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Regional Human Development Report

UNDP

Promoting ICT for Human Development in Asia 2004

Realising the Millennium Development Goals

SRI LANKA

Regional Human Development Report

Promoting ICT for Human Development in Asia: Realising the Millennium Development Goals

Sri Lanka

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ABBREVIATIONS

ABU: Asia-Pacific Broadcasting Union
ADB: Asian Development Bank
ADSL: Asynchronous Digital Subscriber Line
AFACT: Asia Pacific Council for Trade Facilitation and Electronic Business
AGRINET: Agriculture Information Network
AIBD: Asia-Pacific Institute for Broadcasting Development
AMIC: Asian Media Information and Communication Centre
APIIT: Asia Pacific Institute of Information Technology
APNIC: Asia Pacific Network Information Centre
APT: Asia Pacific Tele-community
ARV: Anti-Retroviral
ATM: Automated Teller Machine
BBC: British Broadcasting Corporation
BIT: Bachelor of Information Technology
BOI: Board of Investment
BTech: Bachelor of Technology
CENWOR: Centre for Women's Research
CEO: Chief Executive Officer
CEP: Computer Education Programme
CGIAR: Consultative Group of International Agricultural Research
CINSA: Cultural Information Network for South Asia
CINTEC: Council for Information Technology (the apex body for ICT in Sri Lanka)
CIO: Chief Information Officer
COJ: Companions on a Journey
CRC: Computer Resource Centre
CSO: Civil Society Organization
DECT: Digital Enhanced Cordless Telecommunications
DLC: Distance Learning Centre
EDI: Electronic Data Interchange
EDIFACT: EDI For Administration, Commerce and Transport
EFCD: Environment and Forest Conservation Division
EFL: Environmental Foundation Limited
ENLINET: Environmental Library Network
FORDATA: Forest Data
GCE: General Certificate of Education
GDP: Gross Domestic Product
GIS: Geographical Information System
GIT: General Information Technology
GLNCA: Green Lanka Nature Conservation Association
GNP: Gross National Product
GPS: Global Positioning System
HDI: Human Development Index

HELLIS: Health Science Literature, Library and Information Network
ICT: Information and Communication Technology
IDA: International Development Agency
IDD: International Direct Dialling
ILO: International Labour Organization
IPS: Institute of Policy Studies
ISDN: Integrated Services Digital Network
ISP: Internet Service Provider
IT: Information Technology
ITeD: Information Technology enabled Development
ITN: Independent Television Network
ITU: International Telecommunications Union
IWMI: International Water Management Institute
IX: Internet Exchange
JICA: Japanese International Cooperation Agency
LAcNet: Lanka Academic Network
LAN: Local Area Network
LEARN: Lanka Experimental Academic and Research Network
LISL: Lanka Internet Services Limited
LTTE: Liberation Tigers of Tamil Eelam
MASL: Mahaweli Authority of Sri Lanka
MCH: Mother and Child Health
MOOH: Medical Officer of Health
MRI: Medical Research Institute
NASCP: National AIDS/STD Control Programme
NAPW: National Action Plan for Women
NGO: Non Governmental Organization
NRM: Natural Resource Management
NRMS: Natural Resource Management Services
OPAC: On-line Public Access Catalogue
PC: Personal Computer
PDA: Personal Digital Assistant
PHI: Public Health Inspector
PPT: PowerPoint
PRSP: Poverty Reduction Strategy Paper
PSTN: Public Switched Telephone Network
SEEDS: Sarvodaya Economic Enterprise Development Scheme
SIDA: Swedish International Development Agency
SLBC: Sri Lanka Broadcasting Corporation
SLBFE: Sri Lanka Bureau of Foreign Employment
SLEDB: Sri Lanka Export Development Board
SLIDA: Sri Lanka Institute of Development Administration
SLII: Sri Lanka Information Infrastructure
SLPA: Sri Lanka Ports Authority
SLRC: Sri Lanka Rupavahini Corporation
SLSTINET: Sri Lanka Scientific and Technical Information Network

SLT: Sri Lanka Telecom
SMS: Short Message Service
STD: Sexually Transmitted Disease
SWIFT: Society for Worldwide Interbank Financial Telecommunication
TDF: Telecommunications Development Fund
TM: Thematic Mapper
TRCSL: Telecommunications Regulatory Commission of Sri Lanka
TVE: Television Trust for the Environment
UCSC: University of Colombo School of Computing
VAT: Value Added Tax
VoIP: Voice over Internet Phone
WAN: Wide Area Network
WELR: Women's Economic and Legal Rights
WFP: World Food Programme
WHO: World Health Organization
WHTSL: Wildlife Heritage Trust of Sri Lanka
WLL: Wireless Local Loop
YA-TV: Young Asia Television

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[1.0] Country socio-economic overview

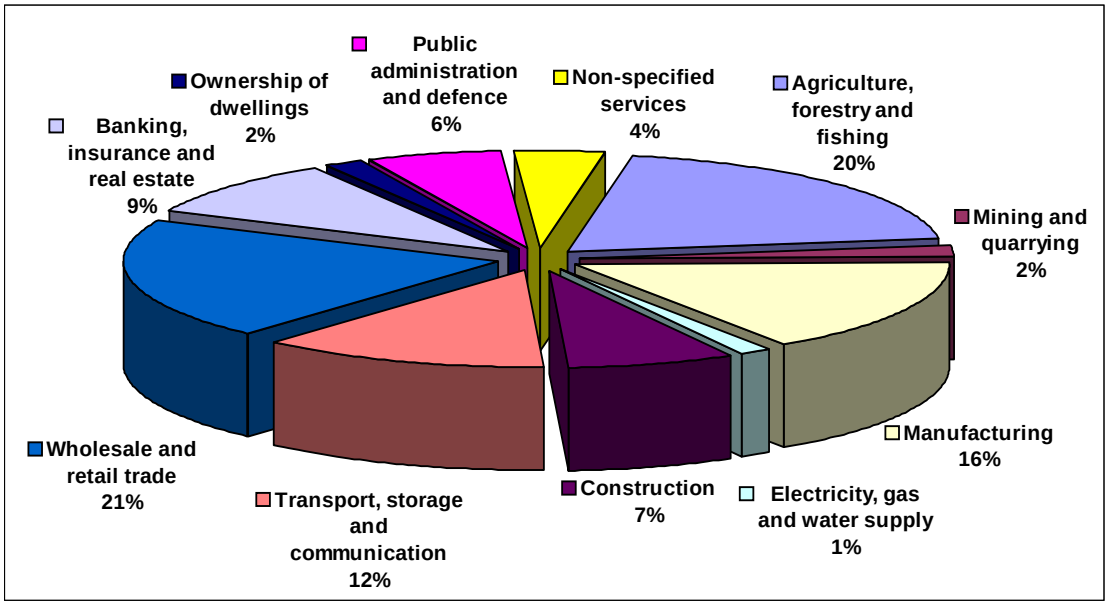
Sri Lanka, struggling to emerge from 20 years of internal conflict, now anticipates a better future with the ongoing peace process. It has an ambitious development programme to regain economic growth and social stability. A country that has retained its parliamentary democracy since independence from the British in 1948, Sri Lanka has achieved high educational and health standards due to consistent investment by successive governments. In 1977 it became the first South Asian nation to liberalise its economy after experimenting for many years with a command and control economy. However, even after 25 years, the full benefits of a liberalised economy are yet to be achieved, largely due to the high defence expenditure that has drained the budget over the years.

Sri Lanka has a multi-ethnic population. The ethnic composition is: Sinhalese (74 percent), Tamils of Sri Lankan origin (12 percent), Tamils of Indian origin (6 percent), Moors (7 percent), and others (1 percent). The religious composition is: Buddhists (69 percent), Hindus (15 percent), Christians (8 percent), and Muslims (8 percent). Only 21.5 percent of the population reside in urban areas, while 72.2 percent live in rural areas and 6.3 percent in estates.[1] Both Sinhala and Tamil are national languages. English too is widely used for official and business purposes.

During the five decades since independence, the Sri Lankan economy has on average grown by slightly over 4 percent annually. The per capita nominal income, which was estimated at US$ 120 in the early 1950s, has now reached US$ 858, [2] showing an annual increase of 11 percent. The watershed year was 1977, when policy reforms were introduced to shift the focus from an inward looking development strategy to an outward looking one, thereby releasing the economy from an array of excessive controls. Since then the economic structure has been transformed from a predominantly agricultural economy to a manufacturing and services based structure (Central Bank, 1998 & 2003).

In 2002, the agricultural sector accounted for about 20 percent of gross domestic product (GDP), while the services and industrial sectors constituted 54 percent and 26 percent respectively. Chart 1.1 shows the contributions of various sectors and sub-sectors.

Chart 1.1 : Composition of GDP in 2002



Source: Annual Report, Central Bank of Sri Lanka, 2002

Sri Lanka presently is heavily dependent on the apparel and tea sectors, which are both export-oriented industries. In 2000, exports amounted to 40 percent of GDP and imports to 51 percent.

The contribution to GDP and economic growth differs from region to region. During the five year period from 1996 to 2000, only the Western Province and the Southern Province experienced a positive change in their share of GDP.

Table 1.1: GDP share by provinces, 1996-2000

Province	Population (in '000s) in 2001	Land Area	% Population	% Land Area	% Annual Average GDP Share
Western	5,361	3,593	28.6	5.7	46.1
North Western	2,157	7,506	11.6	12.0	11.2
Central	2,415	5,575	12.8	8.9	10.3
Southern	2,277	5,383	12.2	8.6	9.1
Sabaragamuwa	1,788	4,921	9.6	7.8	7.3
Eastern	1,415	9,361	7.5	14.9	4.9
Uva	1,171	8,335	6.3	13.3	4.6
North Central	1,106	9,741	5.8	15.5	4.0

Northern	1,042	8,290	5.6	13.2	2.5

Sources: A Provincial Estimate and Analysis of Regional Activity in Sri Lanka (1996-2000), Economic and Social Statistics of Sri Lanka, 2002, Central Bank of Sri Lanka

The above table clearly shows that almost half of national GDP derives from the Western Province (where the capital Colombo is located, and where industry and commerce are concentrated). Categorising provinces into high, medium and low, the Central Bank study indicates that in all three categories, services accounted for the largest share. In the high development category, consisting only of the Western Province, the contribution of industries is nearly seven times that of agriculture. In the other categories, agriculture plays a greater role than industry and accounts for over one third of provincial GDP.

Productivity levels vary between regions and across sectors. The agricultural sector has the lowest level of productivity and low contributor provinces show poor productivity in production.

Poverty affects over one third of the Sri Lankan population, and nearly 90 percent of the poor live in rural areas. The rural sector still depends heavily on agriculture, which generates a substantial portion of rural income.

A wide income gap is evident in Sri Lanka, with the Gini ratio giving a value of 0.43 by 1996/97. During the 1970-77 period, when closed economic policies were followed by the then government, the Gini ratio was 0.35. The figure varied between 0.46 and 0.43 during the two decades of open economic policies from 1977 to 1997. In the period prior to liberalisation, during the two decades preceding 1973, the Gini ratio was around 0.45 to 0.46.

Human development in Sri Lanka is relatively high compared to other developing countries, and the human development index (HDI) compares well with developed nations.

Table 1.2: Human development indices

Country or group	**HDI value**
Countries with high human development	0.908
Sri Lanka	***0.730***
World (average)	0.722
Countries with medium human development	0.691
Developing countries	0.655
South Asia	0.582

Source: UNDP (2003), Human Development Report

The welfare economic policies practiced in the country for several decades have established education and healthcare networks that have led to this situation. The literacy rate stands at 91.6 percent [3] and health indicators such as maternal mortality, infant mortality and life expectancy at birth are at satisfactory levels.

Table 1.3: Social development

Country / group	Life expectancy at birth (years) 2001	Adult literacy rate (% age 15 and above) 2001	Infant mortality rate (per 1,000 live births) 2001	Maternal mortality rate reported (per 100,000 live births) 1985-2001
Sri Lanka	72.3	91.9	17	90
South Asia	62.8	56.3	68	-
Developing countries	65.1	74.5	69	-

Source: UNDP (2003), Human Development Report

The gender development index for Sri Lanka is also at a satisfactory level at 0.726 (UNDP, 2003). This is because education and health care facilities have been equally available for women. However, the gender empowerment measure is very low at 0.272. Women constitute 31.8 percent of the labour force, with a participation rate of 32.4 percent. Unemployment is also higher among women at 11.1 percent, compared to 6.8 percent for men (Department of Census and Statistics, 2002).

Sri Lanka has suffered from the consequences of war for over two decades since the ethnic riots in 1983. The peace process, with a ceasefire in place, has continued for over one year so far. This has been the most successful attempt towards achieving peace in the country, with focus on the reconstruction and rehabilitation of the worst conflict-affected areas. The ongoing peace process has been driven partly by the facilitation of the Norwegian government, and by the active participation of bilateral and multilateral donor agencies that have linked future overseas development assistance to peace. However, there is still a long way towards achieving lasting peace and dealing with the many residual problems of the armed conflict. These include reconstruction of infrastructure in the north and east, resettling of displaced people and combating the rising crime wave. Resolving the conflict in a manner that integrates all communities remains the biggest challenge in achieving lasting peace and placing the country on the path to rapid and sustainable development.

[2.0] National ICT master-plan, policy and regulatory environment

Sri Lanka had no ICT master-plan for much of its over 100 years of telecommunication history and 30 years of IT usage history. The absence of a comprehensive clear-cut ICT policy document has prompted many ICT professionals to call for one:

There were a few attempts to formulate a national ICT master-plan, the most notable being an endeavour in 2000 by Indika Gunawardena, Sri Lanka's first Minister of Information Technology. The major policy change recommended in this attempt was to bring under one umbrella the Council for Information Technology or CINTEC [4], the apex government body for information technology (IT), and the Telecommunications Regulatory Commission of Sri Lanka (TRCSL), which until then was functioning under another ministry. The aim was to converge IT and telecommunication regulatory activities. However, this proposal was never implemented, and the newly created Ministry of Information Technology itself was dissolved within a year due to domestic political changes.

