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SRI LANKA:

INNOVATION, ICT AND COMPETITIVENESS

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Acknowledgements

Acronyms and Abbreviations

2G	Second Generation	ITES	Information Technology Enabled Services
3G	Third Generation	ITU	International Telecommunication Union
4G	Fourth Generation	KSAM	Knowledge, Skills, Attitudes & Mind-set
BPR	Business Process Reengineering	LGC	Lanka Government Cloud
CERT	Computer Emergency Response Team	LGII	Lanka Government Information Infrastructure
CIO	Chief Information Officers	LGN	Lanka Government Network
ETF	Employment Trust Fund	LIFe	Lanka Interoperability Framework
FTTH	Fiber-to-the-home	LRC	Learning Resource Center
GPT	General Purpose Technology	MRC	Ministerial Reform Cells
G2B	Government to Business		
G2C	Government to Citizen	MNO	Mobile Network Operators
G2G	Government to Government	NARC	National Administration Reform Council
GOSL	Government of Sri Lanka	NOC	Network Operation Center
HDI	Human Development Index	NRI	Network Readiness Index
ICR	Implementation Completion and Results	STEM	Science, Technology, Engineering & Mathematics
ICTA	ICT Agency	SLT	Sri Lanka Telecom
IDI	ICT Development Index	SLTRC	Sri Lanka Telecommunications Regulatory Commission
ICT	Information and Communication Technology	UN	United Nations
ITBS	Information Technology Based Services	UNCITRAL	United Nations Commission on International Trade Law

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INNOVATION, ICT AND COMPETITIVENESS

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INNOVATION, ICT AND COMPETITIVENESS

EXECUTIVE SUMMARY

1.   **Recent history around the world has revealed that ICT can play a crucial role in economic and social development of societies at all levels of development.** ICT improves communication and the exchange of knowledge and information necessary for development processes. In other words, ICT has revolutionized the way the society, businesses, and the government interacts, working procedures and processes, as well as product innovations. "As an accelerator, driver, multiplier, and innovator, ICT is a powerful if not indispensable tool in the massive scaling up and inter-linkages of development interventions and outcomes."[1]

2.   **ICT based solutions can be enabling for the growth paradigm, but for ICT to contribute to innovation and development, supply and demand side issues need to be addressed.** On the supply side, ICT solutions are enabled by the ICT industry consisting of telecommunications to create the infrastructure, producers of products, content and services for ICT users, and a workforce with technical skills. Demand for ICT solutions derive from the need to change operations and do things better. For example, global competition encourages private sector producers to make and service things better by using ICT solutions. Additionally, citizen needs (including business) encourages the public sector to be predictable, consistent, transparent and responsive using ICT solutions. The paradigm is depicted below.

Chart 1
Stylized Depiction of Demand and Supply for ICT Use

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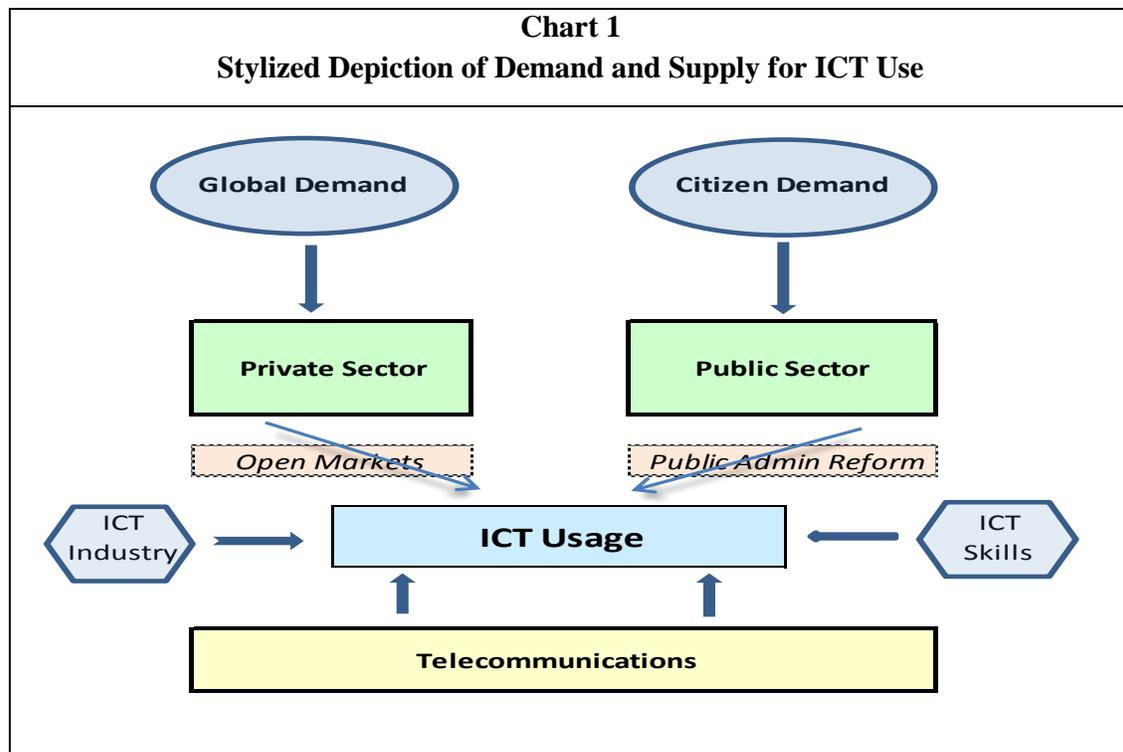
[1] The World Economic Forum, 2014, <u>Global Information Technology Report</u>. Cite quotation.

3.   **Signs the Internet ecosystem is performing include**: (i) a high rate of Internet usage in the main cities and rural areas, (ii) an innovative ICT industry which exports and serves the domestic economy, (iii) graduates at the tertiary level interested in ICT as a profession, and (iv) digital services taking off across the public and private sector with a large proportion of citizens and businesses. ICT has a role to integrate the pillars to form the basis of an interactive, competitive eco-system that is mutually reinforcing along its key lines.

4.   **The benchmarking exercise in Chapter 1 reveals Sri Lanka's notable strengths and weaknesses on the supply side.** Sri Lanka's strengths include: (i) a successful telecommunications sector which is providing high level of access and affordable prices, (ii) a small but growing ICT industry that has shown strong signs of international competitiveness, and (iii) a sophisticated literate work force, particularly in the ICT sector, that has grown almost 20 percent a year for a decade. The obvious gap in Sri Lanka's development toward a knowledge economy stems from the lack of tertiary trained knowledge workers caused by low levels of tertiary enrollment as well as the departure of many tertiary educated workers during the years of conflict.

5.   **On the demand side, in business and at the individual level, Sri Lanka records lower than expected rates of ICT usage, given the country's level of income, size and aspirations.** Despite a growing ICT litera**cy, t**he ranking for usage in the international benchmarks has been falling and now is 120th in the world. Less than a fifth of Sri Lanka's population is using the Internet, and only 10 percent of households have direct access to the Internet. Within the country, indicators show a clear pattern of usage across the provinces and districts which reflect the usefulness of the Internet. However, as a whole there are indications that ICT use has not yet reached the "take-off" stage in Sri Lanka as it has in other knowledge oriented economies.

6.   **Accordingly, policies supporting increased use of ICT in business, government and all of society are integral to a strategy of fostering knowledge and innovation based growth.** As a starting point, the supply of telecommunications services described in Chapter 2 has been relatively successful in Sri Lanka to date by bringing various forms of connectivity to all parts of the island and all segments of society. The policy of encouraging private sector competition through low barriers to entry has served the economy well by fostering a rapidly growing, sophisticated telecommunications sector.

7.   **Recognizing the role of technology and broadband access on standards of living, it is appropriate to consider ways to modernize the policy, legal and regulatory framework**. Efforts to develop a comprehensive broadband policy would provide an opportunity to clarify roles, rights and responsibilities of the various public and private entities involved in increasing broadband from its current low level. Specific reforms to modernize licensing, update the spectrum policy and set standards for the Universal Fund are also needed to bring them in line with technological developments.

8.   **Beyond the telecommunications sector, supply and demand side considerations must be addressed to enable the private sector to play a greater role in ICT development.** On the supply side, the growth of the ITES/BPO and the software production sectors of the economy demonstrate the budding success and international competitiveness of a knowledge based industry. It also provides a potentially strong supply base for ICT solutions in many areas of the Sri Lanka economy.

However, the suppliers of ICT solutions and equipment are generally foreign owned and export oriented which leads to a dichotomy between the growing supply of ICT services and the limited domestic demand. Stronger domestic demand for ICT is an integral part of a business environment that fosters international competitiveness through productivity gains.

9. **Digital government and on line services can help deliver public services while and improving public sector governance,.** Digital services are the outcome of a program of service delivery anchored in public administration reform in either a whole of government form, or at a decentralized "project based" level. Public services can also encourage the public to engage in greater ICT usage. The laying of the horizontal infrastructure and the start of a basic institutional framework has prepared Sri Lanka for the introduction of public service and information applications, some of which have already been showing great results. A recent jump in the availability of on-line, digital services is a positive sign of efforts that may lead to increased usage and a start toward a knowledge-oriented society**.**

10. **Policy makers in Sri Lanka, like those around the world, are concerned with ensuring that the new drivers of competitiveness are a part of the development strategy.** However, Sri Lanka's first mover advantage in opening and transforming its economy has placed it in a fortuitous position of having the luxury to take a holistic and comprehensive approach to ICT development**.** Such a strategic approach can at once build on past strengths, apply lessons from Sri Lanka and around the world, and enable any course-corrections based on these lessons. The Government's role in this process, therefore, is to ensure: good network infrastructure (discussed in Chapter II), a good business environment (discussed in Chapter III.), and public and semi-public services (Discussed in Chapter IV.

11. **To support such a strategy, the summing up chapter provides a set of issues to consider in when developing ICT aspects of the blueprint for long term competitiveness**. Following the supply and demand paradigm for innovation and ICT solutions, a series of policy recommendations are made at a strategic level to prompt further study and consideration. The recommendations are formulated to enable additional unbundling and drilling down as a part of a broad based competitiveness, innovation and ICT strategy, should one be pursued.

CHAPTER I: SRI LANKA IN THE WORLD OF ICT

A. Introduction

1.   **Recent economic history has revealed that ICT can actively play a crucial role in economic & social development of societies at all levels of income and development**. ICT has revolutionized the way the society, businesses, and the government interact, introduced new working procedures and processes, and spurred new forms of product innovation. Through massive improvements in communication and knowledge exchange, there is established evidence of the positive impact that Internet access has on the development of society and the economy. It can happen through many mechanisms and across wide and varied situations. (Box 1.1).

Box 1.1: E-Transformation Stories from Around the World

In **Talin, Estonia,** citizen e-services have become a routine: e-elections, e-police, e-healthcare, e-banking, e-tax declarations, e-school, etc. Nearly 100 percent of public services for both businesses and citizens are available online - making the "e" prefix unnecessary.

In **Santa Cruz, Bolivia,** brokers would pay the farmers after selling the produce to the markets often shortchanging the farmers in the villages. Now with information sourced from the Internet and an email account, the radio program 'El Correo del Agricultor' (The Farmer's email) broadcasts market price lists.

In **Andhra Pradesh, India,** *Project eSeva* (e-services) is bridging the digital divide in the district of West Godavari in the province and helping the position of women in the communities. Facilities are available to citizens via web-enabled rural kiosks.

In **Wamunyu, Kenya,** the Learning Resource Center (LRC) has enabled teachers with no computer knowledge to become active IT users, incorporating material/information available on the Internet in their learning materials, while students have become more active learners.

In **Nugeoda Delkanda, Sri Lanka,** the Nugeoda Delkanda Land Registry has implemented an e-land register project. The transaction, which took two days and two visits, now takes 30 minutes in one visit.

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2.   **In addition to wide societal benefits, an ICT embedded development process can bring economic dividends in the form of better jobs, higher wages and technical skills.** "As an accelerator, driver, multiplier, and innovator, ICTs are powerful, if not indispensable, tools in the massive scaling up and inter-linkages of development interventions and outcomes."[2] For example, one often cited research shows that a 10 percent increase in broadband penetration is correlated with an average of 1.3 percent increase of GDP.[3] ICT's dramatic impact is based on new ways products are able to be produced (Box 1.2).

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[2] The World Economic Forum, 2014, Global Information Technology Report.
[3] The World Bank, 2009 Information and Communication for Development, Chapter 3,

<div style="border:1px solid">

Box 1.2: ICT and its Impact on the Firm[4]

ICT has changed how goods are produced and sold and how services are organized and delivered. Some jobs have become obsolete while new jobs have been created. More importantly, ICT has transformed the organization of production itself by enabling a finer degree of specialization of the production process and allowing it to be more fragmented than in the past. (Robert Baldwin 2006, The Second Great Unbundling).

Now competition and trade occur at a finer level – at the level of tasks being performed by workers – leading to the offshoring of some production strategies as opposed to the entire production process. The unbundling of production allows firms to exploit comparative advantage to a greater extent than in the past. Emerging markets have joined the supply chain of multinationals at different stages of the production process. Some jobs which were considered non-tradable before (telephone operators, data entry) are now being offshored and new theoretical frameworks are being introduced to study these effects.

Recent research has shown that firms have changed the organization of global supply chains. ICT has affected the incentives of multinationals to reshape their supply chains by the drop in monitoring costs since software allows headquarters to acquire information and monitor the production process in real time, worldwide. Therefore, with low ICT adoption, the headquarters of a company will find it optimal to acquire a firm only in routine-intensive industries where monitoring is not so important. ICT adoption increases the number of mergers in harder to monitor industries to a greater degree.

Information access and communication positively impact organizational structure and time management. When access to information is cheaper and faster, time and presence can be allocated more efficiently. For example, doctor's time and presence is economized as nurses diagnose and prescribe through the use of ICT systems, teacher can be in more places at the same time, and workers can solve problems through collaboration in ways never before considered

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3.   **"In Sri Lanka, international connectivity and access to high-speed, inexpensive internet is sine qua non in developing a vibrant innovation system."[5]** Sri Lanka's society has embraced ICT enabled development outcomes, including (i) inclusive growth, high value employment and technology based exports, (ii) delivery of public services, particularly to the poor and rural areas, and (iii) efficiency, effectiveness and transparency of public spending. ICT based innovation is expected to help realize these goals by allowing the public and private sectors to be efficient and effective while improving access to public and business services by all citizens.

4.   **The public has interest in the enabling conditions for a successful paradigm: access to infrastructure, a conducive environment for innovation, and access to digitally based services**. The following chapters develop this paradigm by unbundling the use of ICT in Sri Lanka for innovation and service delivery. The rest of chapter I places Sri Lanka within the remarkable advances in ICT across the world. Chapter II examines telecommunications as the backbone to ICT access. Chapter III examines ICT as an innovator for industry as well as an innovating industry. Chapter IV describes efforts to incorporate ICT based solutions to improve the delivery of public services in Sri Lanka. Finally, Chapter V summarizes and considers various ways ahead.

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[4] Sergi Basco & Marti Mestieri, "*The ICT Revolution and the International Organization of the Firm,*" October, 2013
[5] Biller Daniel, Infrastructure Assessment for Sri Lanka, World Bank, 2012.

B. Global Trends in ICT

5.   **By the end of 2013, there were as many mobile telephone subscriptions as people on the planet, with 100 percent of the world's population covered by a mobile signal.** More importantly, in 2013 almost 40 percent of the world's population was using the Internet which, in some parts of the world, has become almost as ubiquitous as the mobile-cellular telephone. Still, while 250 million people came on line in the past year, there still remain 4.4 billion people who are not yet using the Internet. It is projected that by 2017, nearly half of the world's population (3.6 billion out of 7.6 billion people) will be connected to the Internet.[6]

6.   **Just as or more significantly, access to broadband – primarily through mobile technology and hand set based services - is expanding at break-neck pace**. Of the world's total inhabited areas, network coverage will increase to 85 percent in 2017, up from 79 percent in 2012. The International Telecommunication Union (ITU) estimates that by the end of 2013 there were around *2 billion* mobile-broadband subscriptions corresponding to a global penetration rate of almost 30 percent. At recent trends, consensus estimates are that an additional 500-900 million people will join the online ranks by 2017, expanding the online population to 3.2-3.6 billion users[7].

Box 1.3: World Wide Growth of Data[8]

Over 2.5 quintillion bytes of data are created daily. 90 percent of the world's stored data was created in the last two years alone. One hour of customer transaction data at Wal-Mart (2.5 petabytes) provides 167 times the amount of data housed by the Library of Congress. Digital data created, replicated, or consumed will grow by a factor of 30 from 2005 to 2020, doubling every two years. By 2020, 5,200 gigabytes of data will exist for every person on earth. Much of this data growth is traversing IP networks. From 2012 to 2017, total traffic over IP networks will grow threefold but mobile data traffic will grow 13 fold. Between 2012 and 2017, seven billion more devices will join the already 12 billion devises connected to the Internet.

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7.   **In particular, penetration of the Internet in developing country households has more than doubled in the last five years.**[9] The growing availability of mobile technology and the incredible growth of data and information content have empowered citizens of emerging economies in ways never imagined. Innovations, such as the rise of cloud computing have reduced competitive differentials in the availability of technology across all types of firms while low entry barriers in the digital space have sparked creativity and given rise to a class of young entrepreneurs around the world. With the appropriate recipe, the opportunity to find new ways to create value by better and more efficiently organizing the use of natural, financial, and human resources will lead to virtuous circles of unimaginable welfare gains for countries that choose to participate.

8.   **Still, even as broadband subscriptions and the share of households with Internet access grow, the current digital divide between developed and developing countries remains striking.** Broadband subscriptions in developing countries doubled over the past two years and Internet penetration

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[6] McKinsey and Company, September 2014, *Offline and falling behind: Barriers to Internet Adoption*
[7] Ibid.
[8] The World Economic Forum, 2014, <u>Global Information Technology Report</u>
[9] ITU estimates

rates increased from 4.4 percent in 2010 to almost 20 percent by end 2013. However, even with these impressive rates of growth, online access in the developing world remains far from the 75 percent Internet penetration rates reached in developed countries. Additionally, the higher bandwidth, fixed (wired) broadband – critical to advanced commerce and communications - reached a quarter of the developed world and only 6 percent of the developing countries population. (Figure 1.1) In other words, 3.2 to 4.2 billion people, more than half of the global population, are forecasted to be off line in 2017, three quarters of which are concentrated in 20 developing countries.[10]

Figure 1.1: Use, Access and Mobile Broadband Subscriptions, 2013

Source: International Telecommunication Union (ITU)
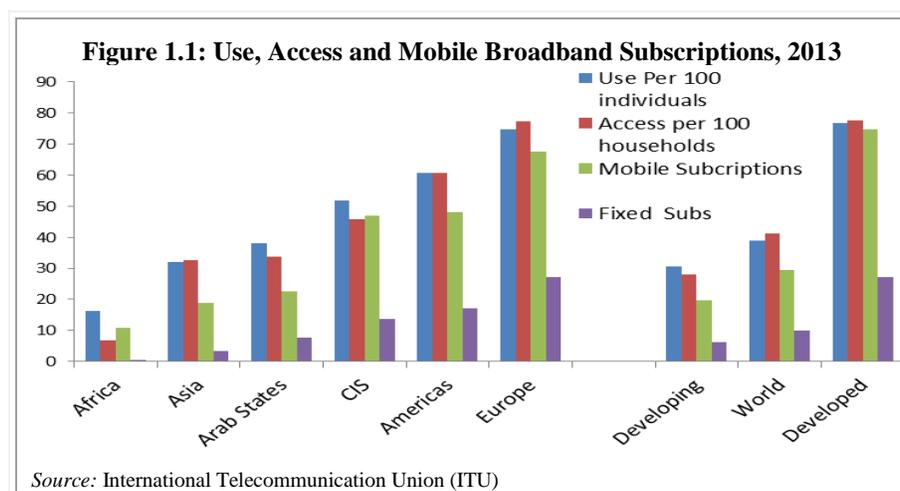
C. Access, Affordability and Literacy in Sri Lanka:

9.   **In Sri Lanka, notable achievements have also been made during the past decade in bringing ICT into society from an almost negligible starting point.** Access has been driven by the telecom sector and its footprint of activities spanning the nation. In addition to having access to quality broadband services, growing internet usage has also been a function of affordability and the rising IT literacy in the country. On the demand side however, the Internet is not being used enough by businesses to implement innovative productive methods or citizens to gain access to public and consumer based digital services. Access, affordability and literacy as drivers of Internet usage are presented here, followed by an overview of Internet usage at a national scale and across the various parts of Sri Lanka. The discussion on internet usefulness for firm productivity and citizen services is taken up in Chapters III and IV, respectively.

