-value accounts and accessible via debit cards or mobile money wallets, referred to here as "digital social payments," is estimated to more than triple between 2010 and 2017 to over US$194 billion (Riecke 2014).

DSPs offer a variety of potential benefits over traditional cash, voucher, or in-kind methods. Proponents most often cite increased efficiency, reduced leakage, and faster, more convenient and more secure payments to recipients. When linked to bank accounts or mobile wallets that offer store-of-value opportunities or access to additional financial services, DSPs to the bottom of the pyramid could pave a way to fuller financial inclusion. However, evidence shows that the financial inclusion benefits of DSPs have thus far been limited: most recipients withdraw 100 percent of their payment at once and by and large do not use the account again until the next transfer takes place, let alone take advantage of additional financial services that may be available to them. This lackluster use has led some to question the promise of DSPs as a financial inclusion gateway.

This paper reviews existing evidence from DSP programs in 12 emerging markets based on a survey conducted by CGAP (Common Group for Assisting Poor, an affiliate of IFC.

Five Most Common and Consequential Consumer Risks Faced by DSP Recipients

1. **Inability to transact due to network downtime or service unreliability**

   Many DSP programs are targeted to populations in poor and mostly remote locations, where mobile network coverage is often weak. As a result, recipients experience frequent network connectivity problems for point-of-sale (POS) devices and mobile phones. DSP recipients trying to access their periodic payments suffer acutely from such unreliability.

   For example, in three digital cash and voucher programs of the World Food Programme (WFP) in Kenya and Lebanon, pervasive network failures and insufficient connectivity exposed recipients to financial loss and potential harm in a variety of ways. Interrupted transactions left payments in limbo, and when networks were down entirely, it became common for recipients to leave their card and personal identification number (PIN) with agents or merchants to complete the transaction later on, resulting in risks and reported experiences of inappropriate, and even fraudulent, agent behavior (WFP 2016; El-Huni 2014). Network or infrastructure failure was also a frequent challenge for G2P recipients in Nigeria and in the HelpAge Program in Bangladesh, which uses the bKash network to transfer funds into mobile wallets (Adewole 2015; InterMedia Africa 2015; Islam and Woodard 2014b). In the Philippines, Pantawid Pamilya recipients not only had network connectivity problems but also inconsistent and unreliable service hours of agents, even when those agents were designated specifically for the DSP disbursement (Zimmerman and Bohling 2015). Network outages and finding an agent's shop unattended added to the time recipients had to wait for cashing-out and being able to use their transfers (Islam and Woodard 2014b).

2. **Insufficient agent or ATM liquidity**

   DSPs are usually transferred in bulk, with most recipients typically withdrawing all of their money on a single day. This creates heavy pressure on the access point to meet liquidity demands, which is a particular challenge in remote and less secure areas. Consequently, recipients often line up and wait for several hours to collect or access their payments or are even sent back home to repeat the journey another day. This risk appears to perpetuate a vicious cycle:

[1] . Professor, Department of Bank Management, Alagappa University, Karaikudi

the shortage of liquidity erodes recipients' trust and confidence in the system, which creates an imperative to withdraw all of a payment at once and as soon as it's deposited, which thereby exacerbates liquidity issues at cash-out points.

For example, in a mystery shopping exercise carried out in WFP Kenya's Cash for Assets (CfA) Program, 21 percent of the recipients were unable to cash-out the desired amount of their transfers due to insufficient agent liquidity (WFP 2016). In another mobile cash transfers program by WFP Kenya, recipients perceived liquidity constraints as a cost factor that made the digital payments useless given the distances to and limited selection of M-Pesa agents. In the Philippines, where the payment per recipient can vary from cycle to cycle, agents often lack sufficient change to pay each recipient the exact amount of his or her withdrawal and, therefore, pay out the transfers to arbitrarily assigned groups, leaving it up to recipients to find the required change to split the payments among them, or the agent may offer them inexpensive merchandise, such as little candies, to make up the difference (Zimmerman and Bohling 2015).

3. Complex user interfaces and payment processes

Complex interfaces and complicated processes—which increase the likelihood of errors and losses from either incorrect transactions or recurring timeouts due to limited transaction times—create risks and a poor user experience for all types of DFS users. DSP recipients are even more likely to be negatively affected: besides being among the most vulnerable and least literate consumer segments, they are often new to and initially uncomfortable with the digital payment system, including the technology and the numerous steps required to access or use the payments (WFP 2016). Beyond the inconvenience of frequent transaction failures and repetition, these issues increase the risk of recipients being charged extra fees by agents or being victims of fraud as they have to ask others for assistance. Such issues can significantly reduce trust and make the system seem inconvenient to the recipient, making it less likely that this initial interaction with DFS will lead to broader use of formal (digital) financial services.