Another attempt was made about one year later with guidance from Milinda Moragoda, Minister of Economic Reforms, Science and Technology, under whose purview ICT was placed. The new national ICT agenda, titled 'ICT Development Roadmap', was introduced by Prime Minister Ranil Wickremasinghe at a special function.

[2.1] National ICT vision and master-plan: ICT Roadmap

Launching the ICT Roadmap, Prime Minister Wickremasinghe said all Sri Lankans should endeavour to join hands to take the country to the 21st century, turning it into a technologically advanced nation with overall development in agriculture, manufacturing, services and social development. He also urged all communities to utilise technological advances to take the country forward through IT (*Daily News*, 2002).

With the sub-title: 'e-Sri Lanka: Smart People, Smart Island' is described as a document that depicts a shared vision of the government, private sector and other stakeholders in the nation's development, to take the benefits of ICT to every village, citizen, and business while transforming the way government works. It intends to use ICT to develop Sri Lanka's economy, alleviate poverty and improve the living standards of citizens from every strata of society. The ICT Roadmap also detailed a portfolio of action plans targeted to be achieved by the year 2007.

[2.1.1] Vision of ICT Roadmap

More explicitly, the following are key objectives of the 'e-Sri Lanka' vision (Ministry of Economic Reforms, Science and Technology, 2002).

For good governance:

- To use ICT to enhance the delivery of public services, knowledge and education to people; create empowered civil servants with information and communication tools; facilitate coordination across government agencies; improve competition and transparency in public procurement; and reduce transaction costs to businesses.

- To enhance citizens' quality of life by the appropriate use of ICT; achieve model status in the formulation and practice of ICT- based governance.

- To make Sri Lanka the regional ICT-enabled commercial hub for South Asia by harnessing top-end professional talent combined with a sound ICT infrastructure.

- To implement an e-government solution to reinforce peace and help integrate marginalized regions and communities within an equitable resource distribution framework. [5]

- To develop a nationwide ICT infrastructure, network all primary and secondary cities and extend connectivity to even the most remote parts of the island through terrestrial as well as space-based communication technologies. [6]

- To build soft infrastructures to complement the country's hard infrastructure featuring Internet based infrastructures and encompass e-commerce gateways, shared service platforms, storage and archiving facilities, ICT enabled service provisioning infrastructures and business process outsourcing platforms.

- To develop innovative ICT applications for social development with assistance from the active non-governmental organisation (NGO) community (e.g. application for credit cooperative societies to facilitate the use of ICT to further mobilize members, extend micro-credit and generate employment in rural areas).

For the development of industries:

- To revitalise Sri Lanka's main and traditional industries of agriculture, tourism and apparel, among others, through the appropriate use of ICT tools, and to penetrate new markets via Internet-based sales channels.

- To enable small firms and rural cooperative societies to participate in e-commerce transactions via international e-market sites.

- To develop the local ICT industry, in tandem with the convergence trends within the ICT industry, particularly in areas like multimedia technologies and third generation mobile devices, and create a ready employment market for high-tech graduates from local universities.

For global positioning of Sri Lanka:

- To develop Sri Lanka as an ICT destination having high quality research and development (R&D) facilities supported by centres of excellence as well as world class academic input and local as well as expatriate diaspora.

- To use ICT technologies to transform educational institutions and learning processes, to extend quality education at all levels and to all parts of the country, by providing students and teachers a world-class educational curriculum via the Internet.

- To develop on-line education to enable lifelong learning, by networking local learning institutions with collaborating academic and training institutions regionally and internationally.

- To meet international standards in the e-learning material production industry to become a leading regional learning service provider. Sri Lanka will leverage the substantial learning resources available globally and participate in the Asia-Pacific Advanced Network and Internet2 consortium.

- To position Sri Lanka as a major air and sea cargo transportation hub for South Asia and beyond by modernising the ports and creating a trade net to lower the transaction costs for importers and exporters.

- To develop the country to be the financial services hub for the South Asian region, relying on its long tradition of progressive fiscal policies backed by top-end professional services, and combined with successive initiatives to modernize the stock market and other financial institutions.

- To modernize the business environment using ICT technologies so that multinational companies can begin offshore operations.

- To create five technology parks for high-tech industries.

- To develop the software development industry in Sri Lanka so that in five years the annual revenues from software exports will reach US$500 million and grow at 30 percent annually.

- To make the country a global hub for ICT-enabled services and business process outsourcing.

For the convenience of the general public:

- To create a communication environment that allows optimal opportunities for all Sri Lankans to participate fully in the global information economy, for businesses to engage in all forms of e-commerce, and for all citizens to support their economic, learning and personal needs.

- To facilitate inexpensive communications with family abroad via email and voice over Internet at cybercafés in all towns; build networks for Sri Lankans living overseas to provide venture capital financing, market entry, international business experience and partnerships with educational institutions and NGOs for the world.

- To position Sri Lanka as a base for developing a model international laboratory for information technology-enabled development (ITeD).

[2.1.2] ICT Roadmap implementation strategy

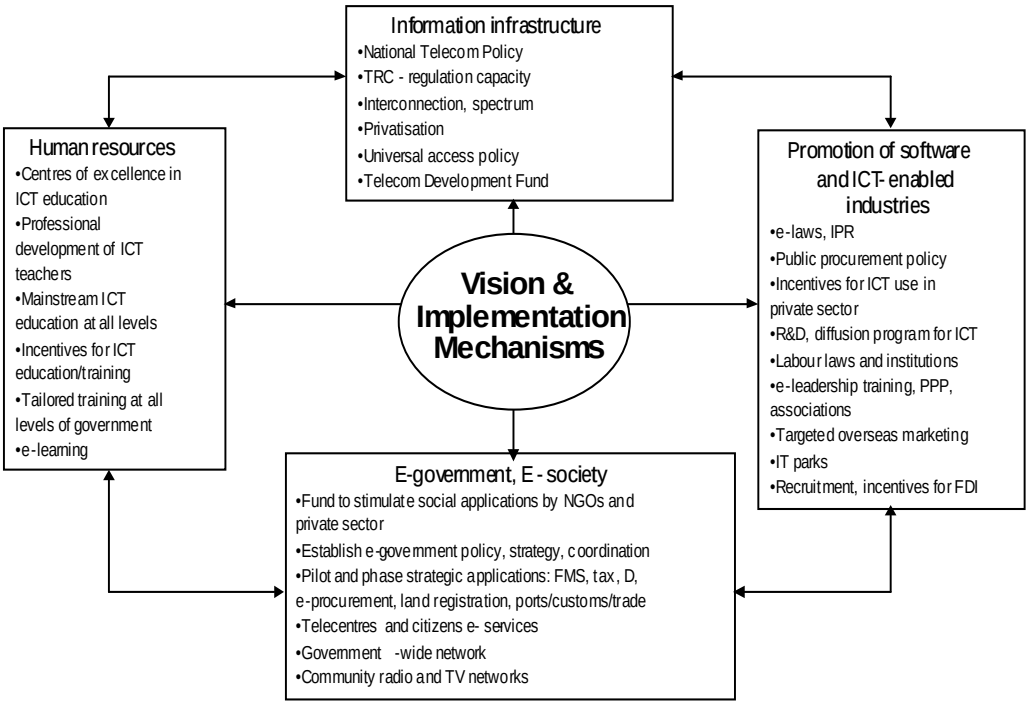
Five programme strategies have been presented to make the ICT Roadmap vision a reality. These five programmes will run in parallel, and are closely integrated. The aim is to bring local integration and external/global linkages. Public-private partnerships are considered imperative for the success of each programme and the integrated vision.

The foundation of the strategy is to initially build the implementation capacity; this includes creating an ICT agency and appointing a chief executive officer (CEO) and a team. It is also planned to build the national information infrastructure, create a framework for the promotion of software and ICT-enabled industries (enabling environment and market creation) and develop ICT human resources. Concurrently, a wide spectrum e-government system is built to reach the highest standards of good governance as well as deliver citizen services and

use ICT as a key lever for economic and social development, bridging the digital divide through a variety of innovative and ongoing societal applications.

The interactions among the five programmes are highlighted in figure 2.1:

Figure 2.1 : Sri Lanka's ICT strategy – e-Sri Lanka ICT Roadmap



The following are the strategies presented in the ICT Roadmap to achieve the goals and objectives to carry out the five programmes.

Building the implementation capacity:

- The Prime Minister takes the lead in setting the overall ICT strategy and communicating this vision to all stakeholders.

- The cabinet of ministers appoints a national task force to give ICT policy directions. This will result in establishing an ICT consultative committee to provide advisory input to the Prime Minister and the task force on policies. Its membership will be drawn from the secretaries of key ministries, industry leaders (both ICT suppliers and users), professional associations, think-tanks and international experts.

- An ICT agency, reporting to the minister in charge of ICT, is set up. The CEO of this agency is supported by five programme managers to cover ICT human resource development, information infrastructure, e-government and e-society, ICT promotion and partnerships, and technology services. The technology services arm will recruit the necessary skills, contract with experts both local and overseas, and provide in-house consultancy to government-wide initiatives.

- The ICT agency provides leadership to establish public-private partnerships / constructs in the ICT field. It will also be the apex coordinating body for donor assistance programmes focused on this area.

- All key ministries establish ICT implementation units to carry out their components of the ICT programme. Each minister may consider creating a chief information officer (CIO) position, or assign this responsibility to a high-level champion within the ministry. Alternatively, the ICT agency could include ministry-specific programme champions / coordinators who are placed in a matrix reporting structure involving the key ministries. All such ministries will have their own in-house champions and have clear ownership in the modernization and citizen-centred orientation of government services.

- Much time and resources will be dedicated to change management efforts, upgrade skills, and redesign business processes. The minister of ICT and the CEO of the ICT agency would work closely with the CIOs and ministerial champions in achieving the desired levels of transformation.

Building national implementation infrastructure:

A. 'Hard' infrastructure — providing affordable telecommunications services for various users, and ensuring local and global connectivity

- The present uncertainty and regulatory risk will be eliminated by adopting the final recommendations of the new National Telecommunications Policy.

- Practical and incremental approaches will be taken to minimise risks for the government, and to reinforce market forces. This is achieved by working closely with the private sector and attracting potential investors to expand the information infrastructure through various incentives and regulatory regimes.

- An explicit universal access policy will be introduced and a telecommunications development fund (TDF) will be established.

- Further privatisation of the public switched telephone network (PSTN) will be undertaken. High priority will be given to restructure Sri Lanka Telecom (SLT) so as to maximise the benefit from the legacy infrastructure towards the future development of ICT infrastructure.

B. Building 'soft' infrastructure and creating the enabling environment

- A business-friendly policy environment is created by conducting high-level training and development for government leaders to ensure they can lead the change management process involved in making effective use of ICT in government.

- Enabling laws for e-government and e-commerce will be introduced as soon as possible.

- An industry-wide ethic of quality control and assurance will be ensured to guarantee that the industrial output for both local and foreign markets would be of a high standard.

- Venture capital laws and exchange controls that inhibit the availability of high-risk capital will be reformed.

- Labour laws will be changed to facilitate workforce mobility in accordance with the requirements of the software and ICT-enabled services.

- Software exporters will be assisted to create awareness of Sri Lanka as a preferred source of ICT products and services. This will include promoting the software industry through foreign missions, hiring marketing firms for building Sri Lanka brand awareness in targeted markets and mobilizing the diaspora to expand market opportunities for the country's ICT products.

- The island will be developed as an open source software development centre.

- An ICT development zone/cyber corridor named the Sitawaka Corridor– on the eastern boundary belt of Colombo – will be set up. This corridor will be supported by state-of-the-art highway and telecommunications infrastructure. The Sitawaka Corridor will be promoted as the preferred location to establish ICT related manufacture and application development covering a broad range of application areas like education, health and entertainment, in addition to core technology based industries.

Developing ICT human resources:

- The number of qualified software professionals will be increased by setting up at least three centres of excellence, assessing and addressing the needs of tertiary ICT education to improve quality and increase capacity, offering incentives to pursue software education, granting autonomy for public university ICT programmes, and giving incentives for R&D activities in universities and across the private sector.

- ICT literacy among primary and secondary school students will be enhanced. E-learning will be supported in priority disciplines and under-served areas. A fast-track approach will be followed with regard to connectivity and ICT usage in schools.

- ICT awareness programmes will be regularly broadcast through the electronic media, and mobile awareness programs will be expanded to cover all parts of the island. At least 15 percent of all primary schools will be equipped with ICT labs in the next 3 years.

- Intake of undergraduates for ICT based university courses will be increased to at least 1,000 annually. One hundred university staff would be provided training at M.Sc.level, and this would be increased subsequently.

- Opportunities and incentives for English and ICT literacy will be enhanced through tax incentives, tuition loans, certification, TV and radio programmes and broad-basing tertiary and university education through virtual learning.

- Supply of ICT professionals to be ensured by a prudent policy on issuing of visas for foreign ICT professionals with required skill sets and by actively recruiting and offering incentives for leading ICT multinationals and training institutions to invest in Sri Lanka.

e-Government

- Communication and connectivity needs of government towards establishing a government wide area network (WAN) will be addressed. The government's information infrastructure will also support a secure and robust email system connecting all government institutions and employees.

- Data registries / databases that can serve e-government applications with a master database of citizen data will be created.

- A geographical information system (GIS) covering land registration, survey, census and statistics data will also be implemented.

- Multi-functional ICT enabled citizen centres, which would provide a one-stop service point for government, will be set up.

- A government call centre will be established to provide voice based interactive support for citizens to carry out their interactions with the government.

Use of ICT as a key lever for economic and social development

A. Societal applications and content development

- A national fund to support innovative applications of ICT for social and rural development will be created.

B. Connectivity and tele-centres

- Explicit universal access policy obligations for licensed operators to contribute towards an infrastructure (telecom) development fund will be established.