1.   Network Coverage (Access)

10.   **Sector reforms and high rates of private and public investment have enabled increased coverage, improved affordability, and widened adoption of telephone services.** By 2010, almost the entire population was covered by a mobile signal offering either voice or voice and data services, and using technologies of 2.5G, 3G and even 4G in some instances. In 2013, mobile phone penetration in Sri Lanka exceeded 100 percent with unique mobile subscribers covering around 60 percent of the population. As in the rest of the world, mobile telephony in Sri Lanka has far outstripped fixed line, which has been declining in use in recent years. More importantly, usage in Sri Lanka's is related directly to broadband access through mobile as opposed to fixed-line means. (Figure 1.2).

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[10] McKinsey and Company, Ibid.

Figure 1.2: Telecommunication Penetration Rates, 2005-2013

Global

Fixed Telephone
Mobile Telephone
On Internet
Fixed Broad Band
Mobile Broad Band

Sri Lanka

Fixed Telephone
Mobile Telephone
On Internet
Fixed Broad Band
Mobile Broad Band

Source: ITU
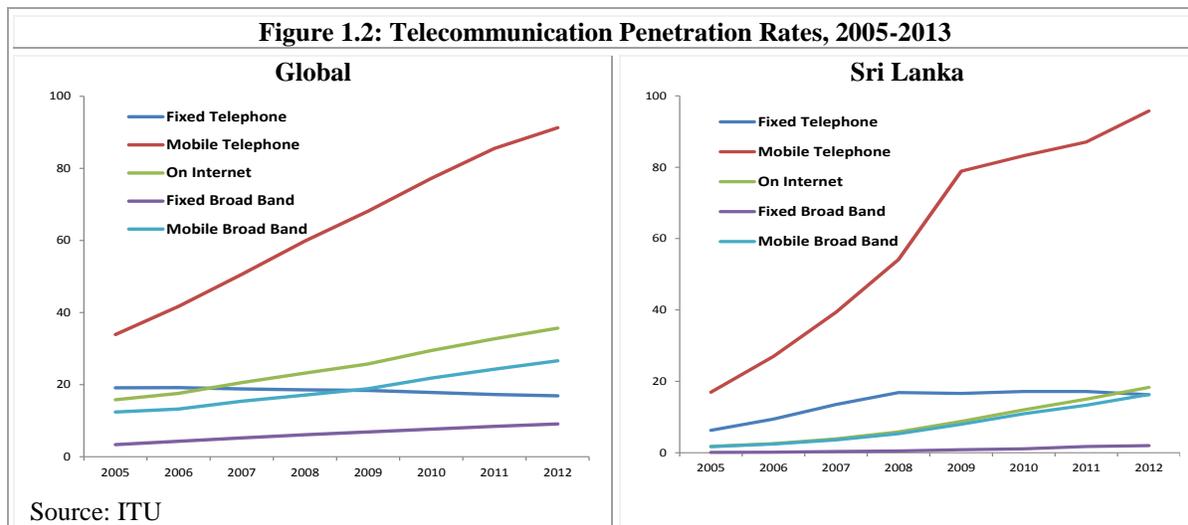
11.   Broadband subscriptions are growing in Sri Lanka but more slowly than for telephony due to high cost of hardware, slowly emerging content, and low levels of ICT literacy. While the share of the population with an active broadband subscription tripled in the past years, it reached only 6.5 percent. Three quarters of the subscriptions were mobile as opposed to higher bandwidth fixed line technology[11] (Figure 1.3).

Figure 1.3: Broadband in Sri Lanka, 2010-2013
per 100 people

Fixed   Mobile

Source: ITU
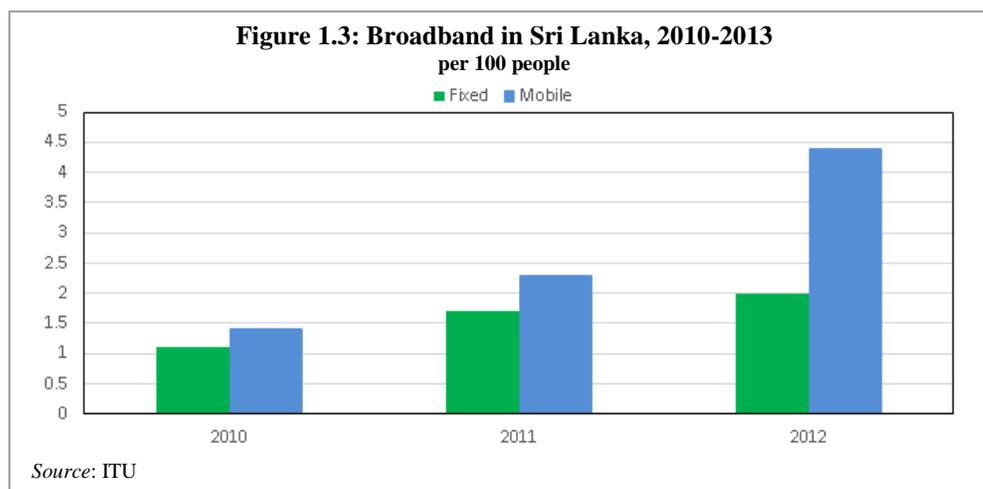
12.   **When Sri Lanka's growth in broadband access is viewed on a global scale, the achievement is less impressive than the penetration achieved in other dynamic countries.** Certainly, Sri Lanka, along with India and Maldives, has been able to increase penetration of mobile-cellular telephones and broadband at a higher rate than other South Asian countries.[12] However, when comparing rates in mobile and fixed line with 26 other comparator countries, it is apparent that Sri Lanka will need to grow much more quickly in order to catch up with some of the fast advancers like Mexico, Vietnam, Turkey and Georgia (Figure 1.4).

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[11] There is no single definition of "broadband", or the data rates (speed) of a broadband connection. Indeed, different technologies indicate different broadband speeds. At the low end, for example, transmission speeds of 256 kbps can be considered broadband. However, 3G broadband can be 0.4Mbps, and 4G/LTE can be as high as 100Mbps.
[12] Not only is broadband and telephone penetration higher, mobile ownership is higher in Sri Lanka (45-50 percent) than South Asia's average (30 percent) and for the developing countries as whole (40 percent) GSMA Intelligence.

Figure 1.4: Broad Band Subscriptions
(per 100 people)

Source: ITU
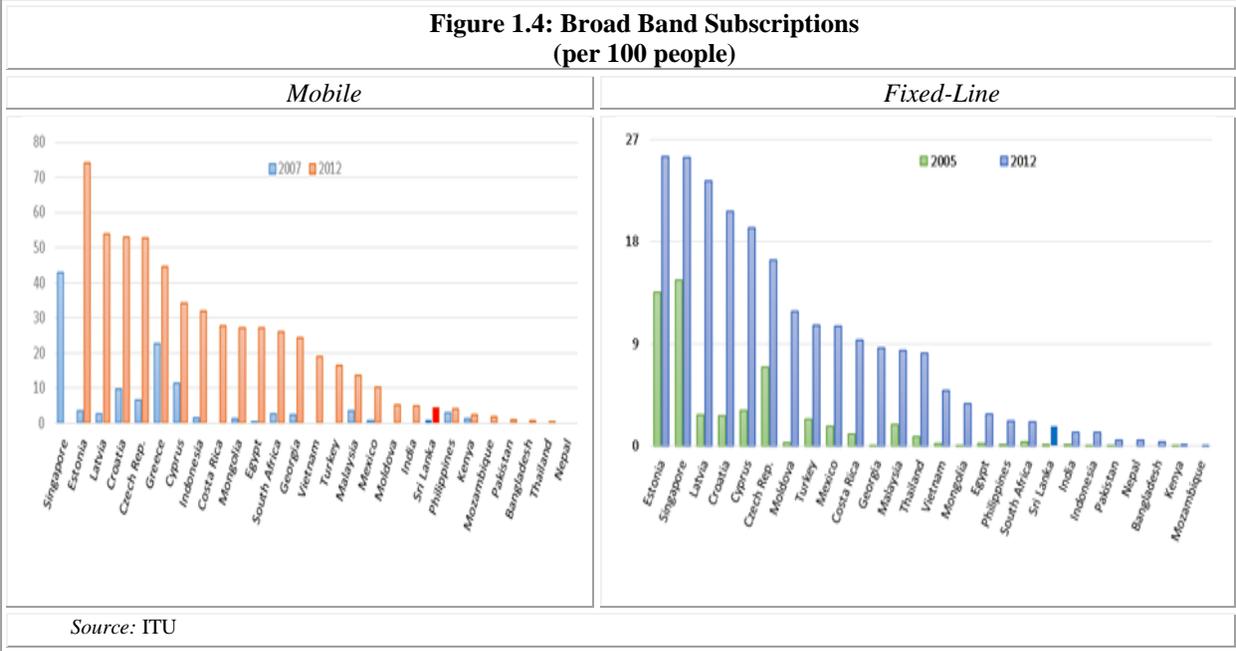
2. Internet Affordability

13.   **An aspect of the Sri Lanka ICT sector that is at once attractive from the consumer's view and curious from a market perspective is the affordability of some broadband segments.** In absolute terms, according to the ITU Sri Lanka provides the least expensive connectivity in the world for mobile (handset and computer based) and fixed broadband. When normalized by income per capita, the affordability of broadband in Sri Lanka is in the top 25 percentile for mobile broadband, and the top 40 percent for fixed broadband (Table 1.1).

Table 1.1: Global Ranking of Sri Lanka Broadband Prices, 2012

	Absolute USD	*Absolute PPP*	*% of Income*
Mobile Broadband (Prepaid-Handset)	3rd	3rd	35th
Mobile Broadband (Postpaid-Handset)	1st	1st	20th
Mobile Broadband (Computer Based)	1st	2nd	24th
Fixed Broadband	1st	1st	60th

Note: Ranking for mobile and fixed broadband categories based on 124 and 160 countries, respectively.
Source: ITU, Measuring the Information Society, 2013.

14.   **Whether the price structure is sustainable based on the current model of industry structure and competition is in question both by the industry and the regulator.** There is a sense that the effort at achieving short term affordability may hinder achievement of longer term ICT goals. While some degree of cross-subsidy may be a part of the business model at early stages of development, the sustainability of the business model may be challenging as discussed in greater detail in Chapter II.

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3. ICT Literacy

15.   **ICT adoption in everyday life enables people to participate in the information society, but requires basic digital literacy to get started.** Digital literacy is defined as a set of skills and knowledge required to participate in ICT activities – the basic knowledge of using a computer. Creating demand for digital content, and therefore ICT services, requires high levels of ICT literacy and adequate human capital.

16.   **Sri Lanka, like other countries, has made the adoption of ICT a key priority.** ICT outreach has improved by undertaking literacy programs and developing facilities with Internet access throughout the nation. The Annual Report of the Ministry of Finance and Planning 2012 notes the progress in Sri Lanka's ICT literacy. From a low of 8 percent in 2005, literacy doubled by 2010 to 20.1 percent and increased to 35 percent in 2012. Still, in a country with a 90-percent literacy rate, even a 35 percent ICT literacy rate indicates that universal ICT literacy remains far off.

17.   **In addition, while ICT literacy has increased to 35 percent nationwide, some provinces recorded dramatic increases while others improved ICT literacy surprisingly slowly**. Western provinces are now almost at full ICT literacy, while the North Central and Central provinces recorded rates in the 50 percent range. The ICT literacy rates in the Northwestern and Southern provinces, however, remained well below the national average. Moreover, the 2012 census revealed that three quarters of the population are unable to use a computer, with the distribution relatively evenly divided between men and women (74 and 78 percent, respectively). More surprising is that 63 percent of the urban population claim to be unable to use a computer compared to 78 percent of the rural population.[13]

4. Internet Usage

18.   **Internet usage as a function of broadband access, service affordability, and IT literacy has been growing rapidly but from a very low starting point.** Even with a relatively early start and rapid growth in recent years, Sri Lanka lags comparator countries in internet usage. ITU estimates that just over 18 percent of the population and only 10 percent of households were using the Internet in 2012, starting from less than 2 percent in 2004 (Figure 1.5). In the last three years of that period, the number of mobile Internet users doubled each year, but even after this rapid growth, only a fifth of the population was reported to be using the internet - compared to almost three times that on the telephone.).[14]

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[13] Government of Sri Lanka estimates from 2012 Census.
[14] Conservative estimates does not take into account internet users without a proper data package, and moreover, considers workplaces, internet cafés and household fixed lines as a single connection.

Figure 1.5: Internet Usage in Sri Lanka

Source: ITU
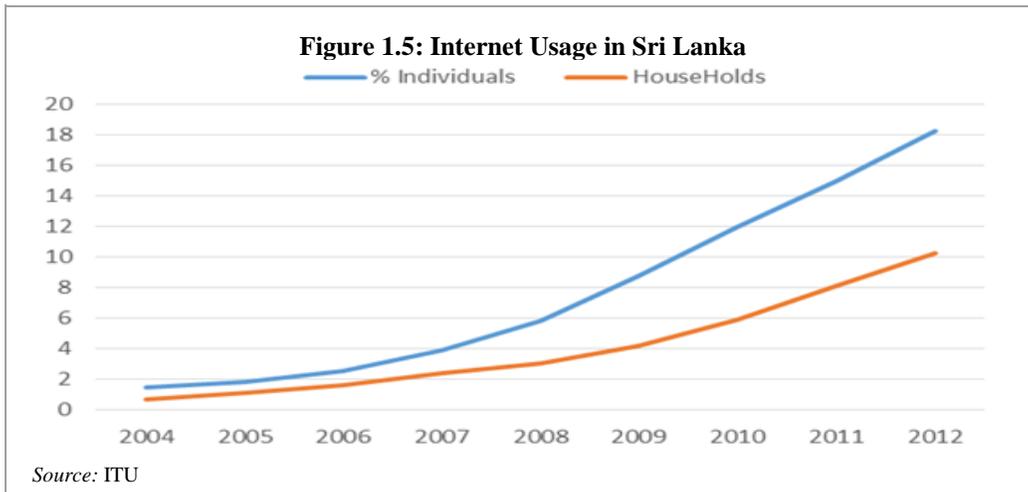
19.   **The rapid growth in individual and household usage is, at first glance, impressive for a developing country –** particularly one which barely used the Internet less than 10 years earlier. The growth is a reflection of positive factors in the Sri Lanka market including: (i) broad coverage of the 3G signal, (ii) falling hand-set prices, (iv) improved literacy, (v) low prices for some Internet packages, and (vi) rising incomes. Indeed, Sri Lanka's usage, in terms of percent of individuals using the internet, has surpassed India and Pakistan, which had higher usage to start, as well as Indonesia and Mongolia (Figure 1.6).

Figure 1.6: Individuals Using the Internet, 2007 – 2012

Source: ITU.
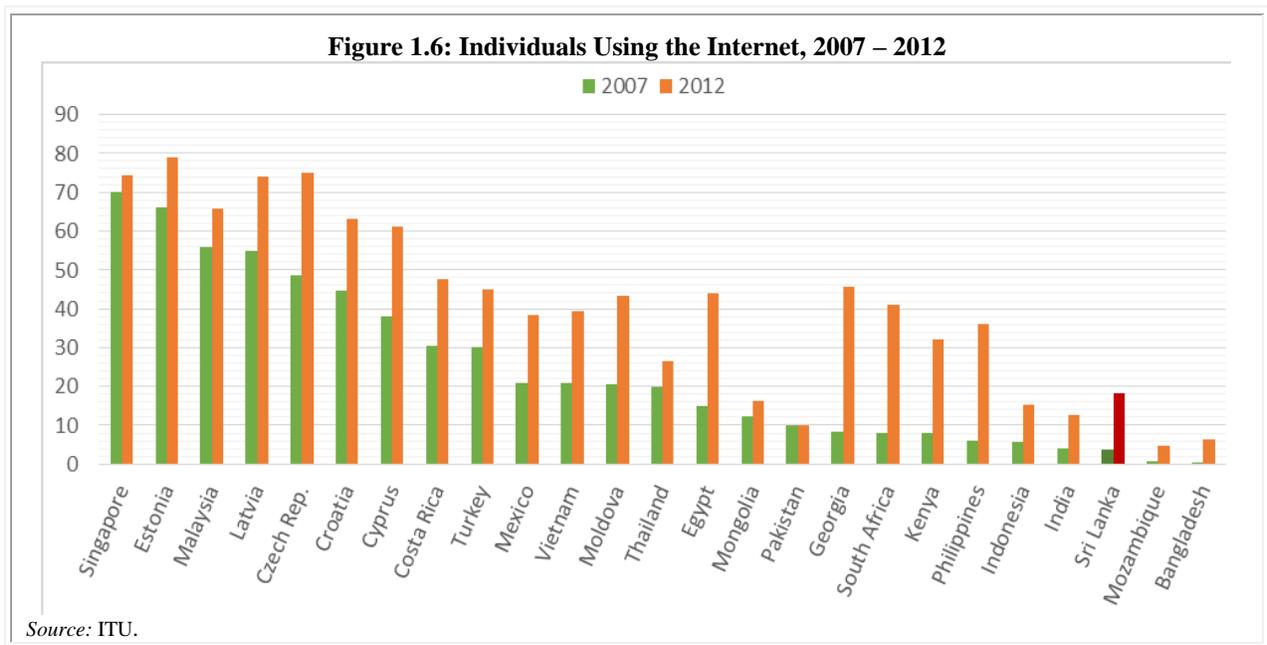
20.   **While Sri Lanka's rising ICT penetration is at first glance impressive, it would not be wrong to expect more for a country with Sri Lanka's aspirations.** There is Internet in only 10 percent of households after 10 years. Although most lower-income and lower-middle income countries posted low usage scores in 2002, Sri Lanka has been able to raise its usage ranking from 118 in 2002 to only 115 in 2012. Given the rapid progress shown by countries like Philippines, Kenya, South Africa or Georgia, who started with low penetration in 2002 but recorded Internet usage levels of 35-45 percent of the population, it would seem that Sri Lanka's Internet penetration could have been higher (Figure 1.7).

