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DIGITAL INCLUSION - A CONCEPTUAL FRAMEWORK

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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.*

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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.

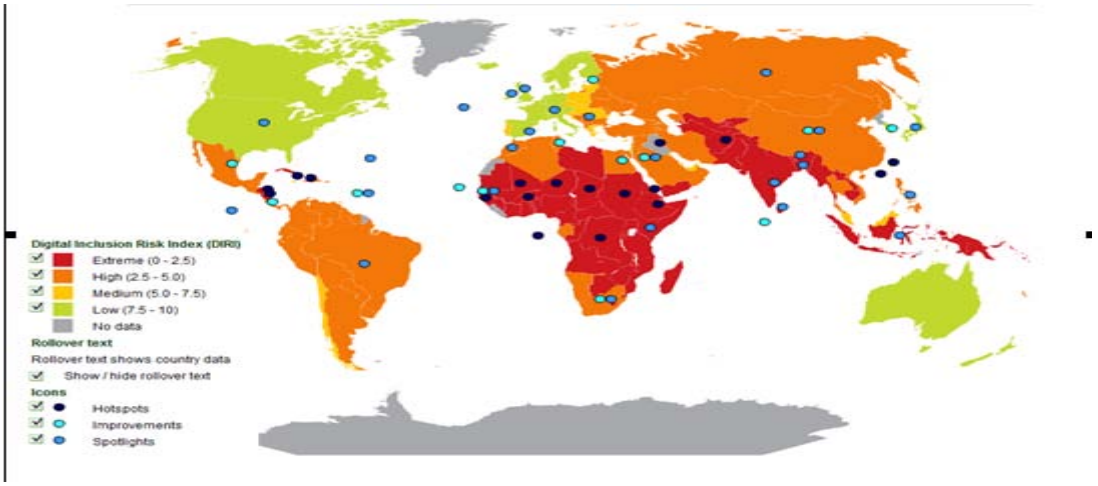
Digital Inclusion Risk Index Map:

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

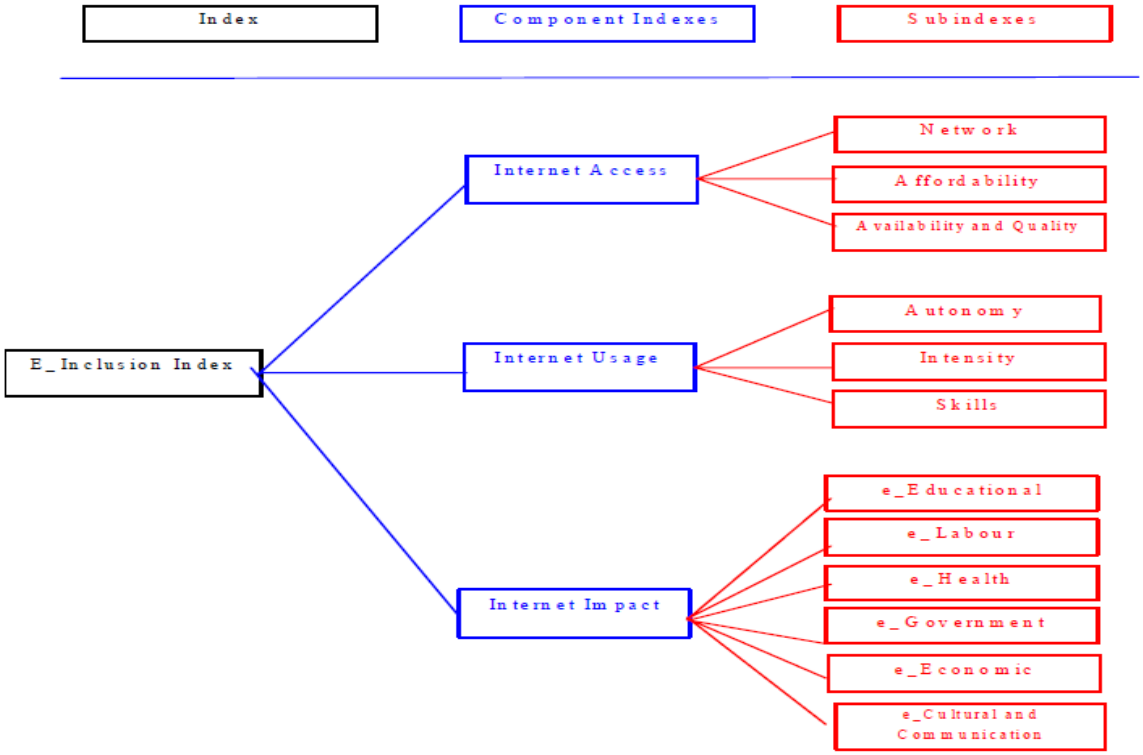
Source: www.Maplecroft.com

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.

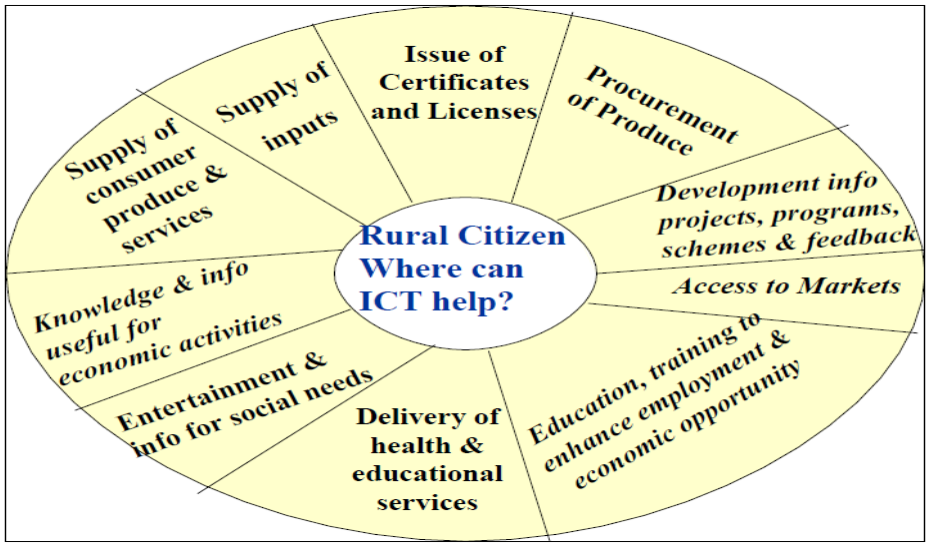
Maplecroft reports that new research developed to identify countries whose populations and economies are stifled by a lack of 'digital inclusion'- the ability to use and access information communication technologies (ICTs), such as computers, the internet and mobile phones- has revealed that India is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