- Tele-centres and other forms of public access to information and communication services will be established.

C. Mass media

- Sri Lanka's mass media and multimedia policy and objectives will be reformulated to be on par with internationally established principles.

- A sustained e-education campaign, making extensive use of air waves, will be conducted.

- A systematic English proficiency campaign for primary, secondary and tertiary students via radio and television will be conducted.

- All present community radio and television stations will be converted into fully pledged Internet relay stations.

- Archived educational video and audio material, presently housed in the country's television and radio stations, will be digitised and stored.

[2.2] Key acts and regulations in the ICT sector

[2.2.1] Print media

Article 10 of chapter 3 of the Constitution of Sri Lanka guarantees the freedom of thought, conscience and religion, and article 14 (1) (a) guarantees the freedom of speech and expression, including publication. However, article 15 (2) states that this right 'shall be subjected to such restrictions as may be presented by law in the interest of racial and religious harmony or in relation to parliamentary privileges, contempt of court, defamation or incitement to an offence' (Gunaratne & Wattegama, 2000).

Sri Lanka enjoyed much press freedom for the first quarter of a century after independence. Except for the requirement to register printing presses and newspapers, there was no form of government control of the press until 1973. That year, a seven member Press Council was set up under the Sri Lanka Press Council Law of 1973. The Council – consisting of seven members, six appointed by the government and the Director of Information as the ex-officio seventh member – has quasi-judicial powers to inquire into complaints against the print press. One observer opines that the Press Council Law severely curtails the freedom to publish specific types of information without prior permission from government officials, which amounts to prior censorship (Udugama, 1986).

Among other statutes whose provisions impinge on the freedom of publication are the Parliamentary (Powers and Privileges) Act of 1953, as amended in 1978, 1980, 1984 and 1987, the Official Secrets Act of 1955, and the Prevention of Terrorism (Temporary Provisions) Act of 1979. The provisions of the penal code on defamation (Section 479), offences against the state [7] and offences affecting public decency or morals or religious harmony [8] are also relevant to the media. Some other ordinances related to print media regulations include the Newspapers Ordinance of 1839, Printers and Publishers Ordinance of 1885, Printing Press Ordinance of 1902, Obscene Publications Ordinance of 1927 and Profane Publications Act of 1958 (Gunaratne & Wattegama, 2000).

Sri Lanka also has well defined policies and laws pertaining to intellectual property. The Code of Intellectual Property Act No. 52 of 1979 embodies legislation relating to copyright, industrial design, patents, trademarks, trade names and unfair competition. Although this act was amended in 2000 to cover software products, it has so far never been successfully used to safeguard the interests of a software developer.

The absence of an effective legal framework to prevent software piracy has resulted in making Sri Lanka a massive open market for illegally copied software products and entertainment media. Many CD ROMs and DVDs containing collections of unlicensed software applications are available in the

computer shops in Colombo and suburbs for prices varying from Rs. 100 – 200 (US$ 1- 2) Going by the current market rates, the originals of this software collection in one CD might perhaps cost more than hundred or in rare cases even one thousand times of that cost of a pirated CD or DVD. This example clearly shows even the mere existence of laws against piracy is not adequate to address this complicated problem unless the law enforcing authorities can make them effective to bring these unwanted practices to a halt.

[2.2.2] Broadcast media

The constitutional and penal code provisions are also relevant to the broadcast (electronic) media. The other enactments too are valid except for a few such as the Press Council Law. The policy and legal framework for the government controlled broadcast media are set forth in the Sri Lanka Broadcasting Corporation (SLBC) Act No. 37 of 1966 and the Sri Lanka Rupavahini Corporation (SLRC) Act No. 6 of 1982.

The SLBC Act of 1966 stipulates that the broadcast programmes should maintain good taste and decency. Precautions should be taken not to cause incitement to crime or disorder, or cause offence to religious beliefs or public feelings. The act also specifies that programmes should maintain a proper balance between the subject matter and quality, and the news broadcast should be accurate and impartial.

The SLRC Act too has similar provisions regarding the programmes they broadcast. The corporation can refuse to televise advertisements that in its opinion are not in the public interest. The act also grants the corporation supervisory powers over foreign and local crews producing programmes for export, as well as the export of video cassettes.

The state monopoly over radio and television ended in 1992, but broadcasting licenses are still issued by the Ministry of Media. There is no declared or established basis for granting new licenses or renewing existing ones, which is entirely at the minister's discretion. The Telecommunications Regulatory Commission of Sri Lanka (TRCSL) wields authority in spectrum management.

The set of ICT Roadmap has also recommended certain measures to reform the broadcast sector to promote the development thrust of the 'e-Sri Lanka' programme.

[2.2.3] Telecommunication

TRCSL is a government statutory body established under the Sri Lanka Telecommunications Act No. 25 of 1991, as amended by the Sri Lanka

Telecommunications (Amendment) Act No. 27 of 1996. TRCSL is the successor to the Office of the Director General of Telecommunications. The Commission does not provide telecommunication services but encourages the efficient and orderly provision of these services by the private sector through a proper regulatory mechanism.

Given below are the present activities of TRCSL:

- Managing the radio frequency spectrum and maintaining this resource in the optimal level as the sole manager.
- Licensing telecommunication (terrestrial, mobile, satellite based, etc.) and Internet service providers and monitoring their performance.
- Supervising imports of telecommunication equipment.
- Acting as a referee for licensed telecommunications operators.
- Acting in the public interest in terms of service quality and price, with regard to all communication facilities provided by the licensed service providers, and ensuring that tariff rates are reasonable from the consumers' perspective.
- Encouraging the expansion of telecommunications networks and new services through regulatory mechanisms.
- Ensuring that the different parts of telecommunication networks work together by enforcing and monitoring standardisation among different operators.
- Offering policy advice and license recommendations to the Minister of Telecommunications.
- Providing fair, transparent, prompt and effective decision processes to operators.
- Ensuring the public interest in telecommunications is safeguarded by conducting regular and frequent surveillance and public hearings.

Sri Lanka is presently undergoing a review and change of its telecommunications policy and regulatory framework. According to the top government official handling media and telecommunications, the partial liberalisation approach adopted thus far has left a number of complicated issues

"which thwart the rapid growth of the ICT industry". The concerns he identified include: monopoly versus perfect competition, a black market in telecommunications with the presence of illegal operators, marginalisation of the rural economy, market asymmetries, and bandwidth problems (Abeysinghe, 2002).

A draft new telecommunications policy was published in early 2002, accompanied by an invitation for public comments. The policy recognises the need to generate optimum opportunities for all citizens to participate fully in the interdependent global information economy by:

- Creating conditions for businesses located in Sri Lanka to engage in all forms of electronic commerce utilising state-of-the-art ICTs, thereby generating skilled and rewarding employment to Sri Lankans.

- Creating conditions for all citizens, be they resident in Sri Lanka or elsewhere, to support their economic and personal relationships and communicate with their government through efficient and economical use of ICTs.

- Using ICTs to improve governance.

The draft policy states that the government will promote the broad development of a comprehensive Sri Lanka information infrastructure (SLII) covering all aspects of ICTs. It also recognises that 'traditional broadcast television and radio technologies are all converging with the telecommunications field' and states that these trends and the evolution of the SLII 'require that this policy address all aspects of the Sri Lankan ICT industries in an integral manner.'

It is however unclear how this telecom policy would augment the ICT Roadmap.

A specific policy framework pertaining to Internet use is yet to be made operational in Sri Lanka (India being the only South Asian country to have done so). The Internet is currently covered within the ambit of the telecommunications policy

[2.2.4] Internet

From the beginning, Sri Lanka has allowed complete freedom of access and content generation vis-à-vis the World Wide Web. Laws and regulations only govern the operation of Internet service providers (ISPs) and country domain name registration.

TRCSL issues licences for telecommunications service providers, including ISPs. As at 1July 2002, 30 companies had been granted licenses as ISPs, with validity periods ranging between five and ten years. The regulator in 1997 decided to charge a one-time license fee of Rs. 3,000,000 (about US$ 31,000) from all new ISPs. This amount has been considered excessively high by licensees. ISPs in turn pass on this cost to the customers, making Internet services too expensive. At the same time, it has been argued that this high fee will discourage start-up companies from entering the ISP market without adequate resources and commitment (Gunawardena & Wattegama, 2003).

There are no specific laws or regulations covering the operation of cyber cafés or tele-centres.

CINTEC functions as the network information centre and administrator for Sri Lanka country domain (.lk) registration. On CINTEC's behalf, registration is handled by the Department of Computer Science and Engineering in the University of Moratuwa. First and second level domain names are considered for registration. The basic policy and procedures of domain name registration are outlined at the registry's website http://www.nic.lk.

The CINTEC Internet Committee regularly reviews and updates the policy it has drafted on the registration of domain names. Any organization, within or outside Sri Lanka, can reserve names in the .lk domain, but only organizations actually carrying out activities in the .lk domain need to register the name. The Committee has also set up a panel of experts who review domain name applications whenever there is doubt as to whether the name sought conforms to the prescribed guidelines (CINTEC, 2003).

[2.3] Key regulatory instruments covering the digital media

As of March 2003, the Computer Crimes Bill had not been adopted into law, and as a consequence Sri Lanka lacked the legal framework for most IT applications. The digital signatures are recognised only within limited scope of some operations. For example, Central Bank of Sri Lanka recognizes digital Signatures for some transactions it does with other banks and financial companies.

These lacunae in law have been recognised by both the Judicial Reforms Commission and the Law Commission of Sri Lanka, but it is not simply the absence of enabling legislation. While the new Computer Crime Bill's 27 sections are fairly comprehensive, experts have cautioned that its eventual implementation will encounter procedural and operational difficulties due to the dearth of police and judicial officials proficient in IT. Thus, even if the bill is passed in the near future, enforcing its provisions will pose formidable challenges.

There are currently no official plans to set up the necessary legal infrastructure with respect to electronic transactions, privacy and security regulations. Even the ambitious ICT Roadmap does not place adequate emphasis on these essential areas.

[2.4] National ICT infrastructure

[2.4.1] Telecom infrastructure

Although the telecommunication history of Sri Lanka spans over 100 years, it was only since the mid-1980s that the ICT infrastructure was established following economic liberalisation and gradual deregulation. The first step in restructuring the telecom sector was made in 1980 when the postal service was separated from the then Department of Posts and Telecommunications. But it was only in 1991, after the department was transformed into a government owned corporation called Sri Lanka Telecom (SLT) that the pace of development accelerated.

However, the private sector's participation in the telecom sector preceded this by a few years. In 1989, a private company introduced the country's first mobile phone service, which was also the first in South Asia. In the 1990s, other companies entered the mobile phone market, which expanded rapidly partly due to the long waiting list for fixed phones. In the mid-1990s, private companies also introduced wireless local loop (WLL) telephone services, which spurred competition in the fixed phone market (Gunawardene & Wattegama, 2001).

Drastic changes have occurred in the telecommunications sector since 1990. The fixed access (both wire-line and WLL) telephone connections rose from 121,388 in 1991 to 883,108 in 2002 – a growth of over 700 percent. The number of WLL connections provided by two operators in Sri Lanka stood at 114,488 in 2002, a slight drop from the previous year. Perhaps the most significant trend in the telecommunication sector is the phenomenal growth of the number of cellular connections, which increased from just 1,800 in 1991 to a staggering 907,422 in 2002. In 2001 and 2002, the cellular services expanded by 55 and 37 percent respectively, resulting in the ratio of mobile phones to fixed access telephones being 1:3. The overall tele-density was 9.6 phones (fixed and

mobile) per every 100 persons in 2002. That year, there were 6,681 payphone booths and 5,516 radio pagers in Sri Lanka. However, the personal digital assistant (PDA) usage was still extremely limited. Commercially available satellite phone services were introduced in early 2002, and the number of users remains small, mainly due to the high cost of the hardware and operation (TRCSL data).

Table 2.1 shows the growth of these services during the last ten years.

Table 2.1: The growth of telecommunication services in Sri Lanka

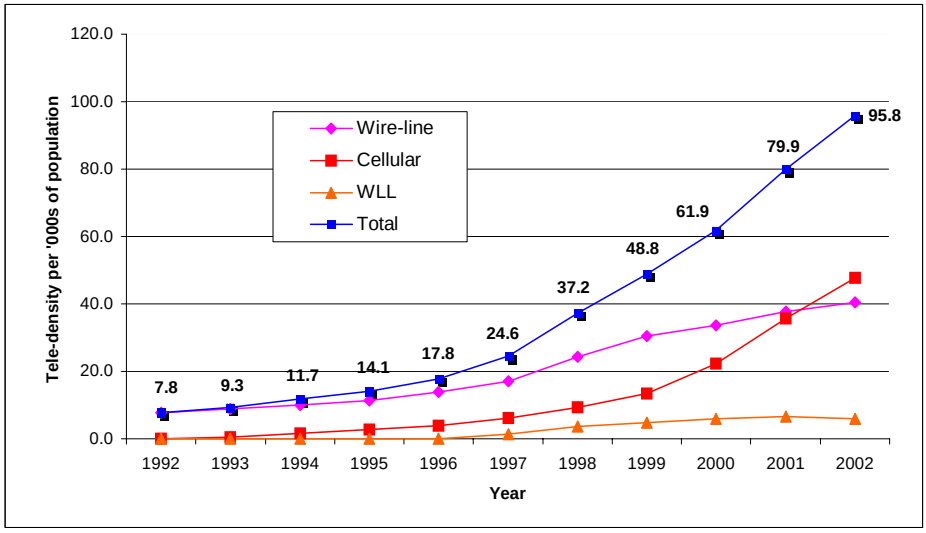
Year	Population in '000s	Wire-line Phones	Cellular Connections	WLL Connections	Public Payphone Booths	Radio Paging Services
1992	17,426	135,504	-	-	-	-
1993	17,646	157,774	6,242	-	-	-
1994	17,891	180,724	29,182	-	905	6,302
1995	18,136	204,350	51,316	-	1,597	9,565
1996	18,336	254,500	71,028	527	3,002	10,721
1997	18,552	315,241	114,888	26,381	3,682	10,829
1998	18,774	455,598	174,202	67,931	4,761	10,511
1999	19,043	580,199	256,665	91,717	5,799	10,300
2000	19,359	653,144	430,202	114,267	8,222	7,009
2001	18,732	708,200	667,662	121,082	7,281	6,535
2002	19,007	768,620	907,422	114,488	6,681	5,516

Source: Economic and Social Statistics of Sri Lanka, 2002, Central Bank of Sri Lanka

It is interesting to note that the numbers of both payphone booths and radio paging services have declined slightly in the recent past. The number of WLL connections also dropped in 2002. Cellular phones showed a steady and significant growth, while fixed access phones also increased, but not so significantly. This indicates that (as in some developed countries), the cellular mode of communication is getting extremely popular with users giving up other modes of telecommunication facilities in favour of cellular connections. The reduction in the payphone booths, radio paging services and the WLL connections too can be largely attributed to the great popularity of cellular phones.