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Figure 1.7: Accessing the Internet in Sri Lanka, By District and Province
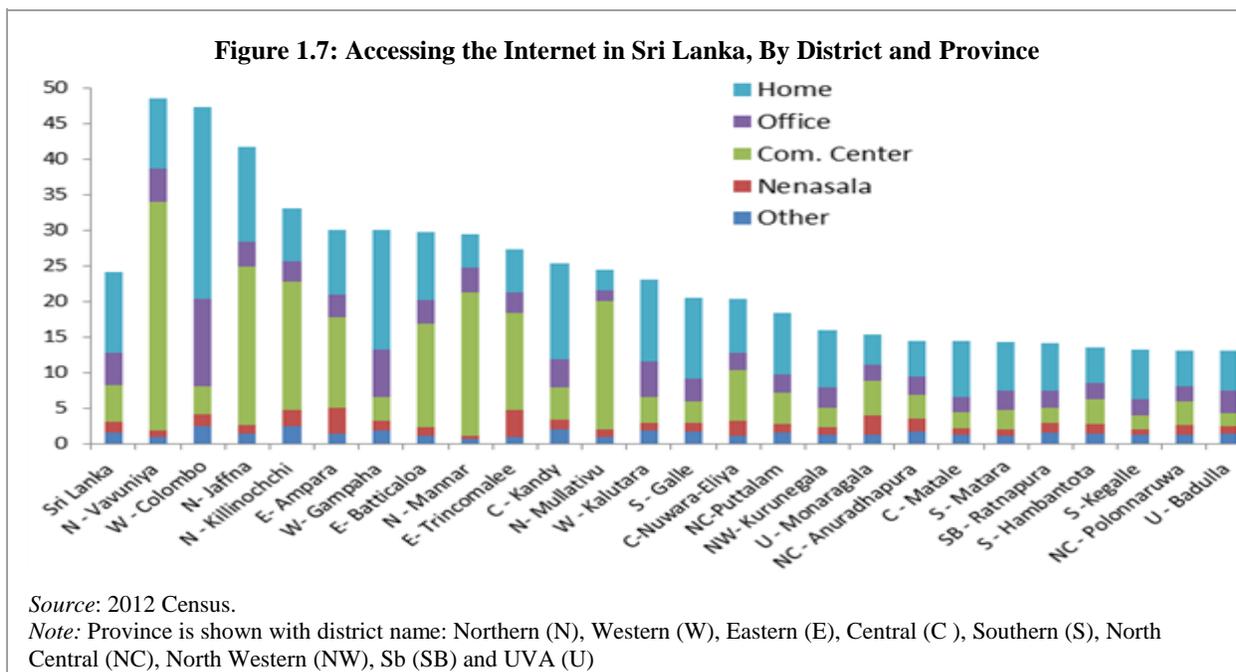
5. ICT Use across Sri Lanka

21.   **An important insight to usage and access of the Internet comes from an analysis of district level data provided by the 2012 census.** Patterns of usage can be seen which have implications for the ways the Government and industry may wish to promote usage. Just under a quarter of households in Sri Lanka say they access the Internet.[15] Of this around 16 percent of households say they access the Internet from home or the office, while the other 8 percent access the Internet from places outside the home or office, communication centers, Nenasalas (public sector Internet access points), or a small number of "other."

22.   **The average masks important differences across districts and provinces with regard to the share of households accessing the Internet and place for its access.** In Colombo and its neighboring districts in the Western province (Gampaha and Kalutura) about 47 percent and 25 percent of households, respectively, are accessing the Internet – mostly through household and office access. However, the Northern and Eastern provinces - the more conflict affected areas - have a greater number of households actually accessing the Internet.

23.   **In fact, of the eleven districts above the national average in accessing the Internet, only Colombo, Gampaha and Kandy are not post-conflict, minority districts**. Importantly, these post-conflict districts do not access the Internet from the home or office due partly to the large fixed cost of hardware. Instead, access is obtained mostly from Communication Centers (private Internet cafés). Figure 1.8 shows the very low penetration of computers in the home in the districts with the highest usage.

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[15] This is not the same as having access to the internet in the household, which was responded to as around 10 percent, as in the ITU data. Instead, this corresponds more closely to individuals using the internet, which is 18 percent of the population in the ITU data and 24 percent of households in the census – though some double counting may be possible from the census.

Figure 1.8: Computers in the Home, By District and Province
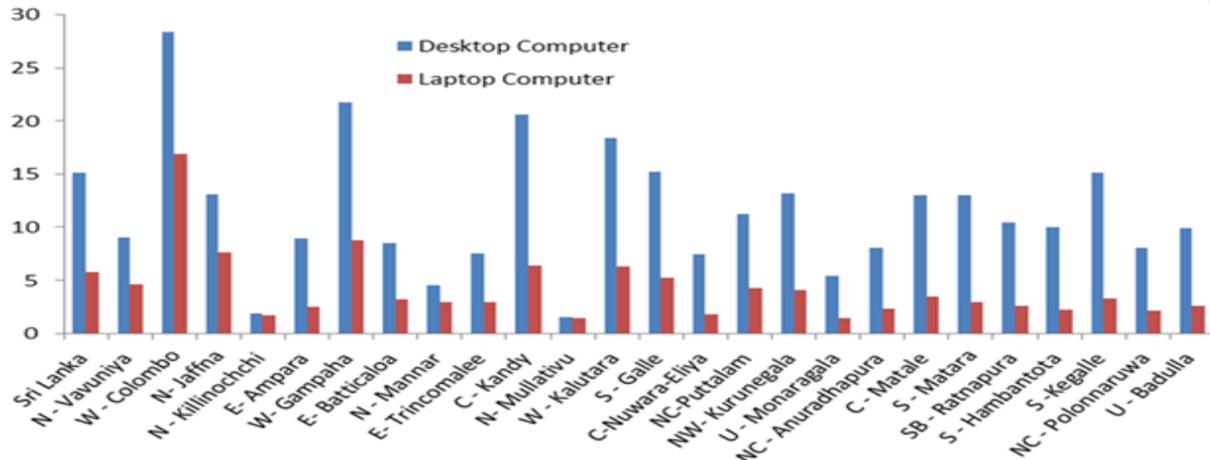
24.   **The conclusion to be drawn from the dichotomy of usage and access outside of the home is that it is content that matters in terms of drawing people to the Internet**. It can be postulated that districts which access the Internet more than the national average are those in which the population has an interest in contacting diaspora outside the country. The fact that this population travels to communication centers in order to do so, supports the following conclusions:

- Use of the Internet depends mostly on having a concrete reason to use the Internet,
- Access to the Internet does not always depend on having a computer in the home,
- Private sector solutions have sprung up to meet the demand for access, and
- In some places, there may be hardware, if not literacy, constraints to Internet use.

D. Benchmarking the state of Sri Lanka's ICT Development

25.   **Two international benchmarks are relevant for examining Sri Lanka's performance with regard to ICT adoption, and the progress made over the years.** The World Economic Forum's *Network Readiness Index (NRI)* measures the preparedness of a country to exploit the opportunities offered by ICT. The second index is ITU's *ICT Development Index* (IDI), which is widely used to compare and evaluate ICT uptake. The NRI is the index most widely used for benchmarking purposes in Sri Lanka.

26.   **Currently, Sri Lanka ranks 76th in the world, up from 86th in 2006-07, based on a 20 percent increase in the NRI score over eight years.** Sri Lanka is now in the same neighborhood as Mexico, South Africa, Indonesia and Thailand. The 20 percent increase in Sri Lanka's score rivals other fast movers in the world, such as Georgia (30 percent increase), Mongolia (28 percent) and Vietnam (13 percent), as well as fast movers that started at low levels, including Bangladesh, Kenya and Moldova. At the same time, the ranking of other important countries in the Asian region fell, including India (44 to 83), Pakistan (84 to 111), Philippines (69 to 78), Indonesia (62 to 64) and Thailand (37 to 67) (Figure 1.9).

Figure 1.9: Network Readiness Index

Source: WEF, *Global Report on Information Technology*, various issues
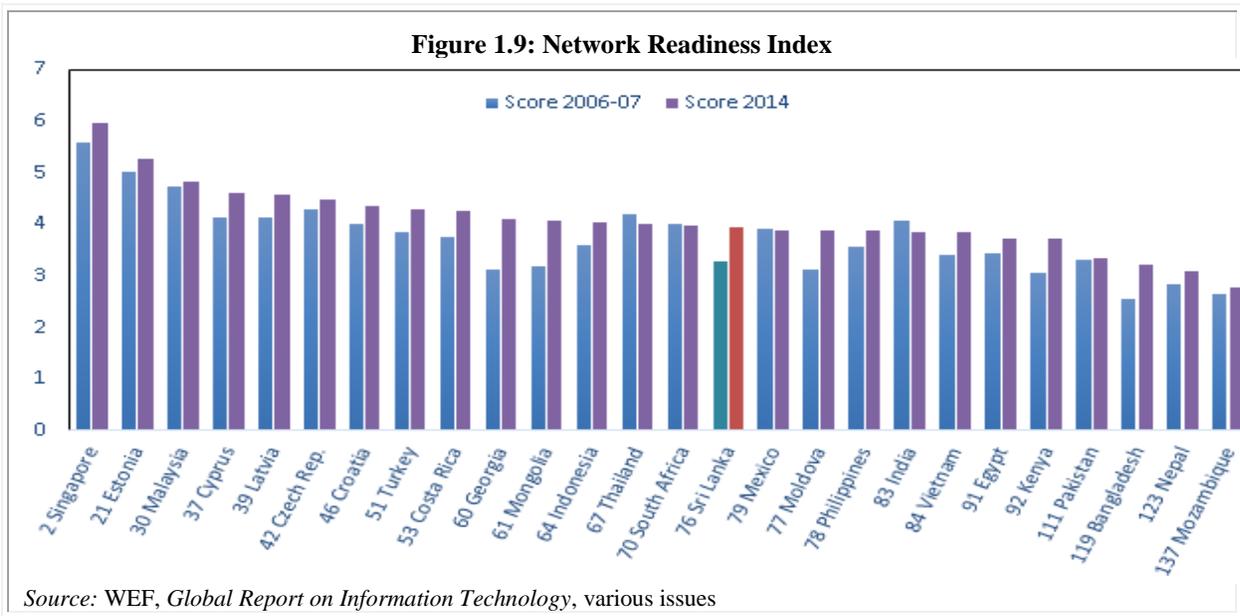
Within the index however, big differences are found among sub-components, revealing varying strengths and weaknesses in Sri Lanka's access to, and use of ICT. The enabling *Environment* component improved from 81st to 63rd on the strength of the business and political environment. The *Readiness* component, measuring ICT infrastructure, affordability and skills needed to make good use of ICT, also improved in a similar fashion with the ranking going from 87th to 64th reflecting Sri Lanka's inexpensive connectivity.). The weakest part of the index is attributed to the critical areas of Usage, where Sri Lanka's scores and rankings have been low and falling in recent years**.** In 2012 Sri Lanka ranked 112th out of 147 countries in terms of *usage of ICT by individuals,* falling nine places since 2007. *Usage by business* and *by government* improved and ranks 50th and 43rd in the world, respectively (Figure 1.10).

Figure 1.10: National Readiness Index Sub-Indices

Business, Individual and Government Readiness

RSI '13   RSI '06

(Bar chart showing RSI '13 and RSI '06 values for: Singapore, Cyprus, Estonia, Latvia, Costa Rica, Turkey, Croatia, Mongolia, Moldova, Georgia, Czech Rep., Malaysia, Sri Lanka, Thailand, India, Indonesia, Mexico, Vietnam, Egypt, Philippines, Bangladesh, Pakistan, South Africa, Kenya, Nepal, Mozambique)

Business, Individual and Government Usage

USI '13   USI '06

(Bar chart showing USI '13 and USI '06 values for: Singapore, Estonia, Malaysia, Czech Rep., Latvia, Croatia, Cyprus, Costa Rica, Turkey, Mexico, Indonesia, South Africa, Vietnam, Egypt, Georgia, Philippines, Mongolia, India, Moldova, Thailand, Kenya, Sri Lanka, Pakistan, Bangladesh, Mozambique, Nepal)

Source: ITU

27.   **The IDI index, which focuses more on actual uptake, paints a slightly more challenging picture for Sri Lanka.** The current ranking of 107 out of 151 countries places it as the South Asia regional leader, apart from the Maldives, but leaves it in the bottom quartile worldwide. More importantly, the absolute score doubled to 2.66 in the period from 2002 – 2007, raising its global rank from 99 to 104. Over the next five years, however, Sri Lanka recorded a fall to 107 in the IDI global ranking. (Figure 1.11).

Figure 1.11: ICT Development Index

IDI 2002   IDI 2012

(Bar chart showing IDI 2002 and IDI 2012 values for: 15 Singapore, 22 Estonia, 34 Czech Rep., 35 Latvia, 38 Croatia, 45 Cyprus, 59 Malaysia, 60 Costa Rica, 65 Moldova, 69 Turkey, 71 Georgia, 83 Mexico, 84 South Africa, 85 Mongolia, 86 Egypt, 88 Vietnam, 95 Thailand, 97 Indonesia, 98 Philippines, 107 Sri Lanka, 116 Kenya, 121 India, 129 Pakistan, 135 Bangladesh, 148 Mozambique)

Source: ITU.

28.   **The IDI's three components reveal strong performance in terms of infrastructure access and good labor force.** However, they reflect the low tertiary enrollment and a small rise in usage from none at all. (Figure 1.12). The lack of movement in the scores over the time period when other countries were advancing rapidly means that the ranking did not change much over the decade. *Access* remained around 104 ranking in the world, *Usage* rose slightly to 114, and *Skills* actually fell from 85 to 90. Issues surrounding each of the components - access, usage and skills, will be examined in more depth in this and subsequent chapters.

Figure 1.12: Sri Lanka's IDI Components

Source: ITU
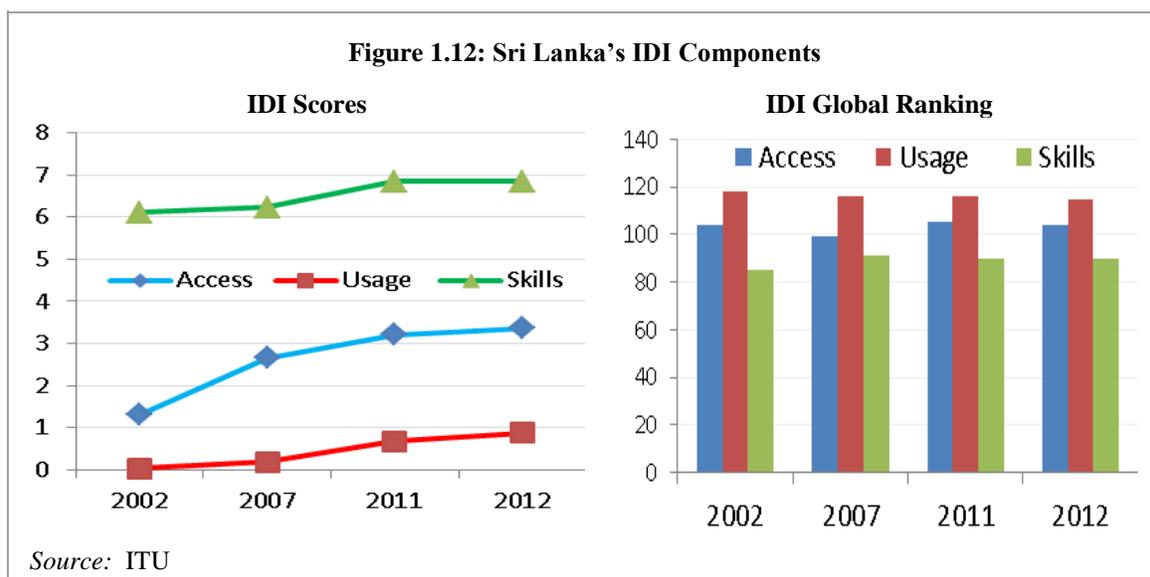
E. Conclusions

29.   **Today's world is divided more in terms of technology than by other factors.** Without Internet access and ICT services there is a fear that economic development will be hampered, and as a result, marginalized regions and nation-states will remain trapped in a disadvantaged situation. To avoid this situation Sri Lanka has embarked on an ambitious endeavor to increase ICT access and usage. If successful, the country is likely to reap its benefits in the near future.

30.   **However, international benchmarks underscore the "ICT paradox:" low cost internet, high overall literacy, and advanced technology, but relatively low ICT literacy and internet usage.**   In particular, (i) successful attempts are being made to enhance the broadband footprint in the country, (ii) public sector programs in education and ICT outreach have helped build ICT literacy in the country, and (iii) Sri Lanka is one of the most affordable places for Internet connectivity in the world, providing competitive prices for mobile broadband and fixed broadband.

31.   **Yet, the country has room to more fully utilize its ICT's potential.** The principal sign of this perception is the consistently low usage of ICT. Ranked 81st in the NRI *Usage* rankings, Sri Lanka has made slow progress since 2006-07, improving by a mere 5 places in the global ranking. Of particular concern is the conflict between low usage by individuals (ranked 112) and the demand of a knowledge oriented society.

A. Introduction

32.   **Innovation is supported by a technology ecosystem.** The system starts with infrastructure, is made possible with connectivity, and includes transformational applications developed for citizens, businesses, and government. The chapter unbundles this paradigm by beginning with the telecommunication and connectivity dimension. In doing so, the chapter will (i) describe the policy context in recent years, (ii) summarize market and regulatory developments, (iii) identify policy issues in expanding broadband Internet services, and (iv) suggest a way forward.

33.   **Expansion of broadband has the potential for dramatic impact on the Sri Lankan economy.** As ITC becomes affordable, accessible and useful, growth becomes inclusive. Connectivity enables competitiveness of the IT based services (ITBS) sector[16], new ways for public services to be delivered, and social interaction through new methods. Reliable connectivity is necessary not only for a growing ICT industry, but also for services and even for traditional manufacturing sectors. Most importantly, increased broadband penetration and Internet adoption throughout the society is a pre-requisite to a vibrant innovation ecosystem.

> *"The telecommunications sector is a backbone of the Sri Lankan economy and shows potential to benefit from growth of the services sector and the untapped global ICT market. The impact goes beyond the local ICT market, expanding into traditional sectors such as agriculture and manufacturing… the telecommunications sector led by the private sector is an impetus for the national economy.[17]*

B. Recent Development in the Sector

34.   **Since 1989, important changes have taken place to develop the telecommunications sector.** Partial de-regulation and public-private investment have been spurred by broad-based reforms, including: (i) enabling of competitive service provision; (ii) restructuring of SLT, the now partially state-owned incumbent; and (iii) creation of a regulator to license telecommunications services, manage and license the radio spectrum, implement price regulation, and protect consumer interests (Box 2.1)

Box 2.1: Key Events in Telecommunications Policy

1989	Liberalization: first private mobile network operator enters the market
1991	Telecommunications Act sets paves way for sector regulation, corporatization of incumbent
1996	Amendment of the 1991 Telecommunications Act to create TRC
1997	SLT partially privatized
2003	Exclusivity of international telephony ends
2006	Sri Lanka's first commercial 3 G license issued
2007	TRC issues fifth mobile telephony license, broadband wireless services launched, subscriber levy imposed
2010	TRC begins consultations on convergence and interconnection related issues
2014	Discussions of strengthened TRC law and broadband policy underway, sector consolidation continues

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[16] Insufficient broadband infrastructure has been cited by the BPO industry as a major bottleneck to expansion, citing Singapore, Malaysia and the Philippines for dependable services.
[17] Biller, 2012. Ibid.

35.   **Mobile penetration has been rapidly rising from 17 percent in 2005 to 92 percent in 2012, as compared to fixed telephony which has gone from 6 percent to 18 percent,** (Figure 2.1). Similar to the trends around the world, penetration of mobile has outstripped the declining fixed line telephone. By 2010 the entire population was covered by a mobile signal, and by 2013 mobile phone penetration in Sri Lanka had reached 120 percent (although the number of unique mobile subscribers is undoubtedly much less - estimated at around 60-80 percent of the population).