A CGAP study of four newly digitized social payment schemes in Haiti, Kenya, the Philippines, and Uganda found that recipients exhibited an astonishingly low understanding of how the payment schemes, and particularly the digital payment aspect of it, worked (Zimmerman, Bohling, and Rotman Parker 2014). In a mobile voucher program in Nepal, the complicated process and user interface was a major problem for recipients. Recipients had only five minutes to complete their SMS-based voucher redemption and if a timeout occurred before the transaction was finalized, the recipient had to start all over again (Murray 2013).5 Moreover, the SMS-based system did not allow the use of local script and language, which was another challenge for recipients who were unable to read and understand the messages.6 Two months after introducing mobile payments to WFP Kenya food-aid recipients, a survey by CGAP and WFP found that there were still recipients with inactivated SIM cards.

4. Poor or no recourse mechanism

Recourse mechanisms, such as complaints, queries, and dispute resolution, are another particularly weak spot in DSP programs (Zimmerman, Bohling, and Rotman Parker 2014). Recipients often don't know about or are confused about recourse and support options, making it difficult for them to solve problems or get answers to questions they have about their payments. Recipients from several programs also worried that if they complained they could lose their transfers, a misperception that made them reluctant to report problems. Even where customer support or grievance hotlines do exist, recipients are either not aware of them, or have had negative experiences, such as being kept for a long time in automated waiting lines or having their call dropped before they could speak to anyone. This usually results in frustration and, in some cases, financial loss incurred from spending their airtime to make the call. In Bangladesh, for example, recipients of mobile training allowances complained that when they wanted to talk to a bKash support agent they often gave up—thinking that it was not worth waiting to express a problem that might not even be resolved (Islam and Woodard 2014a).

Recipients commonly state a preference for face-to-face problem solving—which is also rooted in cultural and personal biases—and often turn to agents or merchants for help. However, these parties cannot always adequately address problems or questions because they lack the respective training, access to a faster-to-reach support hotline, and sufficient business incentives to make time to help customers—especially to help social payment recipients who may have their own particular questions and needs (McKee, Kaffenberger, and Zimmerman 2015). In WFP Kenya's CfA Program, 69 percent of the recipients who reported a problem during their mystery shopping visit said the agent did not address the problem to their satisfaction. In 29 percent of these visits, the agent called the bank's hotline (only half reached a customer service representative), in 50 percent the shopper was given contact information

so that they could follow-up on their own, and in 21 percent the recipient did not get any support at all (WFP 2016).

5. Fraud that targets the recipient

DSP recipients are particularly vulnerable to fraud such as unauthorized fees, price hikes at merchants, and skimming of payments (i.e., illegally retaining a portion). For example, during the introduction of WFP Kenya's Cash Lite Program, 72 percent of recipients paying at the shops with their bank cards were charged additional fees or higher prices than other customers (WFP 2016).7 Recipients of digital G2P programs in the Philippines, Uganda, and Nigeria reported incurring extra costs—sometimes referred to as "taxes" to withdraw their payments at the agents (Zimmerman, Bohling, and Rotman Parker 2014).8 In India, 13 percent of surveyed G2P recipients report paying a bribe to access their payments (InterMedia India 2014).9 Recipients are often unaware of the actual charges and fees associated with their payments, nor do they know the exact amount and frequency of their benefit, leaving them vulnerable to such instances of unfair treatment and fraud. CGAP and WFP Kenya assessed recipients' awareness of transaction fees and found that 62 percent of CfA Program recipients did not know that there were transaction fees, despite paying a transaction fee of at least KSH 50 for each withdrawal (WFP 2016).10 In the Pacific Financial Inclusion Program (PFIP) in Fiji, 68 percent of recipients were not aware of agent charges and half were not sure whether there were charges or not (Leonard 2011). And in Ghana's LEAP Program, 80 percent of recipients did not know their payment amount, and 85 percent were unaware of the frequency of their payments (Abbey, Odonkor, and Boateng 2014).

PIN protection is another challenge that is particularly prevalent in DSP programs as many recipients share their PIN with agents or third parties and do not enter their PIN into the POS device or mobile phone themselves. It appears that agents and recipients often compromise data protection procedures in this way for the sake of efficiency, especially when recipients come in large numbers on paydays and agents have to serve many clients quickly.11 In Fiji, for example, PIN-sharing was reported as common practice, particularly by elderly people whose family members or friends picked up their benefits (Leonard 2011). In Nepal, the majority of mobile voucher recipients relied on registered "helpers" to carry out transactions.12 These helpers entered the PIN in 89 percent of observed SMS and in 37 percent of observed smartphone transactions (Murray 2013). Research on the ARCC II Program in the Democratic Republic of the Congo documented that recipients lacked capacity and understanding to control the process of entering the purchase amount and PIN themselves (Murray and Hove 2014). In WFP Kenya's Cash Lite Program, 36 percent of recipients handed their bank card together with the PIN letter over to the merchant to carry out the POS transaction (WFP 2016). In 73 percent of the test visits in WFP Kenya's CfA Program, agents did not allow recipients to enter their PIN even though 72 percent of these recipients had memorized their PIN and knew how to enter it (WFP 2016).