Graph 2.1 shows the change in tele-density over the past 10 years, both in different modes and as an aggregate.

Graph 2.1: Tele-density growth during the past ten years



Source: Economic and Social Statistics of Sri Lanka, 2002, Annual Report 2002, Central Bank of Sri Lanka

[2.4.2] IT and Internet infrastructure

The computer population began growing in the late 1980s with the introduction of personal computers (PCs). The latest available data from the International Telecommunications Union (ITU) show the total number of PCs at 150,000, which means a density of 0.79 PCs for every 100 persons. This figure is only a rough estimate, as there is no mechanism to track such data (Gunawardene & Wattegama, 2003).

Although Internet and email facilities have been available in a few academic institutions since 1984, Internet access on a commercial basis became available in Sri Lanka only in April 1995, when a private company, Lanka Internet Services Limited (LISL) commenced operations. Sri Lanka was the first country in South Asia to have unrestricted, commercial Internet access (Wattegama & Sreekanth, 1998).

SLT launched its own Internet service in August 1995, and in the subsequent seven years several more ISPs entered the market. By July 2003, 30 companies had obtained licenses from the telecommunications regulator to

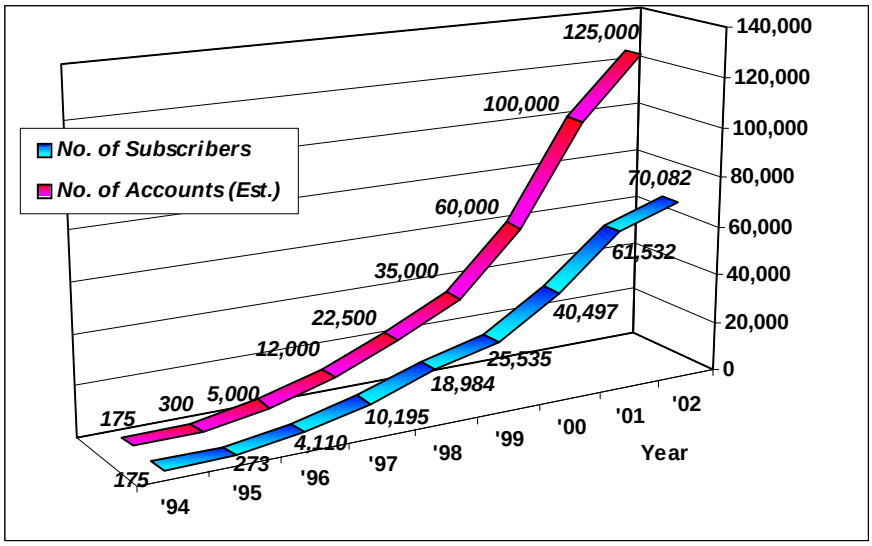
provide Internet services. However, not all have started Internet services yet. A few companies are known to offer Internet services without a license. Because of these irregularities, official statistics do not reveal the true picture of Internet services and users in Sri Lanka.

According to TRCSL, the total number of Internet accounts was 70,082 by end 2002. ITU data for 2001 gives the total number of Internet users in Sri Lanka as 150,000.[9] Meanwhile, industry data indicate that subscribers to Internet and email services grew by 52 and 14 percent respectively during 2001 and 2002 (Central Bank, 2003).

It is not desirable to depend solely on TRCSL data, as it provides only a partial picture. TRCSL only provides the numbers of Internet / email subscribers through licensed ISPs. These figures would have been fairly near the respective numbers of Internet / email accounts during the first few years, but now the situation is quite different, as this number of subscribers does not include the Internet / email accounts provided through corporate servers.[10] Hence to accurately indicate the number of Internet accounts it is necessary to do an estimate of the total number of Internet / email accounts.

The graph (2.2) shows the authors' estimate of the number of Internet / email accounts against the official TRCSL figure of Internet / email subscribers. Using a conservative figure of three users per one Internet account, the current number of Internet / email users can be approximated to 375,000 or roughly 20 users per every 1,000 people.

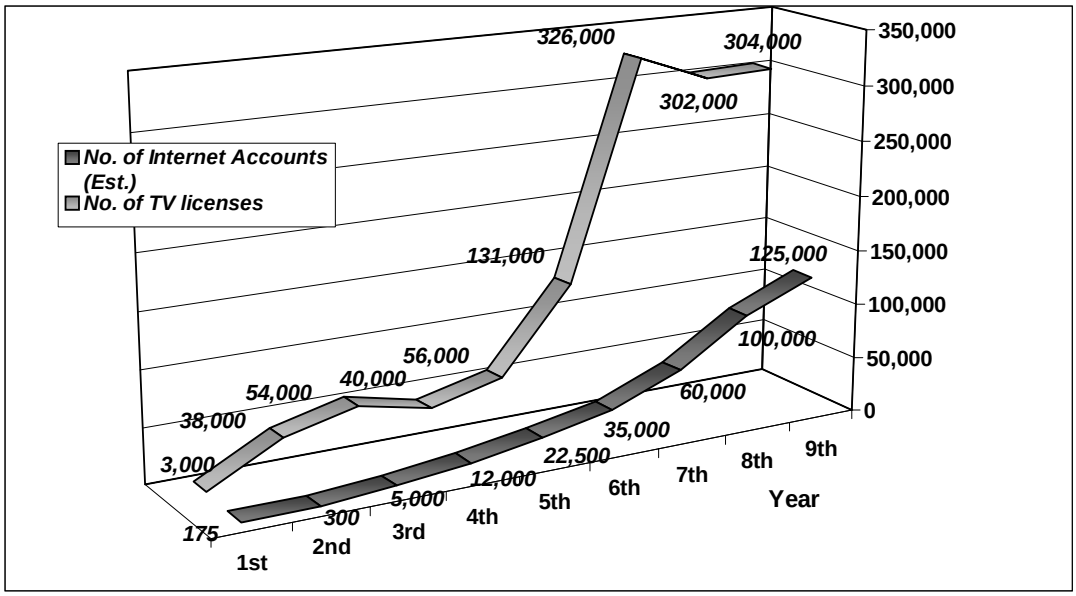
Graph 2.2: Growth of Internet in Sri Lanka (from 1995 to 2002)



Sources: Telecommunications Regulatory Commission of Sri Lanka and authors' estimates

It is also noteworthy that the growth rate of the Internet user base in Sri Lanka was significantly lower than that of the television viewer base during its first eight years which is contrary to the pattern in many other countries.[11] The graph (2.3) shows the number of Internet accounts provided against the number of television licenses issued within the first seven years of each medium. This clearly reveals that the Internet has failed to penetrate a larger section of the population, as television did more than 15 years before.

Graph 2.3: Growth of Internet vs. growth of television
(within the first eight years of introduction of each media)



Sources: Central Bank of Sri Lanka and authors' estimates based on Telecommunications Regulatory Commission data

As in the case of many countries that provide Internet access through multiple ISPs, Sri Lanka too initially faced a problem of interconnectivity between the local ISPs. This resulted in data transfer between two local machines located close to each other physically, but connected through different ISPs, going through the Internet and possibly travelling millions of kilometres. To avoid such data transfers congesting Internet traffic and consuming valuable interconnection bandwidth, a local Internet exchange point (IX) has been installed by a consortium of Internet Service Providers to route all the local traffic through the IX rather than through the Internet (CINTEC, 2003).

[2.4.3] Broadcasting infrastructure

Sri Lanka claims a long broadcasting history, which began in 1925 with the use of radio to transmit the then British Governor's speech. Incidentally, Sri Lanka –

then Ceylon – was the first British colony to introduce a radio broadcasting service. In the early years, broadcasting was only in English, but in 1931 Sinhala and Tamil services were launched. In 1949, the year after independence, the government established the Department of Broadcasting, which came to be popularly known as 'Radio Ceylon'. This was popular not only in this country, but also within a large part of South India, which was covered by the transmissions. Simultaneous broadcasting in all three national languages began in 1950, while an education service was introduced a year later (Gunaratne & Wattegama, 1998). Sri Lanka Broadcasting Corporation, imitating the BBC model, was formed in 1969. Until the mid-1980s, radio broadcasting was a government monopoly, with two services (national and commercial) in each of the three national languages, and a few regional services in Sinhala.

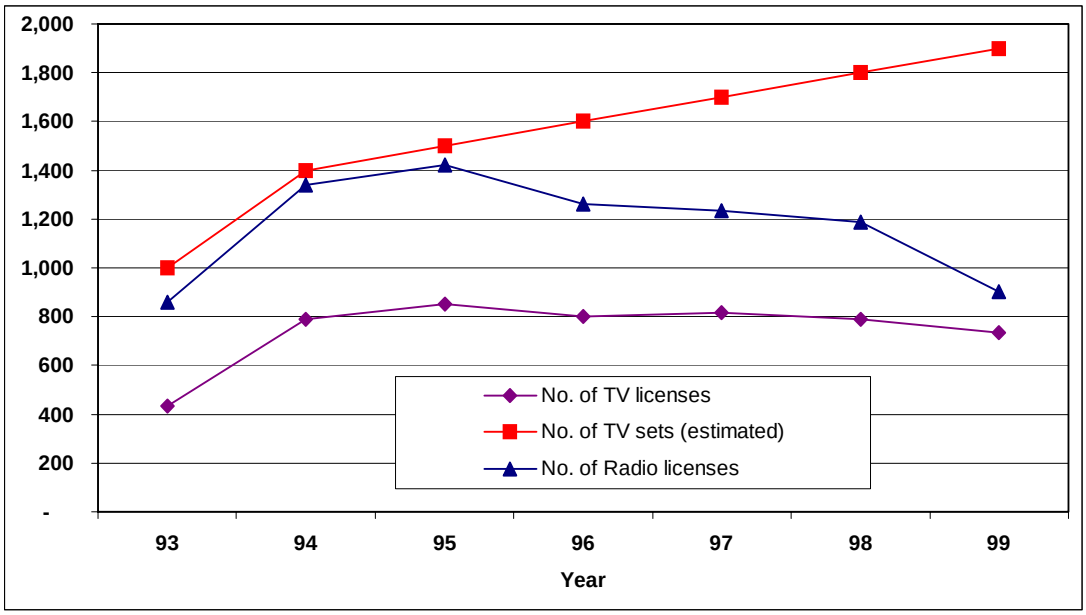
The television services in comparison have a relatively short history. The first television service was introduced only in 1979. This service, which covered only limited parts of the island, mainly Colombo city, was taken over by the government a few months later. A national television service to cover almost the entire country was established in 1982 with Japanese aid. Initially the telecasting too was a government monopoly. During the first few years, the programmes were largely imported, and invariably in English. In 1982, 52 percent of the programmes were in English, 39 percent in Sinhala and 9 percent in Tamil. By 1996, the Sinhala content had increased to 53 percent, Tamil to 16 percent, while the English content declined to 31 percent (Central Bank, 1998).

At present, there are several radio services in addition to the national service. Among these, the frequency modulation or FM services are very popular. Sirasa, Savana, Lakhanda and Hiru cater to the Sinhalese audience, while Yes FM, Sun FM and TNL Radio focus on English listeners. FM 99 and Sooriyan are aimed at a Tamil audience. There are a few community radio services to serve selected rural communities. Despite the advent of more advanced media, radio services are still quite popular in Sri Lanka.

As for television, the situation is not different. After the government relaxed its broadcast monopoly in 1992, several private sector players began operations. Some of the most popular television services include MTV, Sirasa TV, Shakthi TV, Swarnavahini, ETV, TNL and Dynavision (ARTv). This is in addition to the three government owned channels Rupavahini, Independent Television Network (ITN) and Channel Eye. Among the private channels, only a few concentrate on a wider national audience while the rest cater to a limited English-speaking audience by mainly telecasting imported programmes. The government channels by no means hold a monopoly, but they enjoy the largest percentage of audience, probably due to their coverage throughout the island. The Sirasa and Swarnavahini channels have won the public trust for unbiased news presentations, while the public generally feels that news presented by the government controlled channels lack credibility.

It is not possible to accurately assess radio and television penetration. Until 1999, details of radio and television licenses taken were available. These provided some sort of indication as shown in graph 2.4, but that too was not exact, as many radio and television sets in the country were being used without a license. However, even this indicator has been unavailable for the years after 1999, as the government decided to waive the licence fees for using radio and television sets. The average number of listeners / viewers per radio or television set can be estimated to be 4 – 5, which is the average number of members in a household.

Graph 2.4: Radio and television penetration (in '000s)



Source: Sri Lanka Broadcasting Corporation and Sri Lanka Rupavahini Corporation data quoted by Central Bank in 'Economic and Social Statistics of Sri Lanka', 2002

[2.4.4] People's access to technology

The telecommunication and Internet users are predominantly based in the Greater Colombo region where economic activity is also concentrated, and where a fifth of the population lives. Likewise, 70 percent of the country's communication infrastructure is concentrated in the Western Province (where Colombo is located). ICT proliferation outside Greater Colombo is still limited due to a number of reasons, including the high cost of Internet access, lack of English proficiency, lack of computer literacy and technical difficulties. Due to the low Internet proliferation outside Greater Colombo, ISPs have not installed local Internet servers outside major cities. This means users in such areas have to dial long distance to a server in Colombo each time they access (Gunawardene & Wattegama, 2003).