Figure 2.1: Mobile Telephone Subscriptions, 2007-2012

Source: ITU
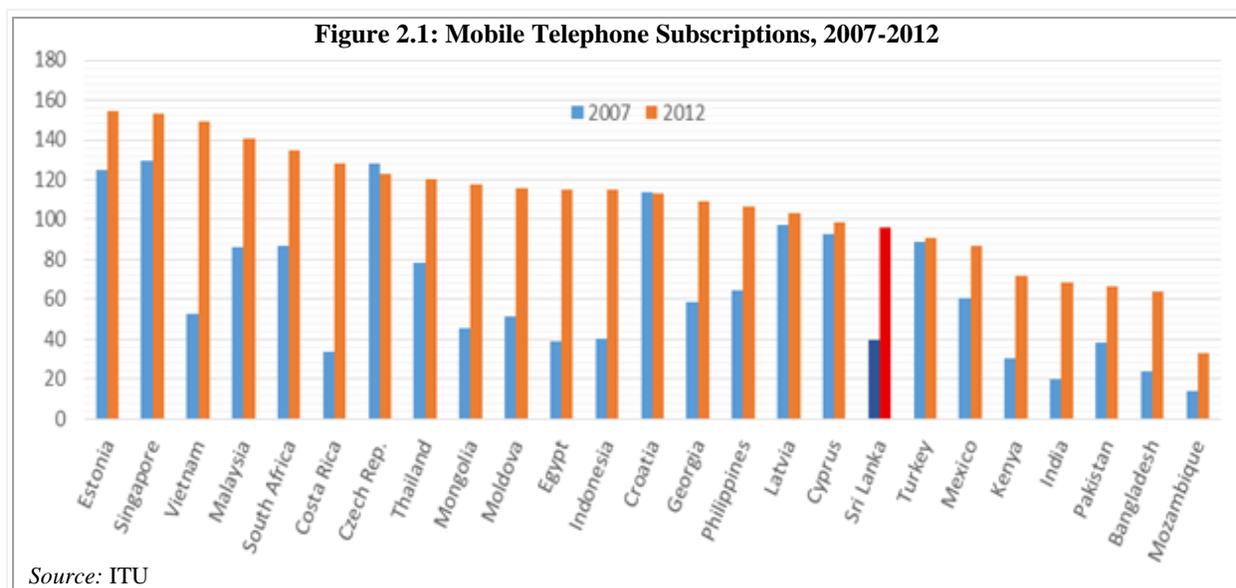
36.   **In terms of providing broadband connectivity, as the backbone for the internet, significant progress has been achieved by the set of telecommunications operators.** Sri Lanka currently has one of the most dynamic and competitive telecommunications sectors in the region and compares well globally in terms of access, prices, and quality of services offered. In particular:

- Telecommunications service prices, particularly data prices, have fallen to some of the lowest in the world. Service providers, including the incumbent, compete fiercely on pricing and packaging for most segments of the data market.

- Sri Lanka is a technologically advanced market in the region and introduced high-speed third generation (3G) networks before other South Asian countries. It has introduced 4th Gen (LTE) networks and is in initial stages of ICT convergence: merging of voice, data, and media. The country's first fiber-to-the-home (FTTH) broadband service was launched in major markets. [18]

- International investments have been attracted as a positive feature of the sector's development. ICT competitiveness of the country increased based on the experience of global players in building and operating advanced telecommunications networks while introducing managerial talent, financial capacity, and technological excellence.

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[18] Industry executives expect that through FTTH, users will be able to get access to high-speed Internet access, video on demand, Wi-Fi, VoIP, live feeds, online education, online gaming, teleworking, video conferencing, etc. without bandwidth limitations

37.   **Still in terms of uptake in the home, the number of "households with access to the Internet" has grown from 2.4 to 10.3 percent, but still remains stubbornly low by global benchmarks,** (Figure 3.2). Despite the early technological advances, the numbers fail to keep pace with countries which started at the same place such as Kenya, Mongolia, Vietnam, and Georgia. Sri Lanka's penetration remains just ahead of large countries with challenging access conditions, such as India and Indonesia with access of 9.5 and 6.5 of total households, respectively. Therefore, in contrast to mobile voice, Sri Lanka's performance with penetration of the high speed Internet, though growing, has been much lower than levels in much of the world.

Figure 2.2: Households with Internet: 2007 and 2012

Source: ITU.
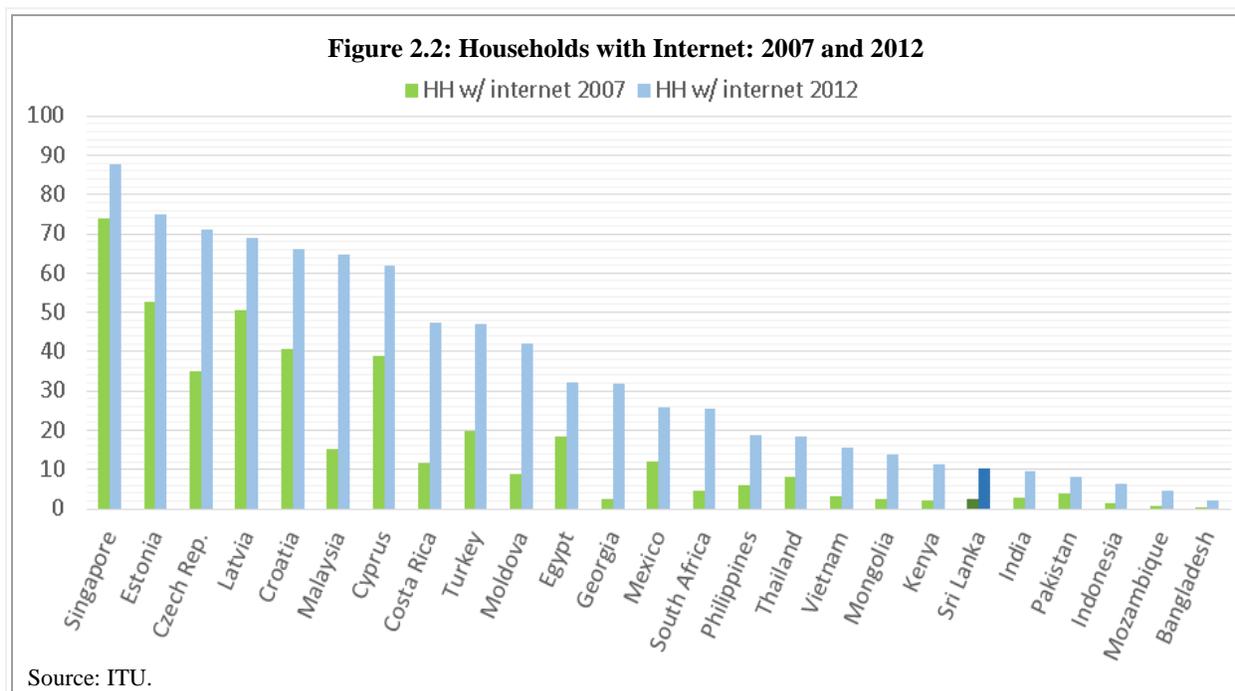
C. Structure of the Market

38.   **Sri Lanka's telecommunications sector is small by global standards with a fairly large number of providers for an island with a population of 20 million.** The boom in mobile telecoms services has served to develop the sector to advanced levels as described above. The end of the island's civil war in 2009 is providing opportunity for an expansion to previously underserved areas boding well for the sector's continued growth in broadband over the next few years.[19]

39.   **The sector currently consists of seven operators collectively providing the range of telecommunications services.** Sri Lanka Telecom (SLT)[20], Lankabell, and Dialog provide fixed services (including fixed broadband; and Dialog, Mobitel,[21] Etisalat, Hutch, and Airtel provide mobile services (including mobile broadband). Three private operators, Mobitel, Dialog and Etisalat, control the bulk of the mobile market with a combined market share of almost 80 percent in October 2012, though the market did become less dominated by Dialog and Mobitel (Figure 3.3).

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[19] Economist Intelligence Unit, Sri Lanka: "*Mobile telecoms sector primed for consolidation.*" October 2013
[20] SLT has been a successful PPP with the GoSL owning a 49.5 percent stake; Global Telecommunication Holdings NV of the Netherlands 44.9 percent; and the general public owning the remainder of the shares.
[21] The wholly-owned mobile subsidiary of SLT.

Figure 2.3: Mobile Market Operational Structure
(Share of Total Subscriptions)

2008

2012

Source: Wireless Intelligence (2013).
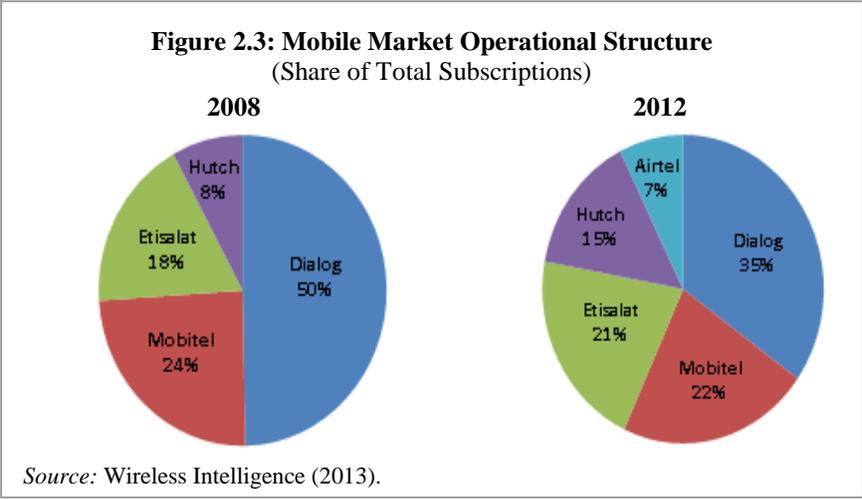
40.   **The sector remains strongly influenced and led by SLT**, not only through its traditional support to backbone infrastructure development, but also in retail as the second largest mobile operator with 22 percent market share, the largest fixed line operator with 44 percent market share, and the largest broadband operator with 79 percent market share.[22] Moreover, SLT controls one of two of the country's cable landing stations with sustained high fees. [23]

D. Sustainability of the Business Model

41.   **Sri Lanka has some of the lowest broadband access prices in the world while maintaining high investment necessary for advanced technology.** The main operators have rolled out nationally available infrastructure, multiple networks and advanced services, while maintaining the lowest prices for broadband in the world, (US$ 10/month for 3G). Traditional methods of maintaining profitability included internal cross-subsidization between voice and data, between business and consumers, and between high speed and low speed. In addition, while five undersea cables are operational, international connectivity is costly due to SLT's monopoly on the landing stations and gateway facilities. There is a significant amount of fiber in the country but it is reportedly under-utilized while the rapid increase of wireless broadband from smart phones is increasing pressure on backhaul capacity.

42.   **Consequently, operators in Sri Lanka question the ability to grow under the current business model despite room for expansion.[24]**. Even as household internet penetration in Colombo is around 27 percent saturated, service providers are now looking to expand into the 12-14 secondary cities of Sri Lanka, and then to rural areas (Table 2.1). Operators have the opportunity to exploit networks and add subscribers but generally from lower income communities which costs more to connect and requires new business models to expand and remain profitable.

Table: 2.1: Households Using Internet (%)	
Colombo	26.9
Gampaha	16.7
Kandy	13.5
Jaffna	13.3
Kalutara	11.6
Galle	11.4
Vavuniyua	9.9
Source: 2012 census	

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[22] Telegeography (2013), Wireless Intelligence (2013).

[23] Economist Intelligence Unit, Ibid.

[24] With the advent of 3G and 4G networks and services, there is increasing migration to "smart" (i.e., IP-based) networks, and access to the Internet will increasingly be via a "smart" device.

43. **New models of competition are being considered with more active sharing of networks instead of forced competition with infrastructure provision.**[25]. It is important to lower international segment prices and ensure redundancy, in part by ensuring open access. There is also a need to bring down domestic leased line prices since the only way to keep broadband prices low over time is to ensure healthy competition and lower input costs.[26]

E. Sector Issues

44. **Telecommunications liberalization has been successful in Sri Lanka but the sector's technological advances mean that key aspects of the regulatory framework need updating.** There is much to build upon going forward given the expertise on the ground in the form of large, stable private sector participants in the sector and technically knowledgeable regulators with at least a decade of experience with a liberalizing market. The market has advanced relatively rapidly within a policy and regulatory framework that needs to be modernized**.** There is limited connection between the successes in the market place and the stated objectives of the regulator.[27]

45. **A visible manifestation of policy lagging the market is that the quantitative milestones for the sector are modest in the face of the expectations, on target, but already obsolete.** Broadband penetration rather than 'data connections,' and other clear definitions, is needed to measure the number of users of high-quality services. While the official figures for "Internet and Email Connections" are not very high, they do not include mobile broadband. Targets also need to be set for broadband services and universal access to Internet services, including for rural areas[28].

46. **Public-private consultative committees have recommended that an updated policy framework address the supply side constraints to ensure quality, affordability and access.** The suggested supply side policy issues recommended for further consideration by the relevant Government bodies and consultative committees include: (i) strengthening and modernizing the legal and regulatory framework; (ii) introducing competition regulation to address issues of dominance and cross-subsidization; (iii) modernizing licensing; (iv) rethinking the approach to universal service; and (v) modernizing spectrum policy.

1. Legal Framework and Licensing Regime

47. **The current policy and basic enabling legal framework served Sri Lanka well but needs to be modernized to lay the foundation for the next generation of sector developments.** The legal framework supporting Sri Lanka's reforms and success over the past 20 years is the Telecommunications Act, No. 25 of 1991, as amended. It focused on principles of competition, high-quality service and universal service. However, the current regulatory system focuses on technical issues from the perspective typified in the analogue, circuit-switched telephony era while today's broadband market is dominated by digital, packet-switched, IP-based mobile communications. Such

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[25] Lanka Business Online. May, 2014

[26] Given the high cost of infrastructure investments, mobile operators in Sri Lanka have opted to undertake passive sharing of network elements, whereby infrastructure such as towers and land (for the placement of telecoms towers) are shared. (Economist Intelligence Unit, October 2013)

[27]For example as expressed in the TRC's 2006–16 development plan.

[28] Broadband policy targets for 2016 and beyond are modest in terms of speed and coverage and have already been exceeded by what is available in the market Even the basic concept of what is considered "Broadband" should be modernized to be characterized as as 5 Mbps and above –the minimum to enable multimedia communication.

convergence in a competitive market place will decrease reliance on technical regulation and put increasing pressure on economic regulation through the application of general competition principles.

48.   **There would also be a significant benefit from modernizing the licensing regime to facilitate market entry in other segments.** The licensing regime for telecommunications is a product of the Telecommunications Act and defines the rights and obligations of network operators and service providers, and includes a definition of which services they can offer and under what conditions. In Sri Lanka, the current technology-specific licensing regime is outdated and not aligned with current technological or market developments.

49.   **The current licensing regime hinders the introduction of new technologies, services and business models** by (i) maintaining archaic industry distinctions that are no longer relevant (e.g., different licenses for data communications and telephone services even though IP-based networking has eliminated technical constraints),[29] (ii) hinders fair and transparent regulation and creates opportunities for regulatory arbitrage, and (iii) has led to perceptions of "ruinous competition" resulting in TRC setting "floor" prices, especially for mobile voice services.

2.   Competition Principles

50.   **Service level and wholesale level competition in the market has been inadequate.** There has been a significant level of "network- or facilities-based competition" between different firms offering the same services over different networks. However, SLT dominates the Sri Lanka broadband market, accounts for about 85 percent of subscribers, and controls the fixed line telephone network - a key channel for broadband delivery. SLT, and to a lesser extent Dialogue, have fiber backbones. Still issues remain regarding infrastructure sharing, leased lines, and own "international gateway" access to submarine cable capacity.[30] There also may be regulatory issues concerning Lanka Bell's underused cable station and Dialog's BBG cable under construction.

51.   **Competition regulation should be considered as a complement and possible replacement for the traditional technical regulation that is carried out today.** Without a competition law of general application, the treatment of anti-competitive behavior within the telecommunication/ICT sector is tasked to TRC under the Telecommunications Act. While TRC is required to "enable a competitive environment and to protect consumer interests," this does not necessarily translate into principles of competition regulation for the sector,[31] particularly as TRC lacks independence of appointment and budget, is not safeguarded regarding conflicts of interest, and is constrained by limited technical capacity in a fast evolving sector.[32]

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[29] Internet protocol based networking, which is service-neutral – allows any type of service to travel over any type of network – and has eliminated technical constraints in providing Internet services over telephone lines or cable TV networks for instance, and even allows Internet service providers to carry high quality voice communication.
[30] Many countries have regulated the opening of the wireline telephone network, which allows service competition between the incumbent and new entrants to provide voice or broadband services over the incumbent's network.
[31] Competition enforcement through the Consumer Affairs Authority Act of 2003 is inadequate for the complex competition issues facing the ICT market. Clarification is needed regarding (i) the definition of anti-competitive behavior, (ii) whether a complaint could be filed by a competitor, (iii) whether the Consumer Affairs Authority is the authority to investigate and adjudicate cases, and (iv) a comprehensive system of sanctions.
[32] Hiring practice for TRC staff generally brings staff from state owned enterprises that are bound by civil service salaries and rules, making it hard to attract and retain high-caliber staff with the proper technical skills.

3. Universal Access

52.   **While Sri Lanka expands broadband services for universal access to the Internet, a key constraint has been the lack of a strategic approach.** Rural connectivity and universal service issues are important to bridge rural-urban digital divides and even national coverage**.** Domestic initiatives are ongoing to expand the reach of high-capacity backbone networks across Sri Lanka with a focus to improve connectivity and prioritization of service delivery to underserved areas. However, service goals and identified mechanisms to attain those goals are needed. The existing funding mechanism - a per-minute levy on incoming international calls - is inefficient, distortionary and easily bypassed since it is based on an outdated notion of international telephony as a luxury.[33]

4. Spectrum Policy

53.   **Spectrum policy defines which spectrum is available for various uses, how this spectrum will be assigned to users, and what the terms and conditions of use are**. A comprehensive spectrum review was undertaken in 2005 leading Sri Lanka to be one of the few developing countries to have "re-farmed" spectrum.[34] However, three important market evolutions suggest a need to review spectrum policy. First, the rise of wireless broadband requires identification of new ranges of spectrum for high speed, mobile data services. Second, advances in technology mean that assumptions about the need to divide and regulate spectrum are being overturned. Wi-Fi networks, which use unlicensed and unregulated spectrum, have been very successful worldwide. Finally, the convergence of technologies means that spectrum policy and licenses should be technology- and service-neutral and should not limit which bands might be used and by whom.

F. Conclusions

54.   **The telecommunications sector has much to build on, particularly given the technology in the country stemming from early policy choices to open up to private participation.** Telephone penetration throughout the country is high and broadband uptake is beginning to take off. The access to international cables, backbone infrastructure being rolled out by leading companies and various technologies through which companies are extending service to the "last mile," bodes well for Sri Lanka's societal and commercial aspirations as a knowledge society. The market boasts professional expertise on the ground, an experienced regulator, and good dialogue between both.

55.   **However, to capture future opportunities, the institutional and regulatory framework will need modernization to keep up with technology and enable future market contestability.** On the one hand, the regulatory has been technically oriented in its policy and interventions, albeit without the benefit of key aspects of modern regulation such as operational independence, market information, and competition principles. At the same time, a number of key policies require assessment, evaluation and updating, including enabling legislation based on a modern broadband policy document, a credible program for universal access and demand enhancement, a competition review of Spectrum policy and a policy on shared infrastructure.

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[33] The current universal service fund was originally intended to be closed down by 2009, based on the levies on international calls being stepped down annually.
[34] 'Spectrum re-farming' is when government-regulated electromagnetic spectrum is reassigned for services with higher value. The users of the existing spectrum are forced out, although they may be compensated in some manner. The frequency bands are assigned to communications services that yield greater economic or social benefit.