Three Basics to Mitigate Risks and Open up the Financial Inclusion Gateway of DSPs

While more needs to be done to understand the nature, incidence, and consequences of consumer risks for recipients, three basic principles emerge that would build a more solid foundation for effectively mitigating these risks and, thereby, enabling financial inclusion in DSPs for the poor: reliability, communication, and monitoring. These are critical for consumer risk mitigation in most DFS deployments, and are certainly not the only critical elements of well-functioning DSP schemes. Yet, getting these three basics right will not only help improve the overall functioning of these schemes, but will also help open a potential pathway toward financial inclusion. The following are important points about these basics and examples of existing promising solutions that programs and providers have implemented:

1. Ensure reliability of the payments experience first and foremost. DSPs reach recipients through complex systems that can include agents, merchants, mobile phones, POS devices, and ATMs. Both the value chain of actors and the payment systems rely on strong network connectivity to successfully process real-time digital payments. Up-front risk assessment and contingency planning can help to address some of the aforementioned risks at the design stage, such as (*i*) making the customer interface more user friendly; (*ii*) ensuring agent service quality, training, and float and liquidity management; and (*iii*) clearly defining roles and responsibilities for risk mitigation among actors. For example, MTN Uganda added 15 new network towers—five specifically for its SAGE Program—in previously poorly connected catchment areas (Zimmerman and Bohling 2014).
2. Improve communication channels between recipients and providers. Even more than for typical DFS consumers, social payment recipients require relevant, and often substantial, training and communication first when a new digital payment system is introduced and then continuously after rollout. For more self-control and confidence, recipients need to know their payment amount and frequency. Equally as important (and at times

overlooked), they need to know how the system and payment mechanism are supposed to work and where to go if they face problems. This means that responsibilities for specific problems should be clearly defined among those involved in the social payment value chain. A well-organized grievance and complaints mechanism for recipients can also be very useful for improving the program design based on recipient feedback, as identified by USAID in the case of the LEAP Program in Ghana (Abbey, Odonkor, and Boateng 2014). More programs are investing in toll-free service hotlines and communication channels specifically for recipients. For example, Digicel in Haiti doubled its call center staff on paydays for the Ti Maman Cheri Program, and Save the Children and WFP in Malawi gathered representatives from each nongovernment organization, the bank, and the mobile network operator during disbursements to support recipients who had problems or questions (Zimmerman and Bohling 2014; Almazan 2013). Banco Davivienda in Colombia trains and employs former G2P recipients to work for the support hotline to encourage reporting of complaints and improve resolution (CGAP 2014).

3. Institutionalize monitoring and prepare to adjust as needed. Introducing digital payment mechanisms influences the behaviors and incentives of recipients and payment providers alike. Effective monitoring and evaluation of experiences, preferences, and behaviors is therefore necessary for successful program delivery.13 As important, however, is that the DSP systems and partnership structures are flexible enough to make required adjustments, whether they are small tweaks or larger process changes, to quickly rectify problems. For example, to prevent fraud, WFP in Lebanon collaborated with a partner bank to monitor participating merchants' transactions in nearly real time and freeze a merchant's POS device if transactions exceeded certain threshold (El-Huni 2014). After discovering that agents and merchants frequently charge unauthorized fees and treat social payment recipients unfairly, WFP Kenya designed posters with pictures depicting payment procedures and self-protection rules that will be displayed prominently in agents' and merchants' shops (WFP 2016). When Westpac in Fiji found that its agents passed their POS transaction fees onto PFIP recipients or requested minimum purchases, it modified its fee structure to reduce the costs agents incur when serving recipients (Leonard 2011).

These emerging examples of solutions show how a variety of DSP programs and providers are working to get the basics right for successful delivery of DSPs. They address observed shortcomings on the supply side, on the one hand, and demonstrate the importance of strengthening the demand side—the recipients—to self-protect and become vigilant and empowered customers, on the other. Going beyond these basics to achieve meaningful financial inclusion outcomes will require solutions that do more to build trust and confidence in digital payment services, and ultimately add value to recipients' lives and create interest in other financial services. These issues will go unresolved if winning a fee-for-payment government contract is the only motivating factor for providers, or if the program values the lowest fee service proposal over customer-centric systems that can add the most value and best service for recipients. Social payment programs and providers are responsible for ensuring the reliability, convenience, and safety of DSPs. Doing so will imply tradeoffs and require investment of both time and resources, but may be the key to unlocking the elusive win–win–win for all stakeholders.

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Payments Banks – Catalysts for Financial Inclusion

Dr. K. Alamelu
Professor
Department of Bank Management, Alagappa University, Karaikudi – TN - India

Abstract

Financial Inclusion (FI) has been a popular buzzword in India's development lexicon for some time now. In any banking and finance event, FI is given pride of place. But for any social movement in the banking industry to gather momentum, intervention by the Reserve bank of India (RBI) is necessary. The 'Payments Bank' initiative from the regulator is that fillip that will make FI into a social movement in today's device driven digital world. In this background, this paper unfurls the role of payment banks in the journey towards cent percent inclusion.

Key words: Financial Inclusion, Payment Banks, Digital, Growth and Remittances