The telecommunication and Internet access charges in Sri Lanka are relatively high compared to those of industrialized countries. An Internet user in July 2003 in Greater Colombo had to pay between US$1.80 to US$2.15 per hour (including all taxes) for Internet access; the exact amount depends on the kind of package and the number of hours used. A resident outside Greater Colombo pays between US$2.45 to $3.45 per hour. Cyber cafés in Colombo charge US$1.20 to $1.50 per hour of access (Wattegama, 2002c).

In an attempt to reduce the urban-rural disparity, TRCSL has coordinated the establishment of 41 tele-centres in rural areas, each equipped with Internet and email facilities. Commercial operators are also offered incentives to expand payphones in rural areas. Meanwhile, a telecom development fund, to be supported by private sector and donor funds, is envisaged by ICTA to support telecommunication projects in rural areas by offering subsidies (as compensation for operators working in uneconomical circumstances) and possibly fund common infrastructure in these areas.

The quality of Internet access varies in different parts of the island and comparisons are not possible due to the dearth of research and data. Several factors determine the speed of Internet access. Lack of international bandwidth has been a major issue ever since commercial Internet facilities commenced, and the poor quality of telecommunication facilities is another limiting factor. Although high-speed asynchronous digital subscriber line (ADSL) [2MB] and integrated services digital network (ISDN) [64 kbps] facilities are available in Colombo city and some suburbs, their high cost prevents wide usage. Data transfer speeds on narrowband access, using modems up to 56 kbps capacity, vary between 28 kbps and 36 kbps, while in rural areas this speed is sometimes low as 14.4 kbps.

In the absence of an organized consumer group to safeguard user interests, ISPs have been known to offer substandard service. Many ISPs have not expanded their modem pool to match the growth of their customer base, which results in severe difficulties of dial-up access during peak hours. Some ISPs lack adequate back-up systems for complete redundancy; in times of power failures or technical problems, servers have been known to remain out of order for several days, severely hampering and inconveniencing users. The lackadaisical attitude of leading ISPs has prompted frustrated subscribers to select new ISPs that promise better services (Gunawardene & Wattegama, 2001).

[2.4.5] Internet user profile

Due to the lack of data, it is difficult to map out ICT user profiles in Sri Lanka. The Internet users seem to be mainly urban residents and corporations who can

afford the high connection charges and the necessary computer facilities for access.

One study of 560 Internet users in Sri Lanka (Shrestha & Amarasinghe, 2001) yielded the following facts:

- 71 percent of respondents were male, and 17 percent were female (while12 percent did not indicate their gender).
- The largest number of Internet users fell under the 26–35 years age group (23 percent), followed by the 36–45 years group (21 percent) and the 19–25 years group (19 percent).
- Almost 6 percent of the users were 18 years or younger, while 8 percent were over 56 years.
- More than a third of users had completed at least a basic degree; 13 percent were still engaged in full-time studies.

Direct satellite-based service usage in Sri Lanka is still extremely low. Although there were plans to establish island-wide cable TV networks, nothing has materialised thus far.

[2.5] ICT industries and services

[2.5.1] Hardware manufacturing and assembly

Sri Lanka has not developed hardware manufacturing to an appreciable extent. Only a few electronic items and components are manufactured locally. Attempts to manufacture hardware items, such as hard disks and memory chips, have not been very successful. For example, Fujitsu once operated a branch in the Katunayake Export Promotion Zone producing hard disks but this venture was later abandoned as it was not sustainable.

However, the assembling of PCs locally is widespread. This practice began in the early 1990s as an alternative to the more expensive branded machines. A locally assembled entry-level PC now costs between US$ 500 to US$ 750, while a branded machine with comparable features costs between US$ 900 to US$1,000. The locally assembled PCs have gained popularity particularly among domestic and individual users. An estimated 300 companies are engaged in this trade in Colombo alone (Gunawardene & Wattegama, 2003).

[2.5.2] Software origination

The Sri Lankan software industry, though still in its infancy, has grown impressively during the last five years. Software exports, which stood at around US$ 5 million in 1996, increased to US$ 58 million in 2000. This figure was expected to hit the US$ 75 million mark in 2001, but the recession in global markets had an adverse impact. However, this figure too is an estimate, as the Central Bank still does not recognise the IT industry as a separate sector (Wattegama, 2002b).

Notwithstanding this temporary setback, the Sri Lankan software industry has shown an average annual growth rate of around 40 percent from 1996 to 2001. According to the Board of Investment (BOI), there were around 50 Sri Lankan software development houses with an employee strength of 25 or more in July 2003. Some of these firms are located in Colombo's World Trade Centre, the first software park, which was established in 1999 (Wattegama, 2002b).

Sri Lanka's strengths in software development include a well-trained labour force that can be employed at relatively low cost, an English-speaking business community and various tax incentives from the government. The security situation that discouraged some foreign investors improved significantly during 2002. The BOI has introduced special incentives to encourage companies involved in software development. A software company that exports more than 70 percent of its output is given an eight-year comprehensive tax holiday, followed by a twelve-year 15 percent concessionary tax holiday. A software company that caters mainly to the local market is offered a five-year tax holiday.

[2.5.3] Services

Among the services on offer are digitalising services, creation of digital videos, and the development and hosting of websites. However, business volumes in these ventures have not yet reached appreciable levels, except for multimedia developments for the international entertainment industry. IT-related consultancy services are also in the early stages, although many management consultancy firms have added IT related services such as IT strategy preparation, business process reengineering, post implementation reviews, business contingency plans, etc.

A new area now being developed is offshore call centres, where Sri Lanka-based staff respond, over long distances, to customer enquiries directed at multinational corporations. The first call centre was commissioned in February 2002, and uses voice over Internet phone (VoIP) technology. These centres serve British and North America-based clients' requests (by live telephone or the post).

[3.0] ICT impact on human development – eradication of poverty and hunger

[3.1] Background - Poverty in Sri Lanka

Sri Lanka can be regarded as a model to illustrate the multidimensional nature of poverty. On the one hand, the country has made some progress in reducing poverty since independence. These gains are reflected in the impressive human development indicators, which distinguish Sri Lanka from other low income countries.

On the other hand, despite these achievements, poverty levels in Sri Lanka remain high with regard to certain indicators. Progress in poverty reduction in the early 1990s has not been satisfactory in spite of the considerable funds invested in poverty alleviation programmes. Large regional variations in poverty remain (Ministry of Finance, 2002).

Although the country has a long record of being a welfare state, it does not have an officially designated poverty line applicable across all sectors / programmes (Alailima 1997). This is a major problem in tracking changes in poverty status. Thus, considerable mismatches are evident in the poverty data presented by different authorities. This can be due not only to differences in methodologies but also as a result of the variations in selected baskets and sample sizes in different surveys. Absolute poverty is most commonly measured by the ability of a household to afford a minimum set of consumption requirements. In this approach, a food poverty line is first derived using the cost of a food bundle that satisfies a food energy requirement, at given tastes and preferences. An amount equal to the average non-food consumption of those who can just afford to meet their food energy requirements is added to this. Twenty percent is added to the low poverty line to take into consideration the arbitrariness that necessarily exists when a poverty line is defined. For 1996/1997, provisional estimates based on Central Bank data defines the lower poverty line at Rs. 860 per person monthly and the higher poverty line at Rs.1,032 per person monthly. The Department of Census and Statistics recognises the lower poverty line at Rs. 791 and the higher poverty line at Rs. 950 (Ministry of Finance, 2002).

Table 3.1 shows percentages of the population living below poverty lines as defined by two different authorities.

Table 3.1 : Percentages of population living below poverty lines

Department of Census and Statistics (95/96)		Central Bank of Sri Lanka (95/96)	
Lower Poverty Line (Rs. 791)	Higher Poverty Line (Rs. 950)	Lower Poverty Line (Rs. 860)	Higher Poverty Line (Rs. 1,032)
25%	39%	19%	31%

Source: 'Poverty Reduction Strategy Paper', Ministry of Finance, 2002
In 1995, the exchange rate was approximately US$ 1 = SL Rs. 50.
This data does not cover the Northern and Eastern provinces.

Adding to the confusion, the percentage of the population living below US$ 1 and US$ 2 per day are given as 6.6 percent and 45.4 percent respectively for the period 96/97. The mean nominal per capita income was Rs. 5,760 (then about US$ 110) while the median stood at Rs. 3,878 (then about US$ 75) per month. The average daily energy intake was 2,337 kilocalories (Central Bank, 2003).

Due to the absence of a standard set of poverty data, different poverty alleviation programmes have used their own cut-off points in providing financial assistance to the poor. In most cases, the income-based cut-off point appears to have been decided on an ad-hoc basis (Tudawe, 2000). In 2002, nearly 1.9 million families or roughly half of the population directly benefited from the Samurdhi welfare programme – the main poverty alleviation initiative at present (Central Bank, 2003).

The remainder of this chapter is mainly based on data from the Department of Census and Statistics, which appears to be the most widely used source.

[3.1.1] Provincial variations in poverty

Among the provinces for which there are reliable data, the Western Province is the least affected by poverty while the Uva Province is the worst affected.[12] However, North and Eastern provinces which are the areas worst affected by conflict, are also widely believed to be very poor, although at present there are no reliable statistics for these provinces. Only 14 percent of the population in the Western Province live under the lower poverty line, which is far below the national average, whereas over one third of the population of the Uva Province fall into this category.

Table 3.2: Poverty within selected provinces

Province	Lower Poverty Line (%)	Higher Poverty Line(%)
Western	14	23
Central	28	43
Southern	26	41
North Western	34	52
North Central	31	47
Uva	37	55
Sabaragamuwa	32	47

Source: Household Income and Expenditure Survey 1995/96, Department of Census and Statistics
Quoted by: Ministry of Finance in 'Sri Lanka's Poverty Reduction Strategy'

[3.1.2] Urban-rural disparities

Poverty is a greater problem in rural areas than in urban areas. The plantation (estate) sector in the central part of the island experiences more poverty than the rest of the country as measured by the higher poverty line given in table 3.3.

Table 3.3: **Poverty within sectors**

Sector	Lower Poverty Line (%)	Higher Poverty Line (%)
Urban	15	25
Rural	27	41
Estate	25	45
Overall*	25	39

Source: Household Income and Expenditure Survey 1995/96, Department of Census and Statistics

** Excluding North and East Provinces*

Lack of infrastructure and access to utilities in rural areas and the uneven nature of development have contributed to this situation. Underdeveloped road networks and transport services and limited access to basic utilities like safe drinking water and electricity deny opportunities in the rural sector. A simple comparison illustrates this disparity – the time taken to reach the nearest bus stop in rural areas is more than twice that in urban areas, and over thrice that time in the estate sector.

Table 3.4: Access to basic utilities and services by sector

	Access to (%)			Average travel time (minutes)		
Sector	Safe drinking water	Safe sanitation	Electricity	Main road	Bank	Bus halt
Urban	97	91	84	11	12	13
Rural	74	72	57	19	28	24
Estate	72	60	43	38	50	44

Source: The World Bank, Sri Lanka Poverty Assessment, based on Sri Lanka Integrated Survey 1999/2000

The urban-rural disparities become more evident in the percentages of food expenditure in different sectors. The percentage of food expenditure to total expenditure – or the 'food ratio' – is higher in communities more vulnerable to poverty. Households spending more than 50 percent of the expenditure on food and where the average adult equivalent food expenditure is less than Rs. 1,338.48 (about US$ 14) per adult per month are regarded as poor households.

Table 3.5 gives the food ratios and the percentages of poor households in each sector.

Table 3.5 : Food ratios and poor households in different sectors

Sector	Average food ratio (food expenditure to total expenditure as a percentage)	Percentage of poor households
Urban	35.9	7.6
Rural	45.3	26.4
Estate	60.1	23.2
Overall	43.8	23.9

Source: Department of Census and Statistics, Household Income and Expenditure Survey, 2002

Table 3.6 shows the sector-wise average monthly household expenditure components.

Table 3.6 : Household expenditure by components in different sectors

Expenditure Component	Urban	Rural	Estate	Overall
Food & drink	35.9	45.3	60.1	43.8
Liquor & tobacco	1.8	2.6	3.7	2.5
Housing	18.8	9.5	4.9	11.9
Fuel & electricity	4.0	3.8	4.9	3.9
Clothing	2.7	2.6	3.8	2.7
Personal care & health	4.0	4.3	3.4	4.2
Transport & communication	8.8	6.9	2.1	7.1
Consumer durables	2.9	2.9	1.5	2.9
Education	4.0	2.8	2.6	3.0
Other	17.9	19.3	12.9	18.6

Source: Department of Census and Statistics, Household Income and Expenditure Survey, 2002

This indicates that while expenditure on food items is relatively high in the rural and estate sectors, the housing expenditure is high in the urban sector. There are no drastic differences in the percentage-wise spending on basic facilities such as education and healthcare, but when translated to real figures, rural and estate sectors spend much less on these. Another notable fact is that spending on liquor and tobacco is high in the rural and estate sectors. Interestingly, the estate sector also has significantly lower spending on transport and communication, perhaps suggesting that they are a marginalized group in terms of access to ICTs.

[3.1.3] Poverty among economic sectors

In a country where almost a quarter of the labour force is engaged in agriculture, the agricultural sector suffers very high levels of poverty. Half of all people engaged in agriculture fall below the higher poverty line. This is 42 percent of the total poor in the country. The mining, quarrying and construction industries show a high level of poverty too, though their contribution to overall poverty is low due to the relatively smaller size of these industries. The level of poverty among the unemployed and labour force non-participants is relatively low at 28 percent, contributing 5 percent to overall poverty.