A. Introduction

56.   **Globalization and technology have accompanied new forms of production as the division of labor is spread over countries in a supply chain relationship.** These changes have profound impacts on how firms are organized and how business takes place. Such production fragmentation divides up the production process into small parts and spreads them out based on various competitiveness considerations and re-integrates them using information technology, logistics and advanced process engineering. The integrator in this supply chain is the dominance of knowledge-intensive activities and ICT based processes, as firms of all types find better ways of organizing and communicating with the new ICT platforms that now exist.

57.   **Therefore, an increased growth trajectory can occur through the virtuous circle of knowledge-based productivity growth tied to a greater role for ICT in the production process.** ICT in the economy enables productivity improvements in existing activities through better organization, information, and response time -- the key aspects of international competitiveness. These innovative firms attract investment for new activities, products and processes, create demand for technical skills, and encourage the financial sector to take greater risks. Economic expansion, rising exports and better jobs also result from resources moving to new activities, including an industry of ICT products and information technology enabled services (ITES).

B. ICT as a Force in Sri Lanka's Private Sector

58.   **Sri Lanka's budding ICT based economy is small, but growing quickly.** The ICT revolution worldwide has already made Sri Lanka's traditional strengths in education, accounting, science and medicine more marketable worldwide. An emerging ICT industry in software, hardware, consulting, and training is becoming an important knowledge based sector in Sri Lanka and a source of quality employment particularly for young people. Growing at a robust rate of almost 18 percent per year from 2003 to 2013, the total ICT workforce reached 75 thousand, including 6 thousand in Government.[35] Employment in IT companies grew from 7.6 to 34 thousand while the ICT workforce in non-ICT companies increased 6 fold from 6 to 35 thousand (Figure 3.1).

Figure 3.1: ICT Employment in Industry, 2003-2012

Source, Government of Sri Lanka, ICTA, ICT Workforce Survey.

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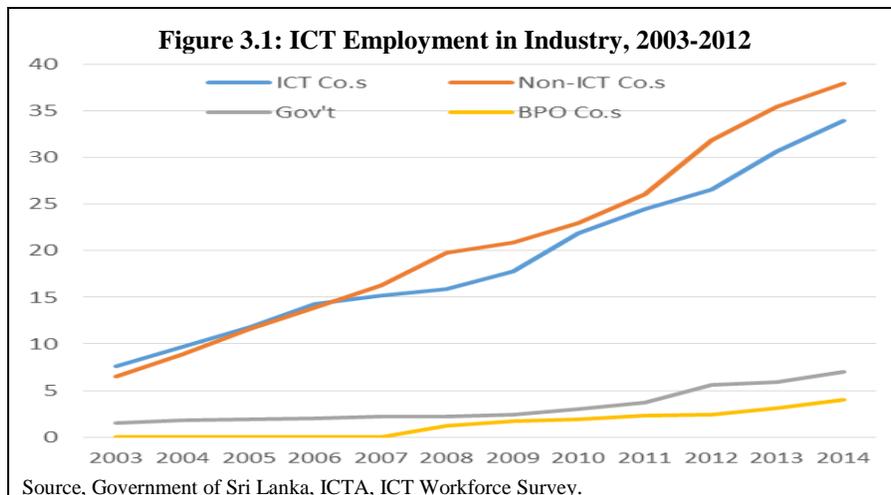
[35] Government of Sri Lanka, ICTA, 2013 ICT Workforce Survey.

1. **The ICT Industry: BPO/ITES, Software, and Consulting**

59.   **There are promising signs of new and globally competitive industries in ICT products and ICT related services.** Among them, activities associated with the Business Process Outsourcing (BPO) and IT enabled services (ITES) sector, which along with software exports, has achieved almost $600 million of exports per year with turnover of over US$ 1billion. The expectation by the industry is that exports of goods and services will rise to $1 billion by 2017 and become a top five foreign exchange earner in the country (Figure 3.2).

60.   **Its industry association, Slasscom, as well as top international observers agree that Sri Lanka is poised as a global player in this industry.** Sri Lanka's geographical location, infrastructure facilities, direct access to the Indian market, high quality workforce standards , open economy and various free trade agreements make it an attractive outsourcing destination.[36] In terms of international ranking: (i) A.T. Kearney ranks Sri Lanka in the top 25 in the world for global service location, (ii) Gartner's 30 leading locations for Offshore services has Sri Lanka included among the top 10 in the Asia-Pacific region in 2010-2011, (iii) IBM Global Locations Trends Report has Sri Lanka ranked at 12th in the top ranking destinations, and (iv) The Global Services top 100 Global Outsourcing Destinations ranks Sri Lanka among the top 10 emerging destinations.

Figure 3.2: ICT Industry's Export Receipts, 2009-2015

Source: Slasscom, Sri Lanka.
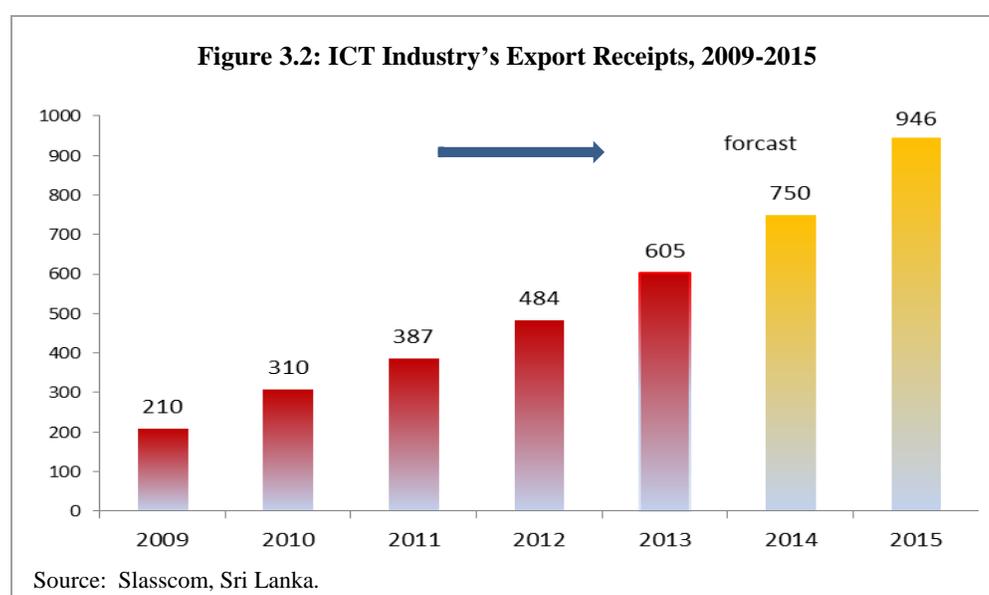
61.   **Certainly the ICT service industry has grown rapidly since 2005 and is poised to continue its world class position.** ICT service exports have grown to around a quarter of total service exports over the period – as compared to exports of ICT related merchandise, which in 2012 was just 1 percent of total merchandise exports. At the same time, in 2005, Sri Lanka did not make the list of the top 40 countries in the A.T. Kearney Location for Global Services Index, and entered at the 29th position in 2007 when the list was expanded to 50. Sri Lanka has since risen all the way to 16th place in 2009 but fell back to 21st place in 2011 (Figure 3.3).

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[36] IBM, *Global Services Destinations Compendium*, 2010.

Figure 3.3: AT Kearney Location for Global Services Index

Source: AT Kearney, Location of Global Services Index, 2012.
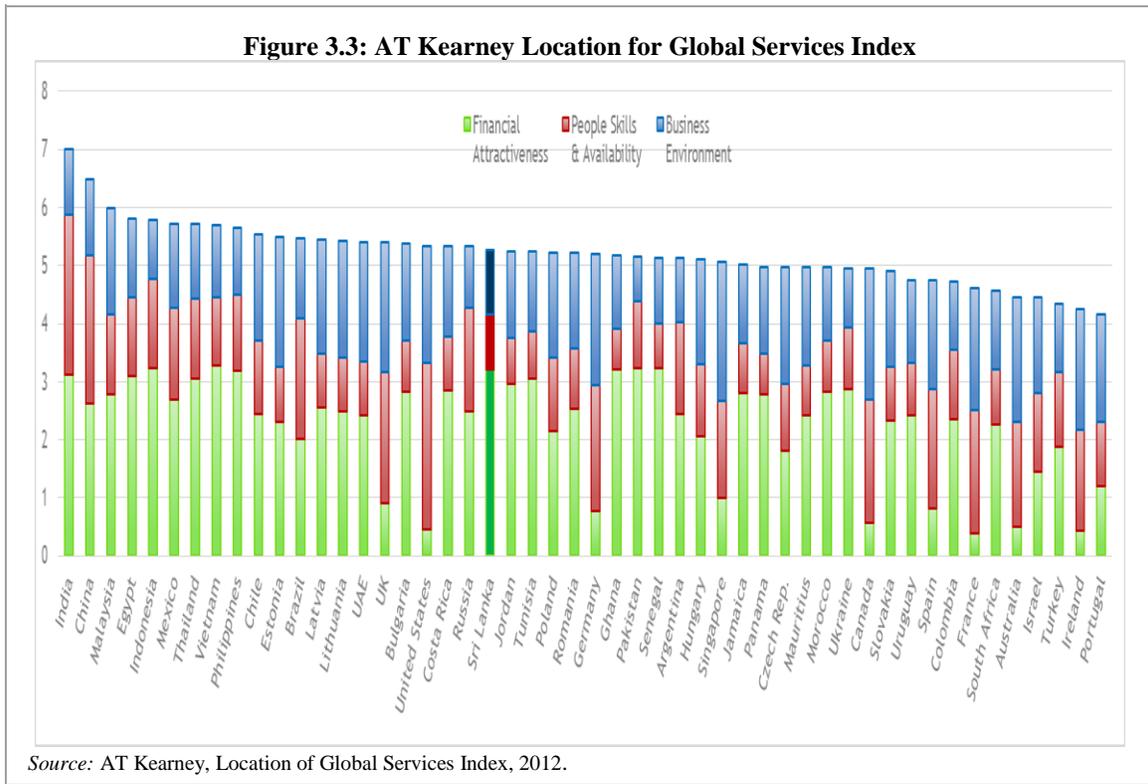
62. **Still, while the country as a service location remains impressive even in the 21ˢᵗ rank, the competitive advantage is primarily centered on cost factors** – particularly compensation costs, (Figure 3.4a). The other two components of People & Skills and the Business Environment is where Sri Lanka is on the much lower end of the ranking. In terms of the People & Skills indicator, the sub-indicators covering *relevant experience and size of labor force*, is holding back Sri Lanka's ranking as compared to countries like India, Pakistan, Vietnam and Indonesia. (Figure 3.4b). The low ranking on the Business Environment component places Sri Lanka with Argentina, Russia, Indonesia and Pakistan (Figure 3.4c). It is questionable how long Sri Lanka will be able to maintain a competitive advantage based only on cost in such a rapidly evolving and ever demanding industry.

Figure 3.4: AT Kearney Location for Global Services Index (components)

a.   Financial Attractiveness

b. People Skills and Education

c. Business Environment
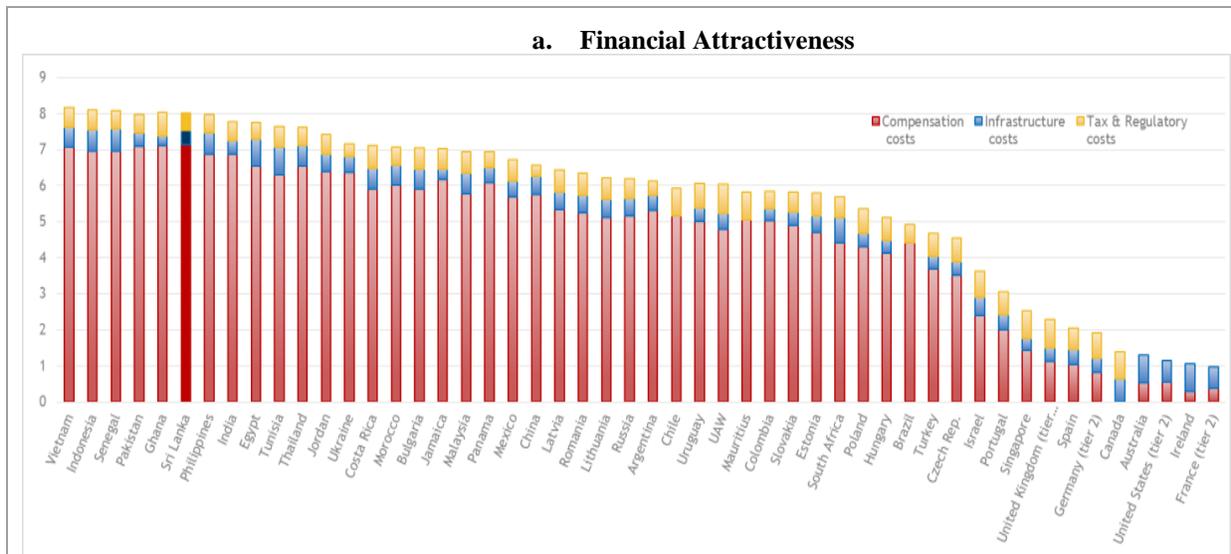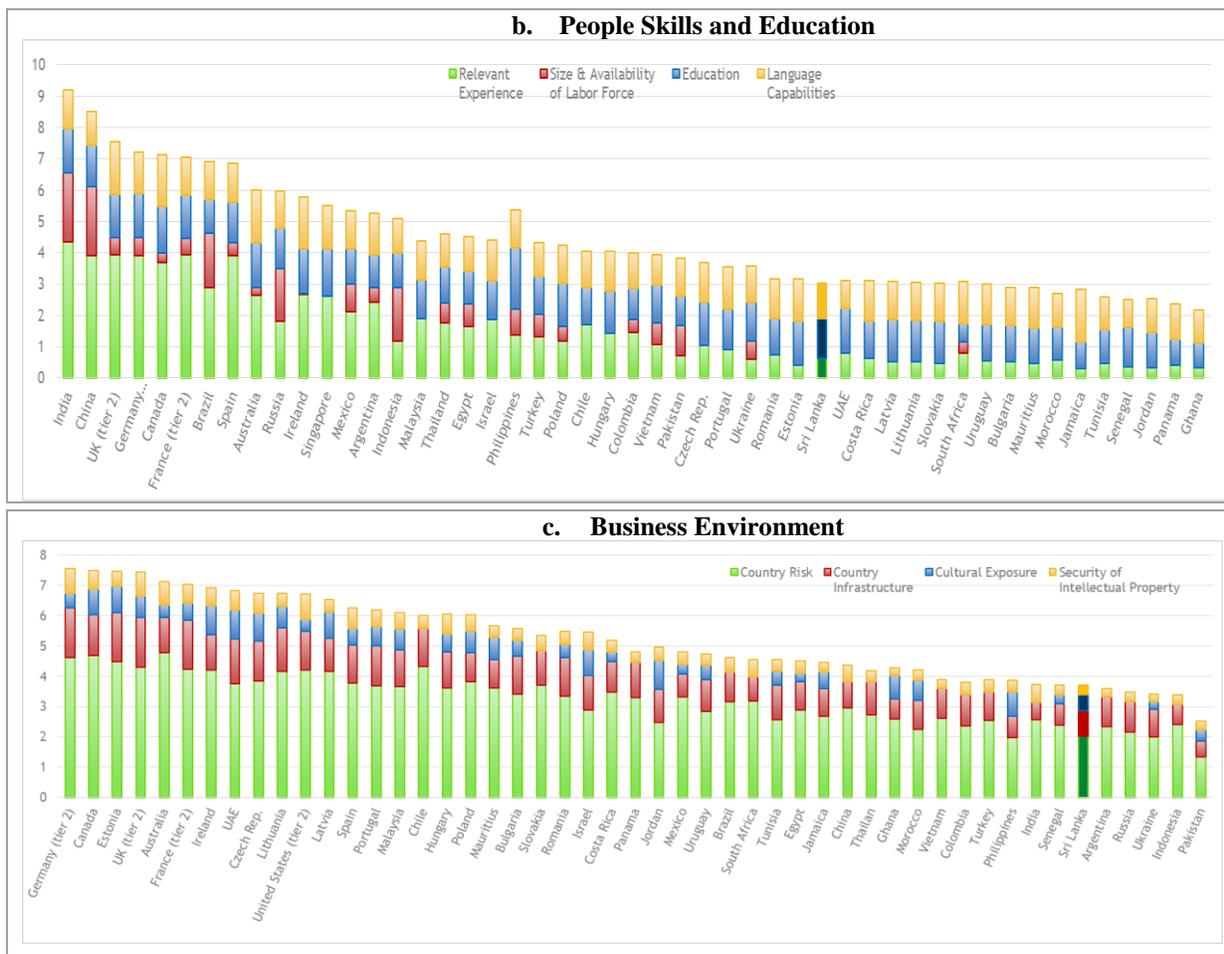
2. Adoption of ICT by Sri Lanka Firms

63.   **Technology adoption by non-ICT firms seems to be relatively weak in Sri Lanka across the spectrum of traditional and non-traditional activities.** Indicators of technology as compared to countries in other regions, and even to countries in the South Asia region, provide an impression that the degree of technology usage by firms is limited and not changing as rapidly.[37] From simple indicators, such as usage of emails and having own web site, to more complex ones such as quality certification and use of licensed foreign technology, the Sri Lanka enterprise sector seems to be at the lower end of the technology adoption continuum (Figure 3.5).

Figure 3.1: Firm Use of Technology
(Percent of Firms Responding Positively)

Source: World Bank Enterprise Surveys, various years.

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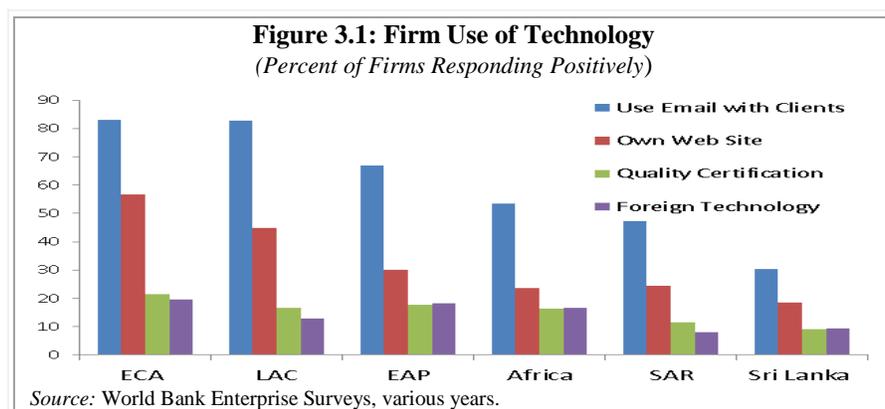
[37] The World Bank, *Island of Prosperity*, 2013

C. Sector Issues

64.   **International benchmarking provides a mixed picture with regard to the degree to which ICT is being adopted in the economy.** Although businesses are not adopting technology as fast as many countries, pockets of export-oriented excellence, in the ICT sector, particularly, are growing rapidly[38]. The experience of Israel, renowned for its innovation society and remarkable outcomes, and an associated reference to Walmart is somewhat applicable to Sri Lanka at its current juncture. The description of successful knowledge activities and lagging domestic oriented sectorsin Israel is intended to demonstrate that for pockets of innovation to lead to shared prosperity, "…strategies should address not only the generation of knowledge but also its destination and ultimate economic impact**"** (Box 3.1). Three aspects of the business environment are noteworthy for these purposes: (i) the role of incentives to innovate, (ii) the investment climate for innovation, and (iii) the level and growth of technical skills in the workforce.