Table 3.7: Poverty occurrence in different sectors

Sector	Occurrence of Poverty [(a)] (%)	Contribution to overall poverty [(b)] (%)
Agriculture	51	42
Mining and Quarrying	59	2
Manufacturing	36	11
Construction	44	7
Wholesale and Retail Trade	30	9
Transportation	26	4
Finance	10	0.4
Communication	23	10
Unclassified	67	10
Unemployed/Non-Labour Force Participants	28	5

(a) Head count based on higher poverty line.
(b) Share of total poor, based on higher poverty line
Source: Household Income and Expenditure Survey 1995/96, Department of Census and Statistics
Quoted by: Ministry of Finance in 'Sri Lanka's Poverty Reduction Strategy'

[3.1.4] Poverty alleviation programmes

Sri Lanka's main national poverty alleviation programme – the Samurdhi programme initiated in 1995 – consists of a cash transfer, a savings component, credit programmes and capital development programmes. It includes several loan schemes made available through the state banks. The Samurdhi Development Credit Scheme (SASANA) for development purposes and the Samurdhi Enterprise Credit Scheme (SAVANA) for entrepreneurs are two such major schemes.

Small-scale capital development projects are conducted under the Samudhi programme utilising the labour of Samurdhi recipients and funds from the Samurdhi Authority to rehabilitate and develop local community infrastructure. Large-scale projects involving the improvement of infrastructure such as roads, irrigation canals, bridges, and community centres are fully funded by the Samurdhi Commissioner's Department and are expected to provide off-season employment for Samurdhi recipients.

Various other programmes such as scholarships, rehabilitation of alcohol addicts, vocational and technical training, and social mobilisation programmes are also carried out under the Samurdhi programme.

There are also several other programmes conducted by the government and NGOs aimed at poverty alleviation. They include Sarvodaya Economic Enterprise Development Scheme (SEEDS), which is part of Sri Lanka's largest NGO, Sarvodaya; the farmers' banks pilot project handled by the Ministry of Agriculture and Lands; and the *Gami Pubuduwa* scheme conducted by a private commercial

bank. These are examples of rural and semi-urban micro-finance schemes that are operating in the country.

NGOs and state agencies engage in vocational training and skills development projects. Some of these programmes seek to provide trainees with skills to obtain jobs in the urban sector while others aim at establishing small-scale cottage industries in rural areas.

[3.1.5] Poverty in the Northern and Eastern provinces

The dimensions of poverty in the Northern and Eastern provinces, which have experienced a long-running armed conflict, are quite different from other parts of the country. Loss of civilian life, physical and psychological trauma, the horror of forced displacement, the disintegration of community social networks, forcible recruitment into militant organizations, constant fear and uncertainty, and prolonged dependence on external relief are all facets of impoverishment in the north-east. There has been a severe deterioration in the general economic, social and physical conditions of the Northern and Eastern provinces over the past two decades. The contribution of these regions to national GDP has declined from 15 percent in the 1980s to just 4 percent in 1997. There has also been extensive damage to private and public property. Educational attainment rates have sharply fallen, school drop-out rates are substantially higher than in other parts of the country and malnutrition is highly prevalent. Qualitative reports suggest that income poverty as well as health care, education and economic conditions are far worse in areas affected by the civil conflict than in other parts of the country.

No reliable information is yet available to indicate the depth of poverty in these two provinces. Based on the limited sources of information, the incidence of consumption poverty is likely to range between 25 percent and 55 percent. The lower estimate is consistent with the preliminary findings of the World Bank's integrated survey, which suggests that consumption poverty in the cleared areas of the north-east would be the same as for the country as a whole (i.e. 25 percent).

There has been much human suffering and displacement arising from the civil conflict. During the two decades of war, it is estimated that well over 60,000 people died, while a large number were incapacitated or injured. The vast majority of civilians residing in the north-east have been displaced. Table 3.8 shows the percentages of families estimated to have been displaced during the 20-year civil conflict.

Table 3.8: Percentages of families displaced (estimates)

District	Jaffna	Ampara	Batticaloa	Trincomalee	Mannar	Vavuniya
Number of families (estimated)	150,000 [(a)]	150,000	120,000	80,000	25,000	35,000
Percentage of families displaced	50%	40%	75%	70%	95%	84%

Source: Ministry of Finance in 'Sri Lanka's Poverty Reduction Strategy'
(a) This approximate figure was obtained by dividing the population by the average number of members in the household in Sri Lanka

Dislocation has resulted in a loss of livelihood, severe stress and the breakdown of families and communities. Many of those who were not displaced or resettled have also been pushed down below the poverty line as their economic activities were affected by the conflict. Transport and security restrictions have periodically disrupted the marketing of commercial agricultural products and fisheries – two key sources of income in the rural parts of the province.

People living in camps for the displaced are the most vulnerable in the north-east, as they are likely to suffer from high levels of malnutrition and stunted growth. Many children are traumatised after living in camps for years – their problems include overcrowding, inadequate shelter, water and food, sanitation, and little access to health and educational services. The more vulnerable groups also include families headed by widows, families with disabled members, orphans and families with members suffering from psychological trauma (Ministry of Finance, 2002).

[3.2] ICT in poverty alleviation programmes

In spite of the considerable number of poverty alleviation programmes launched by successive governments in the recent past, direct ICT usage is seen only rarely. As at mid-2003, there were no significant ICT components in any of the key poverty alleviation programmes, while micro-finance schemes were being carried out by rural banks or state banks with minimal ICT support.

On a few occasions, government, private and NGO sector institutions have launched ICT-related programmes aimed at reducing poverty and making ICT more accessible to the rural or poverty-stricken sections of the population.

In 1999, the Sri Lanka Export Development Board (SLEDB) established an e-commerce facility, 'Cyber Trader', to provide small-scale exporters with market access. There are four other 'e-commerce centres' operating in other districts in the southern part of the country, namely, Galle, Matara, Kurunegala and Hambantota. Exporters in the Colombo region are required to obtain

membership at Cyber Trader to use its services. So far, 638 small-scale exporters have registered as members. The services offered include provision of Internet and email connections, email accounts for small-scale exports maintained at the centre and web pages hosted on the Cyber Trader website. email inquiries received by SLEDB regarding Sri Lankan products and suppliers are distributed among the membership according to relevance, using email, fax or post. There is also an information service where officers of Cyber Trader browse the Internet at the request of exporters and pass on the information in the form of printed documents. Most information requests are regarding foreign buyers for their export products. Systems have not been developed to track the success rate and business transactions arising out of the contacts made using the Internet. However, the Galle and Matara e-commerce centres have managed to keep some record of business created through this service by building a good rapport with customers, who return and inform the officers about the outcome of their new business contacts.

[3.2.1] Prospective ICT usage for developing agricultural societies

The agricultural sector is an area of the economy that is still significant in the Sri Lankan context, despite the transition towards a liberalised economy for a quarter of a century. Together with forestry and fisheries, agriculture still constitutes about one-fifth of GDP and employs one-third of the workforce. Ironically, usage of ICT tools has been minimal in this area.

It is interesting to note that many issues faced by agricultural communities can be resolved through the proper use of ICT tools. The following list is extracted from a longer list of 31 issues identified by a researcher as being the major difficulties faced by villagers in the North Central Province, one of the foremost agricultural areas in Sri Lanka. These issues were raised by the people themselves during public hearings (Tennakoon, 2002):

i) Exploitation of resources and generated wealth by outsiders ('middlemen').

ii) Market oligopoly.

iii) Over-dependence on cereal farming.

iv) Lack of working capital and credit facilities.

v) Shortage of investment capital and investors.

vi) Educational backwardness.

vii) Lack of health and sanitary facilities and poor health awareness.

viii) Lack of understanding of available human resources.

ix) Lack of readiness for crisis management.

x) Lack of good governance.

Almost all these issues are due either to the unavailability of information to the villagers or their inability to interactively communicate with the outside world. The market oligopoly is largely due to the information asymmetry, and it is middlemen who benefit from this situation. This has resulted in a situation where an ear of corn is sold for about Rs.10 (about US$ 0.10) in the open market in Colombo, whereas the farmer receives no more than Rs. 2 (About US$ 0.02). This problem could be easily resolved if accurate, updated and reliable information relating to vegetable market prices, price fluctuations, demand, etc., is made available to villagers. Such information would also help them in deciding the different types of vegetables they should cultivate to meet market demand, instead of always engaging in cereal farming.

It is worth looking at how a multipurpose telecentre and Internet kiosk at each village can address these problems. This kiosk should be able to provide all the information the villagers need (market prices, demand for vegetables, where to buy farming equipment, etc.), while also creating a channel for them to interact with the outside world. This will also help them to voice their grievances to the relevant authorities whilst acting as a combined micro-bank / micro-post office / micro- government agency, etc., to fulfil the day-to-day requirements of the villagers.

This idea has already been taken up in the ICT Roadmap but it needs to be further developed to provide the most effective and efficient services to rural communities.

[3.2.2] Prospective ICT usage in micro-finance and rural banking

Traditionally, the Sri Lankan commercial banks were cautious in expanding their services to rural areas as the low profits did not justify the overheads and professional costs. This was the main reason why the government had to establish the state-owned People's Bank, nationalise the formerly elitist Bank of Ceylon and set up development-oriented banks and rural banks.

During the early 1970s, Bank of Ceylon was required to open branches at agricultural service centres in rural areas particularly to finance agricultural and

cottage industries with other off-farm income generating activities. The Central Bank of Sri Lanka too joined this effort in the 1980s by spearheading the preparation of the Regional Rural Development Bank Act No. 15 of 1985, and subsequently opening district-based regional rural development banks. NGOs also made significant attempts to introduce rudimentary forms of banking services based on small savings of the people themselves, which were later given to members as loans. Similarly, thrift and credit cooperative societies – popularly known as 'Sanasa' – were established to encourage savings and provide micro-finance facilities (Tennakoon, 1998).

This situation has largely changed within the last decade with commercial banks also expanding their branch networks and starting to serve a segment of the population they were not interested in earlier. In 2001, every district in the country, except for the war-affected areas, had at least 50 commercial and rural bank branches (Central Bank, 2002b). The *Gami Pubuduwa* scheme of Hatton National Bank is an example of the private sector contribution to rural banking. Other commercial banks too have introduced many products beneficial to rural communities.

The principal issue any commercial bank faces in extending services to rural areas is the rationalisation of high cost. As profit-oriented business organizations, commercial banks have an obligation towards their shareholders to make profits from their lending activities and remain in business competitively with rivals. Low profit margins against high human resource costs does not justify the traditional approach of branch network expansion to serve rural areas. Computerisation, as it is practised at urban branches, does not solve the issue due to high licensing fees of banking software packages. This calls for a different type of innovative and affordable solution.

One approach is to use locally developed simple and user-friendly standalone computer applications (as opposed to advanced banking packages) at rural banking centres. These provide facilities to carry out a limited number of transactions. Although they lack the sophistication an advanced package offers, the low cost fully justifies their use. The 'Micro Banker' package, still used by the state banks in their remote branches, is one example.

Developments in Internet banking services and the proliferation of telecommunication services to rural areas present another innovative approach. The solution proposed is to operate advanced Internet banking facilities in a village kiosk, probably maintained by a villager or an organized group, to provide financial services at village level. The 'e-Sri Lanka' programme too concentrates on the implementation of village kiosks, while NGOs such as Sarvodaya have already experimented with this idea. Thus, a joint effort by the commercial banks and these organizations can take the benefits of standard financial services to rural Sri Lanka within the next few years. Some underemployed graduates at

village level can be employed to run these kiosks, which will help resolve another social issue.

[3.2.3] Contribution of ICT towards industrial development

The full potential and value of the IT industry and telecommunication sector has not yet been recognised by economic analysts and planners. ICTs have not yet been identified as key components contributing towards GDP, in part because the sector is relatively small, and in part because it is not separated in production sector statistics. ICTs are presently included under the services sector, which constitutes nearly half of GDP.

In spite of their small sizes, the telecom and IT industries have witnessed phenomenal growth during the past five years. According to BOI estimates, software exports (which constitute the major portion of Sri Lanka's IT industry) have grown at a compounded rate of about 40 percent annually during the last few years. Although the size is still around US$ 75 million, if this same growth rate continues, the IT industry will become one of the most prominent industries in Sri Lanka by the year 2010 (Wattegama, 2002d). The telecommunication sector, which has been growing rapidly since 1996, achieved a growth of 25.5 percent in 2001. This was largely due to the dramatic increase of mobile phones by 55 percent. This high growth was the outcome of heavy investments in building infrastructure facilities, strong competition, aggressive advertising and innovative features (Central Bank, 2002a).

There is no doubt that the ICT industry, which currently is the fastest growing sector globally, could significantly contribute to combat poverty and accelerate economic growth. The ICT industry has been identified and promoted in Sri Lanka as a thrust industry that could greatly boost economic performance. It is widely accepted that the key ingredient for the development of the software industry – an educated potential workforce – is available in Sri Lanka, but is currently underutilized due to lack of employment opportunities.

The government has recognised the importance of developing the software industry and paid it much attention by including it as one of the main priorities in the ICT Roadmap. Some of the specific suggestions made towards achieving this end in the ICT Roadmap are as follows:

- Investments will be made both in primary and secondary education in computer literacy and English language. Skill levels in these subjects will be assessed for university admission to any course of study.

- Intensive post-secondary school (and postgraduate) training programmes in English, computer literacy and customer service operations will be

conducted to create a pool of 50,000 top-notch professionals prepared for call-centre and services outsourcing operations in the next five years.

- Complete autonomy for ICT schools within the public university system is given to enable them to rapidly move toward more competitive advanced ICT education.

- Gradual modernization and automation of major government departments will be carried out, with some projects targeted for Sri Lankan vendors to boost the domestic software Industry.

- Fast-tracked legislation and administrative reforms will be stabilised to remove obstacles faced by local companies and foreign investors, e.g. intellectual property rights, labour pool flexibility, immigration, bankruptcy and venture finance.

- Small but frequent 'trade mission' activities will be undertaken to promote Sri Lankan software companies in targeted markets (Middle East, Scandinavia, US) and to raise the country's image as a technology centre.