1.   The Incentive to Innovate

65.   **In Sri Lanka, as in the case of Israel, there are mixed incentives for firms to engage in innovation activities, in particular in the adoption of ICT-based solutions.** There are fiscal incentives for ICT firms and ICT use,[39] and the legal system for protection of property rights is strong in providing protection to copywriting of software.[40] On the other hand, the experience of Israel and others demonstrate that firm level innovation and use of ICT in business is a direct function of the competitive forces and technology transfer generated by foreign trade and FDI.

66.   **In term of the incentives to innovate, Sri Lanka seems ahead of other South Asian countries but short of the countries in Europe, East Asia and now Africa and the Middle East.** Three important indicators are relevant in this regard. Foreign trade, which had risen to almost 80 percent of GDP fell to less than 50 percent in recent years. Foreign Direct Investment (FDI) has been limited to telecommunications and BPO, and has not grown to its potential across services and manufacturing (Figure 3.6). Finally, related and correlated to the two prior indicators, producer driven supply chains have seen Sri Lanka as a major component, as indicated by statistical analysis of imports data covering parts and components.[41]

Figure 3.2: Trade and FDI 2000-2012

Trade in Goods as Share of GDP   *FDI as Share of GDP*

Source: World Development Indicators.

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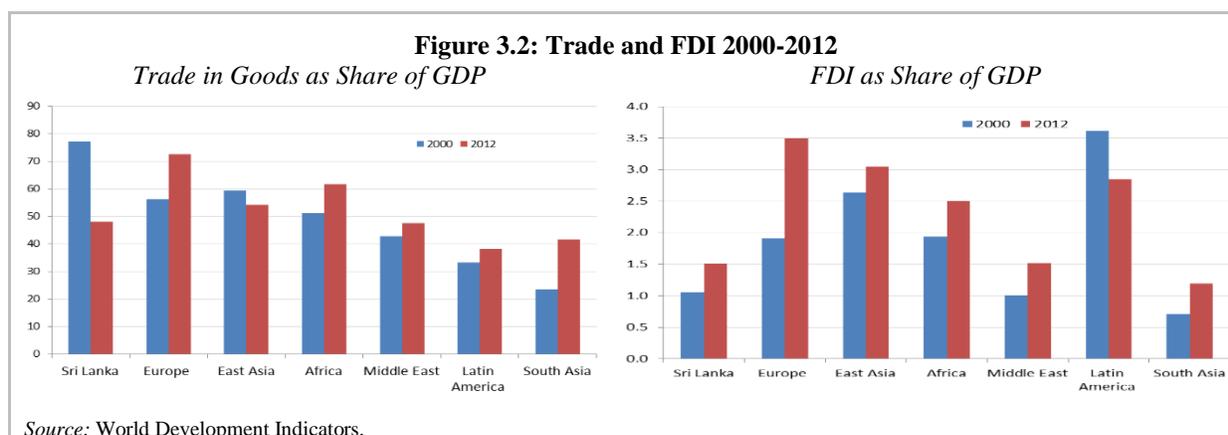
[38] Global firms with international patents are growing, led by Millennium IT which develops software for the London Stock Exchange.
[39] Sales and profits of ICT firms are not taxed and innovation expenses are written off at 300 percent.
[40] Focus group meetings with FITIS and Slasscom.
[41] The World Bank, *Island of Prosperity*, 2013 Ibid.

Box 3.1: Investment in ICT and ICT Adoption - The Examples of Israel and Walmart

Understanding the cases of Israel and Wal-Mart can provide insights on the need for concern over the end destination of knowledge generated by innovations, as much as in the innovation per se. Innovation has been associated with tremendous technological advances that have taken place and in particular in ICT. The preeminent General Purpose Technology (GPT) of our era is undoubtedly ICT, and as such it is enabling and fostering economic growth in developed countries, as well as in many transition and developing countries.

The Israeli economy is a world renowned success in innovation, particularly in ICT. Yet, the benefits from the rapid growth of the High Tech sector eluded the rest of the economy, thus giving rise to a "dual economy" and a mediocre growth rate for the economy as a whole. The following facts and figures summarize the staggering development of High Tech in Israel;

- The ICT sector grew at an average rate of 16% per year, jumping from 5 percent of GDP in 1990 to 14 percent in 2000, and contributing a full 1/3 of the growth of GDP in the 1990s.

- ICT exports grew over the 1990s by a factor of 6, reaching $15 billion by 2000, and accounting for 1/3 of total exports.

- The Venture Capital sector became the 2nd largest in the world after that of the US.

- Israel stands internationally as number 4 in terms of number of patents per capita granted by the US Patent Office to Israeli inventors, after the US, Japan, and Taiwan.

- The R&D/GDP ratio reached a high of 4.6 percent in 2004, the world highest; the number of high-tech companies is estimated at 4,000.

- However, as the ICT sector recently grew at an annual rate of 10.5 percent, the rest of the economy grew at just 2.3 percent with Total Factor Productivity actually *declining*.

In sum, R&D in Israel has been heavily concentrated in ICT and in product rather than process innovations. This implies that most of the Israeli economy has not engaged in innovation, even though its High Tech sector is remarkably advanced. Furthermore, a great deal of the benefits from those innovations flow to firms and users abroad rather than to the local economy because innovations in Israel are aimed for the most part at exports, a significant fraction of the R&D is performed by multinational labs, and over 40% of startups are financed by VCs.. The gap between ICT and the rest manifested itself also in increasing socio-economic inequality, and in fact the overall picture that emerges is that of a "dual-economy which may affect the growth potential of the economy by restricting the future pool of skilled labor and creating frictions and tensions that are detrimental to growth."

In contrast to the Israel example is Walmart. This case illustrates the way ICT can foster economy-wide growth not simply and mainly by innovation taking place in the ICT sector itself, but when a wide and ever expanding range of *other* sectors adopt the advancing ICT and consequently improve their own productivity. A telling example is the revolution in retailing brought about by Walmart, primarily via the massive adoption of ICT-based methods. In fact, the gains in productivity of the retailing sector by itself made a sizable contribution to the total productivity growth of the US economy during the second half of the 1990s.

The two cases provide a cautionary tale of the limitations of even the most successful innovation strategy. In a global economy, innovation strategies should address not only the generation of knowledge, but also its destination and ultimate economic impact.

Source: Adapted from Manuel Trajtenberg, *Innovation Policy for Development: an Overview*, 2006

2. The Business Environment for Knowledge Based Activities

67.   **The investment climate as it relates to ICT and other knowledge based activities has undergone key changes in the past decade and presents a mixed picture for the private sector.**[42] On the one hand, the concerns expressed by incumbent firms seem to now reflect the growing pains of the transition to a more formal, knowledge based economy. Issues with i*nfrastructure* - electricity, roads and transport, and telecommunications - that have been at the forefront of concerns have improved (although power remains a top issue). However, *public administration* – tax, licensing, and land are growing sources of concern as formality becomes more prevalent. *Labor regulations* have become less important while apprehension regarding the *availability of labor skills* is growing, reflecting constraints of a more sophisticated level of production (Figure 3.7).

Figure 3.7: Investment Climate in Sri Lanka
Share of Firms who Say Issue is Barrier to Productivity, 2003 and 2011

Source: The World Bank, *Enterprise surveys for Sri Lanka*, 2003 and 2011.
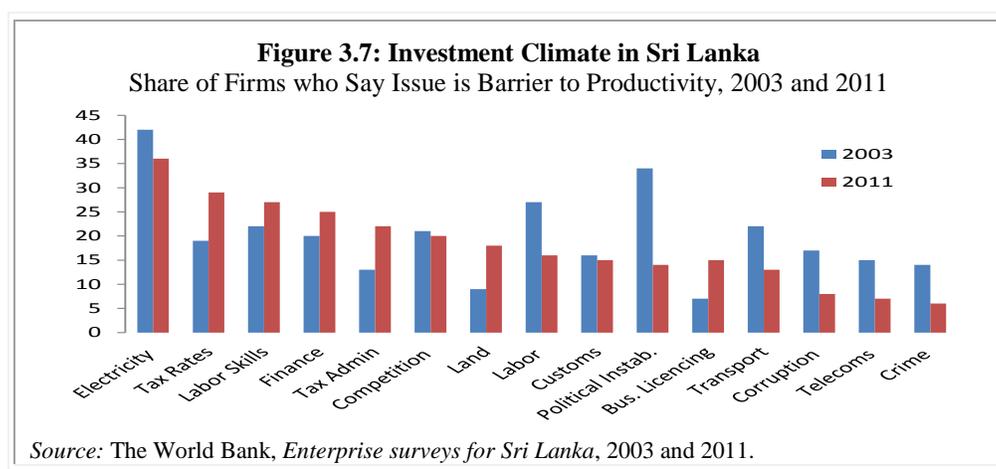
68.   **A similar picture emerges when looking at the degree to which business rules and regulations have adjusted over time.** In areas such as *starting a business, and trading across borders,* Sri Lanka's already strong time and cost performance has steadily improved. The improvements, which have taken place in a*ccess to credit* and *protecting investment,* are also important to knowledge based firms. On the other hand, three key areas affecting formality and risk taking - *paying taxes, contract enforcement and insolvency,*have remained as challenges and open to reforms, signaling possible policy issues that need to be investigated. (Figure 3.8).

Figure 3.8: Doing Business Distance to Frontier, 2005-2013

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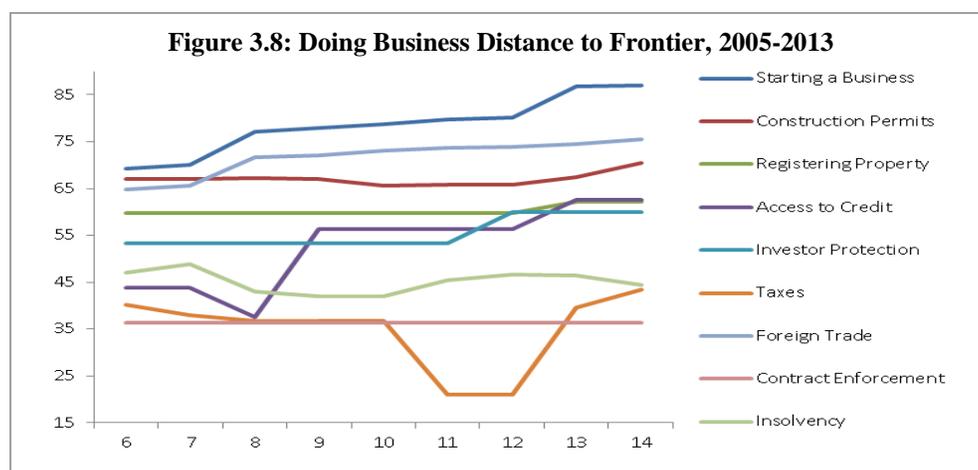
[42] Enterprise surveys provide the snapshot of the firm's view of the strengths and weaknesses in the domestic economy as viewed by the incumbent firms themselves.

3. The Talent Pool and Knowledge Based Skills

69. **International benchmarking revealed a key professional gap for Sri Lanka's aspirations for knowledge based activities: advanced technical skills.** While the strength and sophistication of Sri Lanka's labor force have been cited as having positive traits stemming from a tradition of mandatory universal education and productive employment, there are gaps in the talent pool reported not only by domestic firms as described above, but in an international context. Of the 60 countries benchmarked by the EIU Global Talent Index that measures a country's capacity for developing, attracting, and retaining talent, Sri Lanka was 59th in 2011 (Figure 3.9). It is projected to rise by two places in 2015, surpassing Azerbaijan and Algeria while also staying above Nigeria.

Figure 3.9: Global Talent Index Countries Ranked #25 - #60, 2012

Source: Text.

70. **The factors behind Sri Lanka's ranking include a sophisticated workforce, good environment for talent, and strong compulsory education, but low scores for university education.** Along with the low score for openness and demographics, Sri Lanka's place in the rankings is determined by the 0 score for university education and the minimal score for the country's ability to attract talent (Table 3.2). This large shortfall in workers with advanced degrees and training comes from two ends of the system: (i) not enough students in college and beyond, and (ii) too much of the trained talent residing outside of the country.

Table 3.2: Global Talent Index - By Components, 2011

	Overall Score	Demograph.	Compulsory Education	University Education	Quality of the Labor Force	Talent Environment	Openness	Attracting Talent
India	40.5	75.4	32.0	15.2	84.0	44.4	34.3	19.7
Malaysia	40.1	37.7	53.7	30.0	54.2	51.4	25.7	24.3
Mexico	39.7	35.4	62.9	19.2	44.1	55.6	52.8	23.7
Philippines	37.6	44.6	42.7	14.2	49.0	51.4	53.3	20.0
South Africa	37.4	20.6	62.2	21.1	46.2	69.7	38.1	25.7
Turkey	35.0	35.6	53.7	28.0	40.1	47.2	34.9	7.0
Egypt	32.8	41.0	44.4	19.1	25.7	47.2	36.1	36.7
Vietnam	30.7	40.5	59.8	24.4	24.2	38.1	24.7	17.7
Pakistan	27.0	55.3	9.8	5.4	29.9	38.1	51.1	20.2
Indonesia	26.5	38.8	58.3	11.7	25.4	29.2	18.6	19.0
Sri Lanka	26.3	16.4	64.1	0.0	44.6	41.7	35.3	1.2

Source: Economist Intelligence Unit.

71.   **The severity of the tertiary education gap, as a binding constraint to Sri Lanka's aspirations of being a knowledge-based economy is seen clearly through the gross enrollment rates for 2012.** Sri Lanka's secondary enrollment rate nears 100 percent and rivals the most advanced nations, surpassed only by Estonia and Costa Rica among 26 comparators. However, this achievement is in sharp contrast with tertiary enrollment rate. With 125,000 students passing exam based qualifications for public university for only 25,000 places, and only 10 percent of university entrants enrolled in the science, technology, engineering, and mathematics (STEM) subjects**,** there are severe supply constraints. Sri Lanka's enrollment rate is only 17 percent, better only than the four countries at the lowest end of the secondary scale: Kenya, Bangladesh, Pakistan and Mozambique (Figure 3.10).

Figure 3.10: Secondary and Tertiary Gross Enrollment Rates, 2012

Source: ITU.
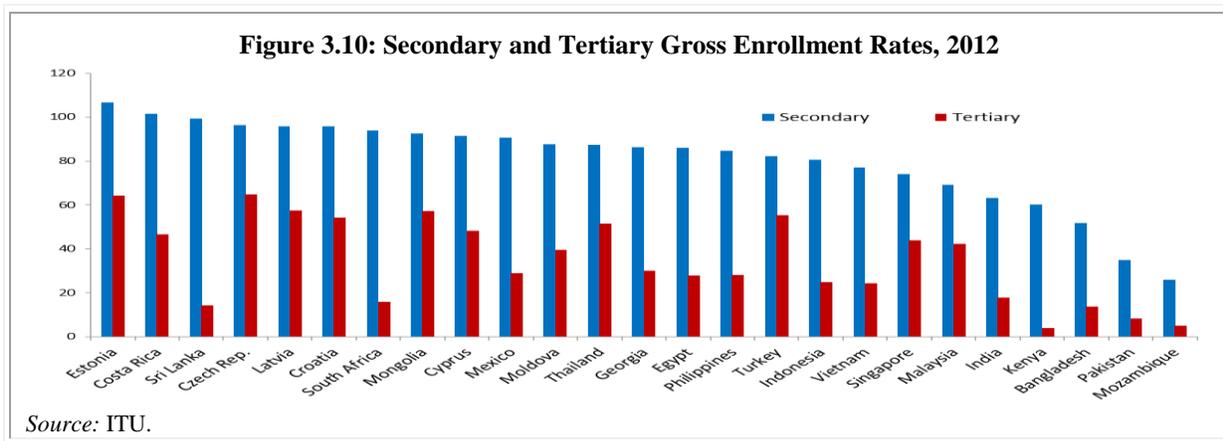
72.   **Given the urgency of the issues, the Sri Lanka authorities are urgently focusing on raising the technical capacity of the workforce in three fundamental ways.** First, tertiary enrollment rates are targeted to rise from the current levels by investing more in terms of capital expenditures and by attracting a greater number of technical teachers on a full or part time basis in the 17 universities. Although the Advanced Technical Institutes (ATIs) have been increasing enrollment and may double the number of entrants, there would still need to be better monitoring of outcomes. Second, technical skills are being upgraded for all fields so that basic mathematics and computer science is embodied in all tertiary graduates, regardless of field, with a goal of making them more 'employable.' Finally, a more active role of private and semi-private technical education outside of the public universities is being pursued along with innovations using distance learning, massive open online courses, and partnerships with ICT vendors (for example with Intel, Google and Cisco).

D. Conclusions

73.   The Business of ICT is seen through two lenses. The first relates to a set technology based firms in the ICT industry that provides employment opportunities, a source of valuable exports and an incentive for workers to obtain technical skills. The second lens from a development perspective considers ICT as a tool for all firms to participate in the new economy with new ways of organization, information sharing and competing. Sri Lanka has made impressive gains in the first area and now commands admiration as a world player in the international market. The challenge for policy makers is how to encourage these gains to spill-over to the economy as a whole through programs and policies that create incentives to innovate, establish a good business environment for knowledge based activities, and invest in STEM based tertiary education.

CHAPTER IV: E-GOVERNMENT AND DIGITAL SERVICES

A. Introduction

74.   **Among the many ways society benefits from ICT (e.g. communication, innovation, entertainment or social media), accessing public services is powerful and transformational.** Digital services provided by and supported by the government, particularly at local levels, stimulate public demand for the Internet and get the population "on-line." Success in getting society on line in turn encourages businesses to innovate by adopting technologies to provide their own digital services. Governments play multiple roles in the provision of digital services.

75.   **The public sector, through policy, regulation as well and government activities plays a large and positive role in facilitating the use of digitally enabled services throughout society.** The public sector ensures a good network infrastructure (discussed in Chapter II), a good business environment (discussed in Chapter III.), and public and semi-public services (Discussed in Chapter IV). A positive role of Government is as an enabler for the private sector and civil society to use digital services has been through promotion of good governance, awareness building among citizens, and the facilitation of collective goods (i.e. platforms, cyber security, disaster contingencies, etc.); In this first role, the public sector establishes policies, regulations and the institutional framework needed to govern the new world of digital services.

76.   **In many countries, the public sector has played a second role to enable and even kick start ICT use, by demonstrating benefits of ICT based services in serving the public interest.** Geographic dispersion, demands for better public administration, and rising needs of citizens from all dimensions of society calls for an ICT-based approach in the public sector in order to raise the effectiveness, timeliness, and safety of the Government response to citizen needs. Therefore, as a user of ICT for its own efficiency and service delivery, the public sector can strengthen its own governance and better serve citizens and businesses.

77.   **Given the lack of a defined recipe for success, learning from the experience of other countries can help avoid common mistakes in deployment of e-government systems.** These mistakes can be very costly, particularly at the infrastructure and architecture level. One of the most commonly cited and admired examples of a government led e-governance approach to public sector services has been the case of Estonia, which, along with Singapore, finds itself at the top end of practically all rankings associated with the adoption, usage and application of ICT solutions. The much heralded case of *e-Estonia* is provided below (Box 4.1).

Box 4.1: Country Profile – Estonia

When Estonia declared its independence in August 1991, few would have predicted that in the short span of 15 years Estonia would rank as one of the leading countries in the networked economy. The power of visionary political leadership combined with strong public-private partnerships has been demonstrated in Estonia's rapid transformation over the last decade. Today Estonia has become a role model and has triggered a surge of interest in the potential of ICT for development within other nations. Estonia cannot rest on its laurels, however. It faces significant challenges in sustaining its position of e-leadership in the networked economy of the future.

"The key message we can teach is that e-government is not only making governance more effective and transparent, but it gives the possibility to develop a real partnership between the government and people".
— Mart Laar, Prime Minister (1992–2002) of Estonia.

Policy Goals

- *E-services*: developing e-services for citizens, the business sector, and public administration.

- *E-democracy*: creating ICT solutions that can help the development of e-democracy.

- *Public-sector*: increasing the effectiveness of the public sector.

- *E-education*: increasing the computer literacy of the population.

- *E-security*: improving and developing the Information Technology Security Policy.

- *International reputation*: A nation with rapid and effective ICT development.

- *E-involvement*: increasing the opportunities for society to use ICT and digital solutions.

E-Services

- *Income tax declaration:* Electronic ID cards provide a safe way to access private data so that citizens can declare their taxes, have constant access to their files and submit VAT requests online.

- *Social security:* Forms and regulations about the social security system are accessible on the Estonian social fund website. A dedicated portal gives practical information about social rights and obligations of people living in Estonia as well as tips to deal with Estonian institutions.

- *Family subsidies:* The online Parental Benefit service allows people to submit applications for the family support program. The entire system is connected to different state databases and eliminates the need for citizens to submit data already known by the state.

- *Medical insurance:* Electronic ID cards allow citizens to use e-services available through the national portal to check the validity of their health insurance, their address (and if necessary they can correct it), the name of their family physician, and the payment of sickness benefits.

- *Library services:* The complete catalogue of books available in Tallinn libraries is available online. It is also possible to reserve the books online.

- *Education:* It is possible to enroll online in higher education institutions. The processing, decision-making, and informing students of their acceptance (or otherwise) is made in a single environment on the Internet.

- *E-voting:* Voters use the Internet for voting in local elections. Voters are authenticated through their electronic ID cards and their selections are confirmed with their digital signatures.

B. Benchmarking Sri Lanka's Accomplishments in Digital Government

78.   **By benchmarking Sri Lanka's experience with digital government against its international peers, the various components can be unbundled and analyzed,** keeping in mind that all experiences are unique. The United Nations (UN) international survey of e-government for the 193 Member States of the UN provides a useful basis for assessing the e-government in Sri Lanka. The survey benchmarks countries every other year to present a systematic assessment of the efficiency, effectiveness, transparency, and accountability involved in public service access and citizen participation. Three of the five sub-indices are highlighted for the analysis - infrastructure, human capital and on-line services.

79.   **During the early years of Sri Lanka's E-Government program, the index rose more slowly than its peers, and so Sri Lanka experienced a sharp fall in global rankings.** The index started at 0.39, ranking it 95th in the world in 2005, and rose to 0.42 in 2008 and then to 0.44 in 2012 (Figure 4.1). Since other countries' index rose faster in that period, Sri Lanka's global ranking fell 20 places to 115th in the world. In 2014 Sri Lanka's index rose to 0.54 and led to a remarkable 41 place jump to 74th in the world. As a result, Sri Lanka's e-Government program is ranked well ahead of other South Asian countries and in the neighborhood of market leaders such as Egypt, Turkey, Moldova and Mexico.

Figure 4.1: E-Government Index (2005, 2008, 2012 & 2014)

Source: United Nations Public Administration Network, E-Government Surveys.
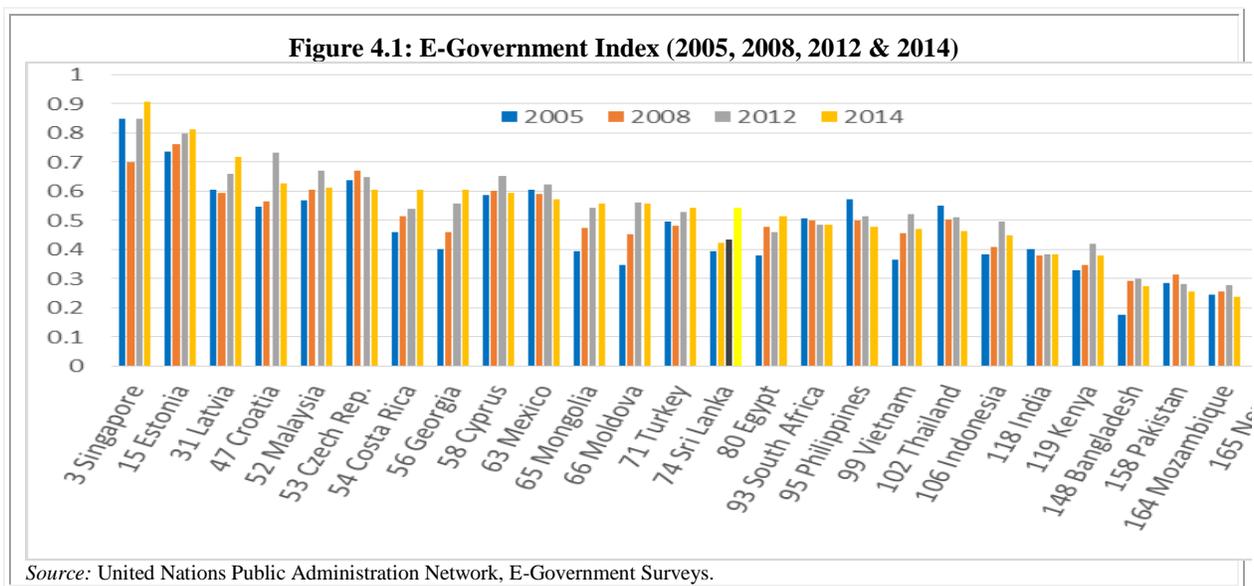
80.   **Unbundling the components of the e-Government index reveals important dimensions of Sri Lanka's e-Government program.** The sub-index covering infrastructure improved early in *the program, rising from a very low level of 0.04 (ranked 135) in 2005, to 0.19 (ranked 116) in 2012* and then to 0.24 in 2014. (ranked 118).[43] Sri Lanka remained ahead of other South Asian countries and at similar levels to Mongolia, Thailand and the Philippines. Other comparator countries including Mexico, Turkey, and Moldova achieved scores above 0.3, while Vietnam, which started at Sri Lanka's level, reached a score near 0.4 (Figure 4.2). On the other hand, the decline in the sub-index covering human capital is also significant as the absolute score deteriorated between 2005 and 2014 and caused the ranking to drop 23 places from 97 (0.83 score) to 120 (0.74 score).

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[43] The increased ranking was on the back of a rise in Internet penetration from 158th to 127th (2 to 12 per 100 people) and mobile usage from 115th to 110th (26 to 83 per 100 people).

Figure 4.2: Infrastructure Service Sub-Index (2005, 2008 and 2012)
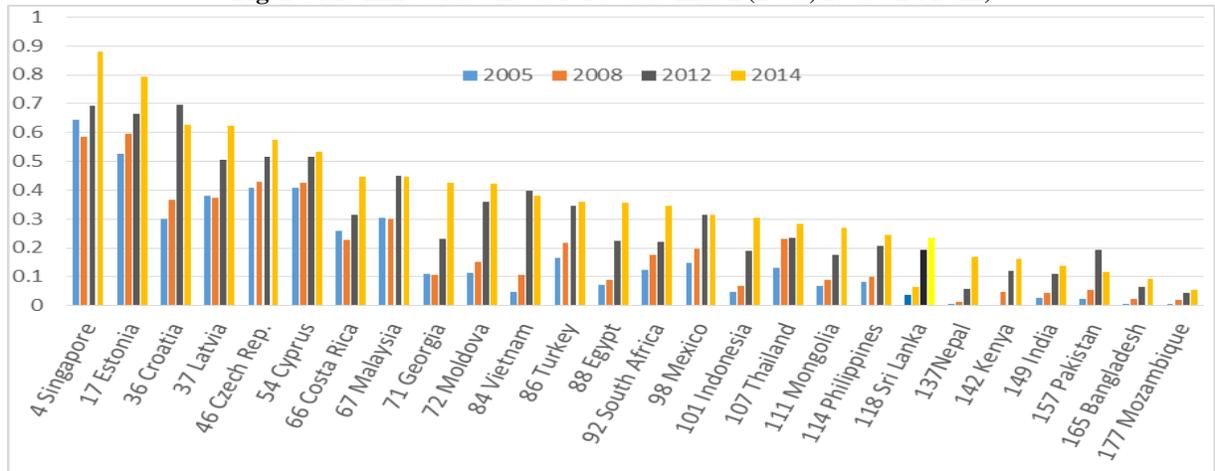
Source: United Nations Public Administration Network, E-Government Surveys.

81.   **The recent improvement in the e-Government index reflects, primarily, a dramatic jump in sub-index covering on line services.** In 2008, Sri Lanka ranked 81ˢᵗ in the world but the index fell through 2012. However, in recent years, considerable effort was made in establishing the online portal which now offers 108 e-services for citizens, 51 e-services for businesses and 10 non-residence related e-services. The portal's extensive mobile and SMS options make the services, information and government forms easily accessible to anyone in the country. As a result, Sri Lanka's ranking for online services jumped to 38ᵗʰ in the world alongside strong e-government countries, Mexico and Malaysia, and ahead of Costa Rica and Mongolia (Figure 4.3)

Figure 4.3: Online Service Sub-Index (2005, 2008, 2012 and 2014)
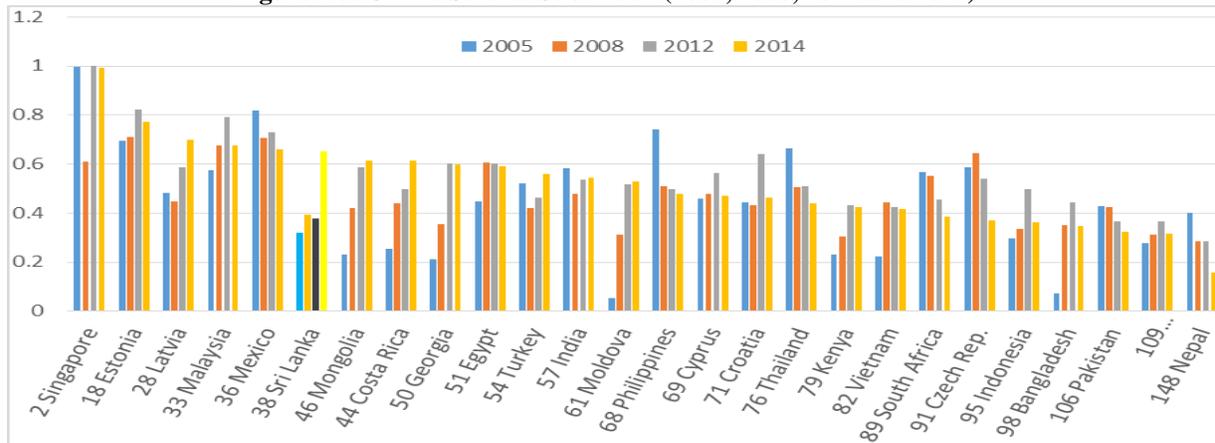
Source. United Nations Public Administration Network, E-Government Surveys.

82.   **A decline in the human capital sub-index is noteworthy and calls for further examination given the tertiary education issues discussed in Chapter III.** Between 2005 and 2012, Sri Lanka's ranking fell 23 places from 97 (0.83 score) in 2005 to 120 (0.74 score). The fall reflects the global trend of falling human capital scores for the most countries since 2008, but in Sri Lanka's case the fall was further than most and so the ranking fell as well. Despite the tremendous increase in ICT literacy, the low and declining enrollments rates at the tertiary level, discussed in the previous chapter was the principal source of the weakness in the human capital sub-index

83.   **The benchmarking confirms that better infrastructure and improved online services are necessary but not sufficient conditions for increased participation by the population.** Between 2008 and 2014, the *e-participation sub- index* declined from 0.145 to 0.099. E-participation as "next generation" public administration is a more advanced stage of online service and is the result of adoption of a digital approach for public sector interaction with citizens. However, despite the availability of services and accessible infrastructure, the *e-participation sub- index* declined from 0.145 to .099 between 2008 and 2014 – a paradox which requires investigation in order to understand reasons behind the low level of citizen participation.

C. Digital Government and Services

84.   **Digital government can foster efficient service delivery, a responsive business climate and good governance if accompanied and driven by reforms in public administration.** Across the world, public administration reform has been a powerful process of transformation for governments toward goals of efficiency, accessibility and transparency. E-government and the associated digital applications can help to foster this process by increasing the speed of operations and managing the increasingly complex government services and administration. In doing so, E-Government also fosters predictability, certainty, and cost effectiveness regarding government regulatory functions which is a key dimension of a conducive business climate. Finally, digital government becomes a key element in a citizen centric approach by allowing two way interactions between citizens and government in which there is improved service delivery to citizens and improved feedback to government.

85.   **ICT applications can contribute to the goals of improved public administration and service delivery in a multitude of ways and through various configurations.** While the number of approaches to the deployment of digital services is as high as the number of countries who have tried, a few principals are commonly held**.** First, '*back office'* efficiency starts with good internal processes and interconnectivity within the public sector. Second, *'front office'* digital delivery of public service can provide the benefits of inclusiveness, equal access, and lower transactional costs for citizens. Business Process Reengineering (BPR) is an important element of both, as paper-based processes yield to a new way of operating in which technology drives how customers are served and institutions are run. As a result, the red-tape and cashier level corruption that is so annoying to business is reduced. Moreover, e-government contributes to greater ICT penetration and literacy as citizen interaction with government increasingly happens "online."

86.   **Optimally, citizen engagement with Government through digital means involves a virtuous circle of experimentation, feedback and adjustment** (Figure 4.4). Specifically, this approach requires (i) a policy and regulatory framework that is calibrated to an overarching vision, (ii) a strong, accountable and transparent set of institutions to implement the policy, (iii) infrastructure and shared services to enable the interactions needed for service provision, and (iv) ultimately, an expanding set of good, reliable and cost efficient public sector services for businesses and citizens. Citizen feedback then provides the force which causes the wheels to turn. The framework as it has been applied to digital services in Sri Lanka is described in more detail below.


Figure 4.4: An Interactive Conceptual Framework for Digital Services

Services

Vision

Citizen¶

Infrastructure and its architecture

Policy and regulation
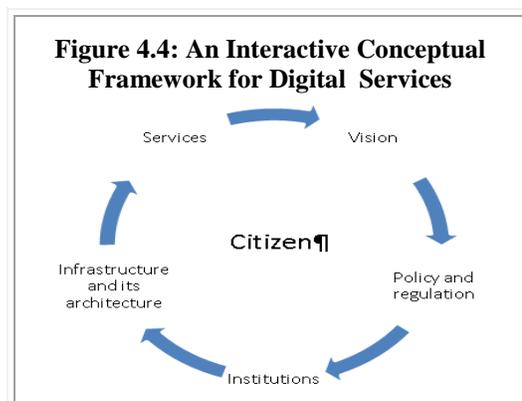
Institutions

1.   The Policy and Institutional Framework for Digital Government

87.   **Based on the vision of a knowledge based society in the public and private sectors, Sri Lanka was an early mover in seeing the power of ICT to enable public service reform.** Given the perceived positive externalities and the national interest from ICT adoption in society, the Government led the early stages of the ICT adoption effort as a facilitator, demonstrator, and catalytic force to foster societal change. In 2003, a unique ICT law was passed in Sri Lanka which was designed to set up an inclusive, extensive and powerful institutional and legal framework for reforming government and consequently bringing to bear ICT in the country. The law sought a comprehensive ICT Policy for the country along with an action plan to implement it though an oversight committee of high level Government officials, a consultation mechanism with industry and academia, and a body of dedicated technical specialist drawn from the private sector.

88.   **The institutional framework was set up over the 2003-09 period with a view to implement the ICT Law in concert with a program of public administration reform.** The Memorandum on "Re-engineering Government" was issued in 2006 as the policy framework the digital government program. The policy was meant to be (i) a requirement on public entities to ensure quality public service delivery using all ICT channels, particularly through mobile technology, (ii) a comprehensive architectural framework for managerial and organizational aspects of governance and service provisioning specified along with rules regarding ICT usage, and (iii) a program of ICT capacity building for public sector employees.

89.   **However, the policy and institutional framework lacked the necessary force for a comprehensive transformation program to be carried out as envisioned by the ICT law**. The program introduced the National Administration Reform Council (NARC) in 2009 as a high level body to coordinate public administration reform, but it never met. Under the NARC plan, Ministerial Reform Cells (MRCs) were meant to design and drive administrative reform programs for each ministry. Chief Information Officers (CIOs) would support MRC driven plans with ICT solutions. Improved service delivery was to result from Business Process Re-Engineering (BPR) in the public agencies, which would be automated by application of ICT based solutions (Figure 4.5 and Box 4.2).

Figure 4.5: Sri Lanka's Conceptual Architecture for Digital Government
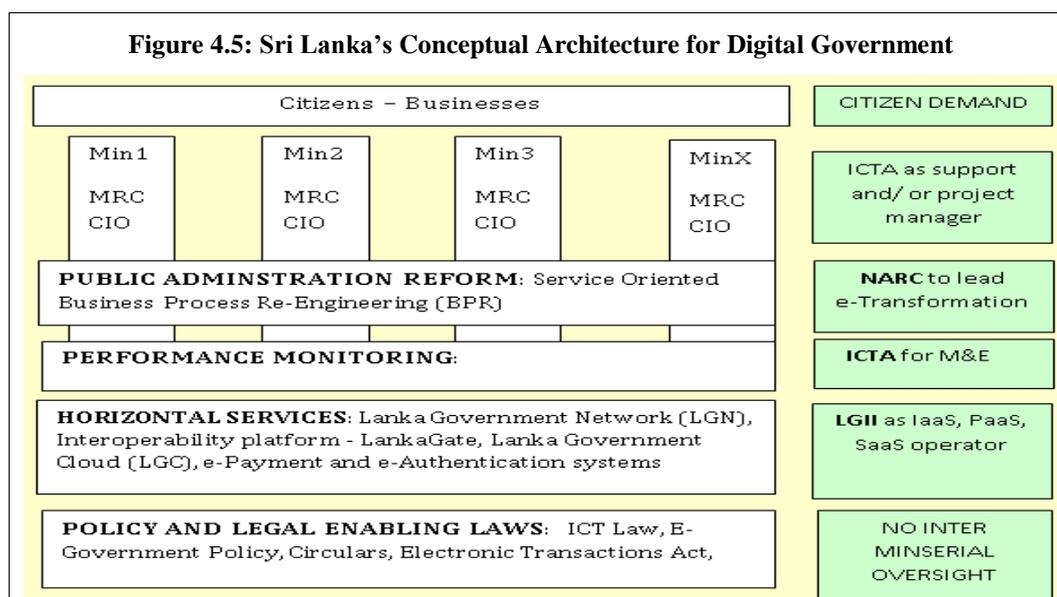
90.   **The institutional framework, while a new approach in 2003, was not easy to activate, particularly as effort to mobilize a top down program of public service reform was not successful**. The NARC and MRCs did not activate and public service reform did not materialize consequently. Simultaneously, policy memoranda were unable to provide the catalytic force needed to push through novel administrative reforms and better service provision. Through the policy, the champions tried to mobilize support for e-transformation, define priorities in applying ICT to government processes, strengthen coordination, and specify standards for ICT usage in the public sector, but lacked the institutional backing needed for such a comprehensive change in Government.

2. *Horizontal (Shared) Services*

91.   **The horizontal or shared services form the critical building blocks for e-government systems on a national level.** In Sri Lanka, horizontal services consist of many layers for use across the government in order to support government wide interaction and coordination. Indeed, the strong effort to build government wide infrastructure, coupled with the national outreach, is reflected in Sri Lanka's strong scores for infrastructure. The principal horizontal systems which have been set up over the past decade are: (i) the network, (ii) the portal and gateway, (iii) the network operations center, (iv) the interoperability framework, (v) e-authentication, (vi) e-payment, (vii) local language enabler, and (viii) the government cloud services. Each is described below.