- A showcase technology park or industry zone will be established, demonstrating Sri Lanka's business-friendly environment, infrastructure and human resources.

It is also relevant here to look at how ICT is being utilized in other key industries conducive to economic development. Sri Lanka needs to identify industries that would place the country on a fast-track to growth, and how ICT can be effectively used to boost them. An important strategy is to identify industries with growth potential and formulate a development plan that builds on the effective use of modern technologies.

The tourism industry is a good example. Boosted by the peace process, it is showing signs of revival and could benefit greatly from ICT applications. Access to the tourist market through websites and email opens up vast possibilities. Unlike the local market, which is small in size in terms of Internet reach, the tourist markets in the West and Far East can be accessed through ICT tools. There are many websites promoting Sri Lanka as a tourist destination, including that of the Sri Lanka Tourist Board and those of various hotels and tour operators. Aggressive advertising on 'the Web' and developing accessible communication systems globally are relatively inexpensive ways of gaining visibility as a tourist destination. Such promotion needs to have sophistication, interactivity and customisation levels not yet seen widely in existing websites.

The banking and financial sector is another key area that has been reliant on ICT for a considerable time. The first attempt to use ICT for core business functions in the financial sector was in the early 1980s when local commercial banks began using countrywide computer systems to link their branches. In a parallel development, they also started establishing their own island-wide Automated Teller Machine (ATM) networks. This enabled the commercial banks to introduce the concepts of 'anywhere banking' and 'anytime banking' that meant the customer was no longer restricted to transact with a single branch or during working hours only. Other developments include the availability of international fund transfer facilities, tele-banking and Internet banking facilities and the rapid rise in credit card use.

Almost all commercial banks in Sri Lanka now maintain their own computerised branch networks connected by on-line systems, and together have about 1,500 branches. [13] The banking density, i.e. the number of commercial banks per 10,000 people was 0.6 in 2002, with the total number of ATMs at 635. The total number of credit cards was about 320,000 at the end of 2002. Of the total cards issued, 77 percent were usable for both local and international transactions (Central Bank, 2003).

In spite of these positive changes, the use of ICT facilities by most rural banks in Sri Lanka is still at a minimal level. Some of the larger branches of rural banks are equipped with a few computers, most of the time working in standalone mode, while many of the small branches still operate manually. The rural credit societies do not utilize ICT, mainly because their intermediary budgets cannot justify the relatively high cost of ICT usage. If these organizations are to be automated, it is imperative that a more economical solution than the use of normal PCs be introduced.

[3.2.4] Role of ICT in facilitating the search for employment opportunities

A few notable attempts have been made by some government institutions to facilitate the process of presenting employment opportunities by making the required information available on-line.

JobsNet [14] (or *Rekiya Piyasa*), an initiative by the Ministry of Employment and Labour, is an on-line and service centre based employment delivery network providing a user-friendly interface between people seeking employment and potential employers. The key objectives, as listed in the website, are to:

- Provide access to information in Sinhala, Tamil and English on jobs currently available both in the local and foreign employment markets and facilitate efficient placement into those positions on a merit basis.

- Proactively source employment opportunities from the government / private and NGO sectors, both local and foreign, and increase employment opportunities available for Sri Lankans.

- Operate a computerised interactive database network to serve as the nerve centre.

- Operate a network of outsourced centres and an Internet-based portal to serve as a direct access mechanism.

- Set up a network of employers' information from all sectors of the economy and sources abroad to be the employment providers.

- Set up linkages to skills / professional training and retraining organizations, and job counselling and recruitment centres to serve as an extension arm for providing training and counselling.

- Set up linkages to NGOs that are delivering social and employment services.

- Set up a mechanism to source overseas opportunities.

Although this effort does not directly aim to create new job opportunities, it intends to reduce the underemployment level by acting as an intermediary agent between job seekers and potential employers.

The website of Sri Lanka Bureau of Foreign Employment (SLBFE) [15] too provides information to those seeking foreign employment opportunities. It also provides other relevant information sought by prospective employees seeking foreign employment, such as country details and regulations, and the services supplied by the bureau. This attempt would be more worthwhile if the website also cater to Sinhala and Tamil readers, who constitute the vast majority of people seeking jobs in the Middle East. At present, the information is available only in English.

[3.2.5] Costs of ICT / Internet access to rural population

Interestingly, financial difficulty is not the only factor that prevents rural communities from further benefiting from ICTs. An analyst identifies the following as the non-financial issues that need to be overcome before access to ICT and particularly the Internet by the rural communities becomes a reality (Wattegama, 2002e):

- ***Lack of computer literacy:*** Though it is over a decade since PCs have been used in Sri Lanka extensively, many people, especially those in rural areas, lack computing skills.

- ***Reluctance to attain new skills:*** Many Sri Lankans believe that ICT is not for them as they perceive they are either too old to learn or not intelligent enough to acquire new skills. A recent survey showed that only 5 percent of Sri Lankan Internet users are above 55 years, while most belong to the 26-35 age range (23 percent), followed by the 36-45 age range (21 percent). This indicates that there still exists a hostile feeling towards the Internet among the older generation. This prevents them from using it, although they might already appreciate how useful it can be (Shrestha & Amarasinghe, 2001).

- ***Inability to handle English:*** Only less than 2 percent of Sri Lankans have the functional literacy in English, the *de facto* language of the Internet. Even if Internet access is made available free of charge, this language barrier will be an obstacle. Local language web content in Sri Lanka is still very limited, i.e. not more than 5 percent of the total websites have Sri Lankan content. Unless local language content is increased, it will not be possible to provide ICT / Internet access to all.

- ***Technical bottlenecks (particularly in rural areas):*** **M**any parts of the island are still not served by any of the wire-line phone networks. Services are available in some areas, but their quality is inadequate for data transmission. Most computer vendors and ISPs have their offices only in Colombo and obtaining technical support in other areas is still very difficult.

- ***Additional access cost to provincial Internet users:*** Another major problem faced by outstation Internet users is that most have to access a server in Colombo by paying national phone charges, which are significantly higher than local charges. Some ISPs have overcome this by either installing provincial servers or charging only the local rates for data transmissions. However, these attempts have so far failed to provide a full solution.

Providing access to information for the poorer segments of society is an important step in helping them out of poverty. In this context, it is not simply access to ICTs at affordable costs that matters most, but rather the availability of locally relevant content in local languages.

[3.2.6] Future plans to build ICT infrastructure in rural areas

The poverty reduction strategy paper (PRSP) of the government, completed in June 2002, identifies 'bridging the digital divide' as a component of the government's poverty alleviation programme. The government proposes to enhance access to information for the poor by:

1. Increasing wire-line telephone access, which was 6.4 percent in 2000, to 13 percent by 2005 through private provision.

2. Restructuring and commercialising postal services by 2005 in order to transform the postal system into an information and finance portal.

3. Raising Internet penetration to 6 per 1000 by 2005 and setting up computer training centres in all districts by the same year (Ministry of Finance, 2002).

More specific details such as target groups and specific problems to be addressed through these strategies are yet to be worked out. Bottlenecks have to be identified and removed if information and communication technologies are to be meaningfully utilized in the struggle against poverty. Increasing connectivity and lowering costs would be the initial steps toward achieving these objectives.

Several proposals have been put forward towards this end. Firstly, the government proposes to set up a national fund 'to support innovative applications of ICT for social and rural development'. In enhancing connectivity and setting up tele-centres, the government intends to establish 'explicit universal policy obligations for licensed operators to contribute towards a telecom infrastructure development fund'. A working group is to be established and a pilot programme set up to examine options to enhance tele-centres' financial stability and rural reach. A pilot project is to be set up to use innovative information and communication technology in 'Sanasa' with foreign collaboration. The government also identifies the need to converge broadcasting and multimedia sectors to enable universal access by all citizens.

There is certainly a strong demand for telecommunication services in the rural areas. This need is obvious as it has been expressed in several different modes as follows (ICT Roadmap, 2002):

- ***Surveys:*** In 1999, TRCSL commissioned a national survey on telecom use and an additional study on the electronic and communication technology needs of people living in areas that did not even have basic communication facilities such as post offices. The study indicated a high demand for telecom services, including payphone services. The demand for multipurpose tele-centres was low, but that could possibly be due to

the inability of prospective users to identify their full potential or their scepticism about the concept.

- ***Expressed demand under unfavourable price regime:*** Despite continuing increases in domestic rates and the continuation of high installation charges (approximately Rs.16,000 – about US$ 165 – which can be paid in instalments since 1999), there has been tremendous demand for telecom services. In 1999, there were 270,000 names in the waiting list of Sri Lankan Telecom, the principal telecom service provider (other suppliers do not maintain waiting lists). The majority of those in the waiting list were from outside urban areas.

- ***Participation in already existing projects:*** The Kotmale tele-centre project attracted much interest and participation. However, the fact is that its services were totally subsidised using external support, which cannot be scaled up at national level. A much better approach is the district tele-centre project that Sarvodaya has implemented since 1998, where community-owned and managed ICT facilities have so far been set up in five districts and linked to village information societies.

However, in order to fulfil this demand several issues need to be successfully addressed first.

The general idea is that wire-line is expensive in low-density areas. Fixed-wireless, especially digital enhanced cordless telecommunications (DECT) was considered the ideal solution for rural areas in the mid-1990s. However, low take-up for voice, inadequacy for data transmission, and non-realisation of economies of scale in manufacturing have dimmed the earlier envisaged prospects and fixed-wireless is no longer considered the cheapest means of connecting rural users. Therefore, Sri Lanka needs to seek a better solution – one that is advanced but cost-effective.

As for the establishment of tele-centres, experiences in other countries (South Africa and India) have already shown that direct funding by the government is not sustainable. It is necessary to review best practices and adopt the principle of least cost subsidies for connecting post offices and providing general access in rural areas.

There is also the issue of revenue generation. One possible way to generate revenue is to outsource the point of delivery of government services through various forms of delivery mechanisms including tele-centres, interactive TVs, village kiosks, etc. These would also play the additional role of making various e-government projects self-sustaining and would give them a life independent of political compulsions and budgetary constraints once they are stabilised. However, this revenue might not be adequate to maintain services continuously.

The current non-cost-reflecting interconnection system too can seriously impact on the effectiveness of rural telecommunication services. Operators generally consider only call origination services as revenue generating because termination is bundled with it. Therefore, rural and poor customers are perceived by the industry as lacking in revenue potential. A properly measured compensation interconnection regime should be introduced to project proper market signals in relation to rural customers.

It is also very important that the urban poor are not ignored in all these policies and practices. It may appear that the urban poor have access to telecom services, but many are unable to use them due to financial and other constraints. Pre-paid mobile telephony has enabled them to overcome these barriers to some extent.

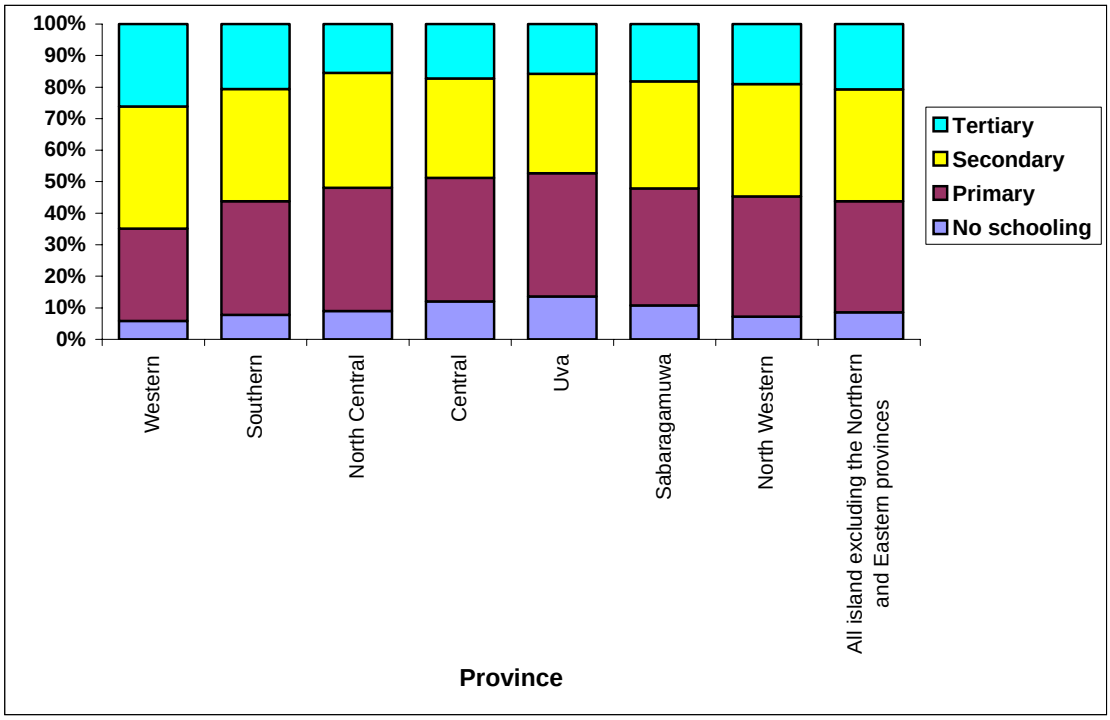
[4.0] ICT impact on human development – facing the educational challenge

[4.1] Introduction

In accordance with long-held traditions, Sri Lanka has always nurtured an advanced educational system, recognising the importance of developing human capital. The country now enjoys a high literacy rate, which is 91.6 percent overall, 94 percent for men and 89 percent for women. The school enrolment ratio of around 90 percent is also higher than most developing countries. Both these factors place Sri Lanka on par with developed countries. In 1996/97, 20.7 percent of the population had had some sort of tertiary education while about 35 percent had completed secondary schooling and another 35 percent primary schooling. The percentage of the population without any formal education was only 8.6 percent – a sharp decrease from 41.8 percent in 1953 (Central Bank, 2002b).