- *Lanka Government Network* (LGN) is the underlying information infrastructure that connects all government organizations. It enables cost-effective and secure provision of Internet, Email and IP based voice services, and addresses government's LAN network.

- *The Lanka Gate Infrastructure* comprising country portal, Internet and mobile payment gateway (Lanka Gov. Payment Service), SMS gateway—collectively provide an enabling infrastructure for rapid deployment and integration of electronic services.

- *A centralized Network Operation Center* (NOC), functions as the government operator with LGN and LGC as public infrastructure to ensure good sustainability and low costs.

- *Lanka Interoperability Framework* (LIFe), establishes general data architecture and standards for data exchange for the government of Sri Lanka. *Lanka Gate* is presented as the next generation interoperability framework to build collaborative government v2.0.

- *E-authentication* requires the Department General of Registrar digitizes all registries under development since 2006 while. The introduction of the "eID card," will enable holders to securely authenticate themselves when using an online service.

- *E-payment* is advanced and regulated with institutions created for e-payments to work securely in different ways based on a conducive environment established by the regulators.

- *Local Language Enabler Standardization* of electronic use of languages in Sri Lanka's language environment was needed to increase nationwide accessibility.

- *Lanka Government Cloud (LGC)* is a private government cloud (launched in August 2012) that offers storage and capacity to public sector clients in a cost-effective and timely manner.

3. *Digital Services*

92.   **Along with good infrastructure, the improvements in the everyday life of citizens from e-Government is ultimately based on relevant digitally provided services.** Services and regulatory functions delivered electronically contribute to good governance while the quality of service provision rises. At the same time, interactive public service delivery would improve ICT literacy and increase use of the internet. The public, government, and businesses would be encouraged to use ICT based on the key principals driving the digital service provision:

- Client-focused rather than organization-centered processes,

- Government accountability for service level standards to its clients,

- Electronic sharing of data across agencies,

- Separation of service delivery (front-end) from transaction processing (back-end),

- Online, user-friendly, distance-neutral information and services to citizens, and

- Transparency in government operations.

93.   **When Sri Lanka began introducing e-government in 2003, the concept of digital services by Government was novel and unknown to the population**. The approach was to seek early wins through digitizing high profile life events such as access to birth and death records, pension payments, and burdensome transactions. The Colombo Municipal Council (for payments of property, trade and business taxes), the Employment Trust Fund (for ETF member management service, viewing ETF balances, viewing claim application status) and the e-Revenue License (the first transactional digital service) were chosen as a good place to start (Box 4.3).

Box 4.3: Public Sector Digital Services - A Good Start

Colombo Municipal System. The online rate payment system that was introduced in the Colombo Municipal System has enabled Colombo city residents to pay Rates, Trade Tax, Tax on Business, Market Rental, House Rental, Shop and Boutique rental and Hawkers rental. This 24 hour e-service has allowed tax payers to make payments via Internet or mobile easy cash, thus saving time and hassle

Western Province Motor Commissioner's Department. The e-Revenue License (the first transactional e-service) created the path to accepting electronic payments for government services. Implemented in the Western Province (2010) where approximately 5000 revenue licenses in 38 DS offices have to be renewed on a daily basis and is now being replicated in the other provinces. With automation, all DS office are connected by LGN, and the issue of a license has been reduced to 90 seconds on average.

Department of Land Commissioner. A majority of the land is owned by the state and managed by the Land Commissioner, who delegated land identification and preparation of land alienation proposals to the respective Land Field Officers of the Provincial Land Commissioner attached to DS offices. Previously a citizen's land application required the Field Officer to visit the location and submit his recommendation to the Divisional Secretary who in turn submitted the same to the Provincial Land Commissioner and thereafter to National Land Commissioner for approval. This process took 6 months. With automation, the time for approval has been reduced to 2 weeks and the applicant can track progress of the application, receive an alert message on the mobile phone at each of the approval stages. Land title deed extracts can be obtained in 30 minutes as compared to 2 days prior to this intervention.

94.	**Since then, e-services were initiated by various agencies – some based on nthe centralized system and some based on a parallel network.** Despite the lack of a broad based effort at public service reform, digital services were launched by ministries which themselves championed specific activities and outcomes. For example, the Ministry of Education, the Ministry of Higher Education, Inland Revenue, Customs Administration, the Foreign Ministry and the Central Bank are each pursuing key digital services at different stages of implementation and launch.

- *The Ministry of Education* implemented a school network (Schoolnet) and provides primary connectivity to schools. The network offers services to parents, students, and teachers.

- *The Ministry of Higher Education* launched the National Online Distance Education Service as a dedicated nation-wide telecommunication network connecting participating universities within a targeted set of 26 access centers.

- *The Inland Revenue Agency* is putting in place two phases of automation using the RAMIS system for online filing and payment through a service, goods and training turnkey partnership with the Singapore Government.

- *The Customs Administration* has introduced a modern system of declaration and clearances. The ASYCUDA World system is now being fully implemented for both imports and exports, and trades as well as coordinates with online payments that go directly to commercial banks.

- The *Department of Motor Vehicles* has engaged in an innovative public private partnership with a private company to provide laser-printed drivers licenses that have now expanded to fully automated processing on line for limited locations.

- *The Foreign Ministry* has introduced the Electronic Travel Authorization which allows a visa to be prepared in minutes and approved in a matter of hours from abroad. There are multiple stakeholders benefiting from this innovation which is unmatched in most countries.

- *The Central Bank of Sri Lanka* is championing Doing Business with facilitation by the central ICT agency and implementing in partnership with the delivery of business regulatory services.

95.	**In most cases, the recipe for success included a set of common elements**: (i) formulation of an objective (i.e. payment mechanisms for the unbanked population), (ii) profit-oriented service delivery bodies mobilized taking the lead (i.e. telecommunications companies), (iii) regulators being involved in the early stages to guard the public interest, (iv) a private clearing company to provide the digital certificate framework (i.e. Lanka Clear), and (v) support from centralized experts to help orchestrate the various aspects and supply technical input .

96.	**Examples of public-private partnership also exist in Sri Lanka with the case of mobile payments illustrating how transforming lives can derive from a collaborative approach.** (Box 4.4). The case represents a notable success deriving from a multi-stakeholder approach that covers both public and private sectors. It, and other shining examples from Sri Lanka and around the world, provides important lessons regarding the delivery of public or private electronic services in the internet era. Provision of services typically involves a focus on (i) the purpose and beneficiary, (ii) an open platform for innovation, and (iii) participation of multiple stakeholders from all areas.

Box 4.4: Public-Private Partnerships for Digital Services: The Case of Mobile Payments

Using digital financial services to move towards a cashless society facilitates commerce and payments throughout the economy by eliminating the expense and burden of cashing-in and cashing-out and carrying physical cash and documentation.

More than 10 million mobile phone users can now send and receive money, settle utility bills, and make payments for other goods and services using mobile money accounts directly from their mobile phones if they wish. There is also a huge potential for electronic remittances transfers via mobile phone and other electronic means. Inward worker remittances were about US$2,850 billion in 2013 and represents almost 9 percent of Sri Lanka's GDP.

Sri Lanka's banking and telecommunications sector introduced one of the best systems of mobile money and payments for person-to-person, person-to-business, and person-to-government payment transactions in the South Asia region. The objective is to facilitate electronic payments among the common man using even the simplest (2G), least expensive mobile phones.

In order to facilitate this process, it is necessary to have relevant laws that govern e-transactions and mobile (m) transactions to develop the confidence by businesses and persons that these transactions are legal and secure. Under *the Payment and Settlement Systems Act, 2005* and in the regulation of 2007, the Central Bank supervises service providers managing a payments system, including licensed cellular mobile telephone operators. In addition to the Payment Systems Law, e-transactions and m-transactions are facilitated through the *e-Transactions Act, 2006.*

As result, Sri Lanka boasted favorable initial conditions with the launch of mobile money, including (i) a high level of access to traditional payment services (69 percent of the adult population compared with the South Asia average of 33 percent), (ii) a strong financial regulatory framework, (iii) a good payment system infrastructure to support electronic money for e-commerce and e-government, and (iv) high penetration of mobile phone service.

The partnership between the Central Bank of Sri Lanka and the TRC coupled with the custodial banking approach to risk management enabled the market to be open to both bank and non-bank providers. Such a level playing field for banks and non-bank providers allowed the telecommunications companies or Mobile Network Operators (MNOs) to launch their own mobile money deployment and help provide services to the unbanked.

Dialog Axiata, the largest private telecoms operator, was awarded the first license to provide mobile money services in April 2012 and the custodian bank-based mobile payment services was introduced in 2013. In 2014 Dialog partnered with Etisalat, to offer in Sri Lanka, the world's first ever end-to-end interoperable mobile payment system with common merchant partners, top up/withdrawal agent networks, and a uniform consumer experience.

D. Sector Issues

97.   **Success and failures in the twelve years of experience with digital services have provided important lessons to help Sri Lanka move to the next phase of service provision.** As the country moves forward, a new cycle of ICT policy design could consider an open and participative approach based on international experience. Three key considerations to take into account from global experience are: (i) optional approaches to service delivery in light of important successes from decentralized efforts, (ii) the need to actively raise the uptake of service use by citizens, and (iii) the value of clarity in key parts of the legal framework for digital services

1.   *Optional Approaches to the Development of Digital Services*

98.   **Public service delivery as a whole was not institutionalized nor incentivized, so only public organizations which had strong motivation were able to succeed with digital services.** Despite the ambitious vision and high capacity at the center, widespread commitment at the implementation level was not strong enough to pursue digital services in a broad based fashion. A strong set of horizontal platforms were developed and infrastructure deployed at the center, but a limited set of "vertical" services (applications) were actually launched by ministries. The centralize approach to digital services led to only 14 public service reengineering projects of which only 5 were implemented. Approximately 48 interactive e-services that have been offered by 22 governmental organizations in Sri Lanka, 33 were launched by the central ICT agency instead of the responsible agency ministry.[44]

99.   **Alternative approaches to public service delivery may be considered depending on a range of critical operational issues.** Based on the large investment in horizontal infrastructure already made and the good start in launching a few services, some momentum has been achieved, However, going forward, alternative approaches to an ambitious national plan could be considered. Lessons from international experience offers some guidance for implementing digital services:

- *Develop a strategy for motivating improved service delivery at a decentralized level*, following multi-stakeholder consultations to assess citizen demand.

- *Implement a policy, institutional and regulatory framework that allows for flexibility by* defining roles and responsibilities for participants with minimal compliance requirements.

- *Incentivize service delivery and ICT champions through* national public service awards to stimulate champions and competitions among high level public officials.

- *Develop a monitoring and evaluation framework* to foster conformity to policy decisions, allow for measurement of progress and to inform revisions as the need for change arises.

2.   *Raising the Level of E-Government Participation by Citizens*

100.   **Public initiatives sought to increase the accessibility, uptake and promotion of the use of technologies**. Standardization of electronic use of languages with information available in three

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[44]. The World Bank, 2014 *E-Sri Lanka, Implementation Completion and Results Report.*

languages, Nenasalas access centers, schools and universities networks, and introduction of "life event" applications are examples of efforts to increase adoption of the Internet in everyday use and improve the quality of life of everyday people. By providing online services in demand, the government plays a role in promoting Internet usage and stimulating demand for access.

101. **However, indicators from multiple sources suggest that a lack of relevant online services and content is one reason Internet adoption is low.** Formal monitoring of e-government compliance, confirmed by third party reviews, underscore impressions from the international benchmarking exercise in terms of limited uptake of services.[45.] Principles to consider include:

- *Apply citizen centric principles at the implementation level,* including (i) access to public information necessary for participation, (ii) bottom-up citizen engagement to foster local ownership, (iii) open platforms, encouraging environment and incentives for innovation to help avoid stagnation, and (iv) up-to-date institutional capacity to increase quality in delivery.

- *Communicate reform objectives, over and over.* Communication and awareness promote the benefits of digital services, in terms of ease of use and reliability. This increases trust and demand for public e-services while fostering digital interaction. Campaigns with heavy repetition of simple messages through many venues and media channels are the best.

- *Pursue of participatory methods with public feedback.* Participatory methods can help policymakers set priorities, encourage more citizens to 'buy in' to programs, increase satisfaction levels and thus augment the chances of successful policy outcomes.[46]

- *Foster multi-stakeholder engagement.* An open approach toward policy and reform design improves ownership and engagement of stakeholders. When the transformational agenda is 'owned' by the stakeholders involved, and services demanded, ICT usage follows naturally.

3. Completing Key Enabling Aspects of the Legal Framework

102. **There has been a strong effort to develop a legal and regulatory framework for digital services in Sri Lanka.** Certainly, the level of services taking place in pockets around the country demonstrates that the legal system supports digital services and electronic payments. There are a number of aspects however, which if addressed, could have an important positive impact on business use of ICT as well as citizen confidence in the system. Each is described in turn:

- *The Electronic Transactions Act* (ETA), the main instrument governing domestic and international e-Commerce, eliminates barriers by establishing legal certainty. Even though the law is largely based on good practice, the rules around legal recognition of electronic signatures is murky, as is the case in many countries. The Act could allow for recognition of foreign certificates and provide an authority to accredit certification providers.[47]

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[45] The World Bank, *Re-Engineering Government eTransformation Strategic Plan and Implementation Plan*, 2014.
[46] Two recent initiatives were launched to increase citizen engagement that could be scaled up: (i) a citizen engagement portal featuring forums and discussion panels, and (ii) an open data portal that contains 89 dataset.
[47]The United Nations Commission on International Trade Law (UNCITRAL) Model Law on Electronic Commerce (1996) and Convention on the Use of Electronic Communications in International Contracts (also promulgated by

- *For data protection and data privacy*, no single law exists, although there are provisions inserted in other laws such as the Telecommunications Act and criminal law. A Data Protection Code of Practice would provide appropriate guidelines for the public and private sector. Without it data protection and privacy would be widely uncovered by legislation.[48]

- *Successful combatting of cyber-crime* requires a comprehensive framework for both the identification of computer crimes and respective procedures for the investigation into and prevention of such crimes which is provided by the legislation. One such procedure is the admissibility of electronic based evidence which needs reconciliation with the ETA.

E. Conclusions

103.   **Sri Lanka recognized early on the potential benefits of digitally delivered services in the public and private sector.** However, the ambitious vision was only partially implemented due to the inevitable constraints which accompany broad-based reform programs as well as the common, but often unforeseen, pitfalls that a new technology can bring. Still, despite the irregular pace at which the program for digital services proceeded and the implementation lags that characterized much of its history, achievements were made that lay the foundation for successful expansion in the future. In particular, critical horizontal infrastructure was established, a high level of technical capacity was built, ICT literacy increased, and some important services were rolled out to the citizens of the country. Most importantly, crucial lessons were learned that will serve as both warnings and guideposts while future approach to digital services are considered.

UNCITRAL) Provisions that are typically included in electronic commerce legislation include (i) legal recognition to e-transactions, (ii) rules about data messages, (iii) the formation and validity of e-contracts particularly when electron communications are used,and (iv) the admissibility of electronic data as evidence in legal proceedings
[48] Such legislation would include provisions that ensure that: (i) personal data are obtained only for lawful means; (ii) data collected are complete, current and relevant for the purpose for which it is used; (iii) the purpose for which data are collected is timely specified; (iv) data are not disclosed for purposes other than those specified, except with permission; (v) data are protected against risk of compromise, destruction, disclosure or misuse; (vi) data subjects have access or confirm data is correct and notified of data breach; and (vii) remedies of breach are provided.

A. Introduction

104.   **Sri Lanka has set its sights high based on a conviction that the ICT sector is critical to support world class innovation and transformation of public services.** The countries with which Sri Lanka competes are strong and sophisticated in the service industry. Sri Lanka can be also, but the evidence is that more needs to done to strengthen the underlying ecosystem for innovation and ICT adaptation. Sri Lanka's benchmarking exercise reveals its strengths, in terms of costs and ease of business model. However, these advantages may not be sustainable given (i) the speed of ICT adoption in the world, (ii) the eventual technical convergence of voice, data and video, and (iii) the intensifying competitive landscape in the global economy today. To meet these challenges, removal of supply side bottlenecks as well as innovative ways to increase ICT demand need to be considered.

105.   **Specifically, a competitiveness, innovation and ICT strategy that would lead to an ICT policy and legal framework for an inclusive modern economy may be appropriate.** The objective of the strategy would be to assess the ability and willingness of the private sector to improve bandwidth to serve rural areas, develop applications, and utilize ICT in its daily operations. As part of the assessment, a series of stakeholder engagements would help validate and expand on the assessment's conclusions. The final strategy would prepare the ground for a modern ICT policy to articulate and institutionalize public sector commitment across the range of policies deemed integral to the national development approach. Collaborative policy design can start with an updating of the old telecommunications policy into a modern ICT policy in order to specify responsibilities, transform relations with citizens, and increase transparency, accountability and outreach.

B. The Overarching Challenge - Unbundling the Broadband Paradox

106.   Chapter I identified the "broadband paradox" in Sri Lanka by benchmarking access to, and use of, ICT in various facets of the economy across a range of countries based on all of the available international indicators. Subsequent chapters shed light on the apparent paradox that emerged from the exercise. However, given the central role of broadband access and use in determining the way forward in the next phase of ICT sector development, the following facts underscoring the broadband paradox should be monitored on a regular basis:

- *The broadband footprint is expanding as* 4G LTE technology is available and the incumbent telecommunications company has launched the first "fiber-to-the-home" broadband service.

- *The Government helping to build ICT literacy* across the country through a range of innovative programs and projects to mirror Sri Lanka's remarkable overall literacy rates.

- *Sri Lanka is one of the most affordable places for Internet connectivity in the world,* providing competitive prices for mobile broadband and fixed broadband.

- *Yet the overall, utilizing ICT is low* for government, private sector and individuals, but most apparent at the individual level.

C. Sector Recommendations

107. Based on unbundling the supply and demand paradigm for innovation and ICT solutions, recommendations for sector policy are made at a strategic level for further consideration.

Policy and Regulatory Environment

- *Review the state of competition, market structure, regulatory approach and business models of telecommunications operations in the broadband market.* Consider issues impacting ICT goals such as pricing, entry, infrastructure, spectrum management, and last mile provision.

- *Based on a new ICT policy, strengthen and modernize the legal and regulatory framework*, including the licensing regime and spectrum policy, to introduce competition regulation and open access policy. Incorporate universal service recommendations in licensing.

Technical Skills

- *Identify gaps, set ambitious targets, and partner with the private sector to raise technical skills in the economy.* Carry out analysis of current and future supply of technical graduates to help chart the way forward.

- *Carry out crash efforts to raise tertiary enrollment targets and rates in STEM subjects through* expansion of CS departments, leveraging IT vendor courses, university participation in the global innovation networks, and leveraging diaspora education

Public Services

- *Evaluate ongoing pilot projects for public service delivery* based on a stock taking of current levels of service delivery, priorities, outreach, satisfaction levels and ownership by providers.

- *Consider institutional structures to mobilize public service reforms based on concrete service targets and public service awards to incentivize champions.* Base the associated implications for the government ICT sector on citizen needs and defined priorities for public administration.

- *Run information campaigns to support implementation of e-services.* An open approach to policy design shows citizens and businesses that the Government is forward-looking, committed, and has a specific plan to improve quality of life. Adoption tends to follow

Business Environment for Innovation

- *Initiate efforts to collect better data* on ICT in the economy, covering trade, production, consumption, access, usage, cost and performance.

- *Analyze innovation activities and the ICT use in business* in relation to the drive for international competitiveness at the firm level for Sri Lanka.

- *Deepen key business reforms*, for example, using ICT solutions to improve judicial processes for commercial cases through process re-engineering and automation of court processes.