The percentages of educational attainment in selected provinces are given in graph 4.1. Tables 4.1 – 4.4 further show how the educational indicators have changed, providing a clear correlation with developments in education facilities over the past five decades.

Graph 4.1 : Educational attainment (percentage)



Source: Economic and Social Statistics of Sri Lanka, 2002, Central Bank of Sri Lanka

Table 4.1 : Selected primary and secondary education statistics

Category	1948	1970	1996
Total number of government schools	3,091	9,928	10,280
Total number of students (in '000s)	1,178	2,716	4,289
Total number of teachers	32,704	96,426	195,203
Percentage of graduate teachers	3%	7.7%	23.8%
Percentage of specially trained teachers	29.2%	50.5%	68.1%
Pupil / teacher ratio	36	28	22
Square kilometres served by a school	22	7	6

Source: Economic Progress of Independent Sri Lanka, Central Bank of Sri Lanka

Table 4.2: Literacy ratio

	1953	1971	1994
Literacy ratio	65.4%	78.5%	90.1%

Source: Economic Progress of Independent Sri Lanka, Central Bank of Sri Lanka

Table 4.3: School drop-out ratio

	1972	1980	1992
Drop-out ratio	7.0%	3.1%	3.9%

Source: Economic Progress of Independent Sri Lanka, Central Bank of Sri Lanka

Table 4.4: School non- enrolment ratio

	1958	1984	1991
Non-enrolment ratio	24.3%	14.7%	7.7%

Source: Economic Progress of Independent Sri Lanka, Central Bank of Sri Lanka

[4.1.1] Developments in primary and secondary education

Sri Lanka had a dual system of education before independence. The English medium schools, which initially commenced during the colonial era with the aim of producing an educated class for administrative work, operated on a fee-levying basis while the vernacular (Sinhala and Tamil) schools operated on a non-fee-levying basis. The C.W.W. Kannangara report on free education made far reaching recommendations in 1944 to address these issues, and led to the introduction in 1945 of free education up to university level for all students. Forty three rural schools which were on par with the private English medium schools

were upgraded during 1943-45 and designated as 'central schools' to provide opportunities for talented but underprivileged students. A programme to provide free mid-day meals to selected students was also introduced in 1945 and was extended to cover all students in 1948 (Central Bank, 1998).

During the 55-year period since independence, many policy reforms were introduced to enhance primary and secondary education and make education accessible to more people.

Given below are some of the important reforms during this period:

- 1951: Making school attendance compulsory for children in the age group of 6 -14 years.
- 1952: Introduction of a scholarship programme to benefit talented students from poor families.
- 1962: Taking over of state-assisted but privately-managed schools by the government, with the intention of rationalising the school system.
- 1980: Free provision of text books.
- 1987: Introduction of the concept of 'national schools' and the conversion of unitary schools to national schools.
- 1993: Provision of free school uniforms.

It is also noteworthy that some of the reforms carried out by the previous governments starting from mid fifties and have continued till seventies have had serious negative impact on the development of the country. One such move, which had a serious impact even on the development of ICT, was the replacement of English medium completely by the vernacular, and confining English only as a second language within the school curriculum. This has largely curtailed the growth of a group of skilled ICT professionals who had their formal education during the period of this educational policy. Preventing students from appearing for the international examinations too had a similar impact of the development of human resources in the ICT sector.

It is arguable whether the quality of the human capital produced by the public education system has always met labour market requirements. However, the on-going educational reforms could gradually improve the situation in the next few years, as the education system is becoming more flexible to meet the demands of the job market.

According to the school census of 2001, there were 9,887 functioning government schools. Another 381 government schools were non-functional – these were closed mainly due to insufficient enrolments. The total number of students in government schools exceeded four million. The school density was one school per six square kilometres, indicating easy accessibility. The average student population was 423 per school. The pupil / teacher ratio was an impressive 22 (Central Bank, 2002a).

There were also 583 *pirivena*s (educational institutions dedicated to teach Buddhist priests) with 52,906 students, and 78 private schools with 96,155 students. These exclude the category of private schools popularly known as 'international schools', which differ from the others by having English as the medium of instruction and preparing students for foreign examinations. Although many international schools operate in the country at present, there are no reliable sources of data on these schools (Central Bank, 2002a).

Another trend seen in recent times is the expansion of the privately owned 'tutory' industry. Most are informal institutions providing complementary support to school education. At the high end, they include IT training institutes, business management schools, etc., which run courses parallel to those at the universities or prepare students for international and local professional examinations. However, no information on these institutes is available as there is no regulatory authority covering their activities.

It is also noteworthy that some of the reforms carried out by the previous governments starting from mid fifties and have continued till seventies have had serious negative impact on the development of the country. One such move, which had a serious impact even on the development of ICT, was the replacement of English medium completely by the vernacular, and confining English only as a second language within the school curriculum. This has largely curtailed the growth of a group of skilled ICT professionals several decades later. Preventing students from appearing for the international examinations too had a similar impact of the development of human resources in the ICT sector.

Table 4.5 shows the general education performance indicators for the years 1999 to 2001 with regard to government schools, private schools and *pirivenas.*

Table 4.5: Statistics on school education

	1999	2000	2001	2002(a)
Total number of schools	10,695	10,615	10,552	10,505
Government schools	10,058	9,976	9,891	9,826
Government schools (national)	310	317	320	323
Other schools	637	639	661	679
Private schools	77	78	78	80
Pirivenas	560	561	583	599
Number of students (total)	4,227,104	4,340,412	4,337,258	4,178,118
New admissions	343,230	332,892	330,316	325,667
Number of teachers	196,726	194,773	198,397	201,235
Pupil / teacher ratio	22	22	22	21
Average number of pupils per school	395	409	411	398

Source: Central Bank of Sri Lanka, annual reports, 2000, 2001and 2002
(a) Provisional

[4.1.2] Expenditure on education

The total government expenditure on education in 2002 was Rs. 37,209 million (or roughly US$ 385 million), a 32 percent increase over the previous year. The expenditure on education as a percentage of GDP was 2.4 percent, 2.0 percent, and 2.5 percent in the years 2002, 2001 and 2000 respectively. The total private expenditure on education was estimated to be over Rs. 10,000 million or Rs. 500 per capita (Central Bank, 2003).

[4.1.3] Issues related to primary and secondary education

Despite the progress made over the past five decades, the general education sector still faces some major problems relating to quality, access and relevance to employment opportunities. Major issues in this sector include:

- The mismatch between skills imparted by the education system and labour market requirements.
- Reduced quality of education due to deficiencies in curricula, teaching methods, etc.
- Reduced quality of teaching strength, particularly due to the lack of proper training and ad hoc recruitment of teachers disregarding basic requirements.
- Widespread regional disparities in educational facilities.

- Poor quality educational infrastructure, especially in rural areas.
- Shortage of teachers in rural areas, particularly for subjects like science, mathematics and English.
- Inadequate resource allocation to the education sector.
- Insufficient resource availability to improve supportive facilities.
- Absence of an agency to monitor the performance of international schools and the 'tutory' industry.

[4.1.4] Developments in the higher education sector

Although university education was available even in the pre-independence era, access to higher education was then limited only to a small fraction of students. The University of Ceylon was set up in 1942 to provide opportunities for all local students seeking higher education. In spite of the rapid expansion of the higher education system in the country during the five decades after independence, only 0.6 percent of youth in the 15-30 age group were able to study in Sri Lankan universities in 1996, while a few more managed to secure places at universities abroad (Central Bank, 2002a).

The University of Ceylon, which absorbed the former Ceylon University College and Ceylon Medical College, underwent a major restructuring when the arts and oriental studies faculties were shifted from Colombo to Peradeniya in 1952. The medical and engineering faculties commenced courses in Peradeniya in the late 1960s.

Following the introduction of free education in 1945, it became necessary to increase the student intake for higher education and make Sinhala and Tamil the media of instruction. To meet this requirement, the Vidyodaya and Vidyalankara pirivenas, two prominent Buddhist education centres, were granted university status in 1959. Sinhala and Tamil were introduced as media of instruction in 1960 at Peradeniya. Such steps enabled students from the lower and middle income classes to benefit from higher education.

The number of national universities in Sri Lanka, including the Open University, stood at 13 at end 2001. In total, there were around 48,000 students and more than 3,200 faculty members. The student/lecturer ratio has varied between 12 – 15 during the last few years (Central Bank 2002a, 1998).

[4.2] Use of ICT in education

Some Sri Lankan universities were quick to embrace computer technology – in the late 1960s or early 1970s. This was partly due to the initiatives of a few academics who were exposed to IT when they pursued postgraduate studies at universities in developed countries.

In 1971, the University of Peradeniya installed an IBM 1130, thus becoming the first Sri Lankan university to have their own computer. The same model was installed at the University of Moratuwa (then called the Katubedda Campus) in 1973. It was only in 1991 that the University of Colombo entered the IT era when they introduced a multi-user General Data Mini, but courses in computer programming had been conducted there since the late 1960s, and their Demographic Training and Research Unit had a computer system since 1973. During the late 1970s and 1980s, other universities too began their own courses in computer programming. In 1979, the National Institute of Business Management – a state sector tertiary educational institution – became the first institute to introduce a diploma course in IT (Samaranayake, 1998).

[4.2.1] ICT usage in schools

It took more time before computers were introduced to the school system. The first programme to introduce computers at primary and secondary level was in 1983. The Ministry of Education appointed a computer advisory committee to conduct the Computer Education Programme (CEP). The responsibilities of this committee included purchasing hardware, training teachers and preparing syllabi and teaching materials (Induruwa, 1999).

The first phase of the CEP commenced in 1984, with 8-bit computers using 16 to 64 kilobytes of memory being distributed to 108 selected schools. A total of 250 teachers were trained by the universities of Colombo and Moratuwa, and a computer firm that had volunteered its services. However, this programme did not yield the expected results. With limited hardware resources, the time allocated was not enough for students to familiarise themselves with computers. Moreover, students were taught only computer programming in BASIC language, and not any of the popular applications.

The second initiative, started in 1994, succeeded in overcoming some of these problems. Under this programme, 300 computer resource centres (CRCs) were established by providing necessary hardware and software to as many schools. The Department of Education and the National Institute of Education were given the task of coordinating and teacher training. Initially, eight centres were set up as a pilot project and their progress closely monitored. Based on their experience, the number was expanded by another 8 in 1995, 16 in 1997 and 39 in 1998. Funds obtained from the ADB and local resources were used to set up these centres.

This project's main aim was to expose school-leavers (who had completed secondary education) to the latest IT applications in both hardware and software. Students were exposed to the Windows platform and the popular application packages used in industry. A local area network was installed at each CRC, enabling more students to share computer resources. The training was conducted with the intention of meeting the needs of industry. A large number of students – estimated to exceed 200,000 – benefited from this project annually (Induruwa, 1999).

Both projects aimed to familiarise students with computers and teach them only subjects related to computer science, and no effort was made to integrate computers to their other subjects.

[4.2.2] ICT facilities available in schools

In addition to the computer training centres established under the above two programmes, some schools have set up their own computer units or centres with assistance from past pupils and / or philanthropists. In spite of all these efforts, not many schools provide ICT training facilities to students in Sri Lanka. A survey conducted by the Ministry of Education and Higher Education in 2001 revealed that only 228 schools among more than 9,000 possessed computer units. [16] Table 4.6 shows the province-wise distribution of schools with computer units.

Table 4.6 : Number of schools equipped with computer units in each province

Province	Total number of schools	Number of schools with computer units
Western	1,411	101
Central	1,490	15
Southern	1,160	23
Eastern	950	35
North Western	1,255	24
North Central	770	03
Sabaragamuwa	1,152	09
Uva	832	08
Northern	867	10
Total	9,887	228

Source: Education Ministry, Economic and Social Statistics of Sri Lanka, 2002, Central Bank of Sri Lanka

A number of attempts have been made to expose students from less privileged schools to ICT. One such initiative was the CINTEC Mobile Computer Laboratory established in 1987. This was enhanced and reactivated twice, first in 1995 and then in 2003, each time with more modern equipment. The bus, which has been given the name *Vishva Gnana Charika*' (Sinhala for Universal Knowledge Tours), is now equipped with a PC local area network comprising of

seven nodes and has Internet access. The modified mobile unit commenced its first coverage of schools in the Colombo South region in January 2003. [15] Another mobile unit developed by a private computer vendor also visits schools and exhibitions to introduce ICT to those who lack computer facilities at home or school. However, these limited facilities can only help demystify ICT for youth and the public, and cannot provide any sustained or deeper learning of the subject.

[4.2.3] Ongoing ICT programmes at school level

At present, the Ministry of Human Resources, Education and Cultural Affairs conducts several programmes to introduce and promote ICT at primary and secondary levels, and to use ICT to streamline the school education process. These projects are part of the education system reforms.

One such key initiative is carried out under the General Education project assisted by the World Bank. This project aims to establish a wide area network (WAN) linking 92 education centres in provinces, regions and sectors to the ministry. This WAN will be utilized to monitor the resources used by each school. Any lack or misuse of resources can be easily detected at a central point. The system will also act as a management information system to gather information to facilitate decision-making processes in supplying different categories of resources to schools. Each provincial office will be provided with five PCs with Internet and email facilities and all other offices will be equipped with two similar PCs each. This arrangement will also enable provincial and regional officers to communicate with the ministry using email. The groundwork to implement this WAN has already been completed. The already established local area network of the ministry comprising 172 PCs will form a key part of this WAN.

In a parallel initiative supported by ADB, the ministry also plans to establish computer training centres at 800 selected schools. Among the selected schools, those belonging to A and B categories will each receive 20 PCs and 3 printers, while those in category C will each receive 15 PCs and 2 printers. These resources would also be used for the schools' administrative functions. The project is expected to be completed by 2004 (*Sunday Times*, 2003).

Meanwhile, the National Institute of Education under the ministry intends to issue a set of CD ROMs to be used by secondary school students in government schools. These will cover a wide range of subjects including electronics, biology, advanced English, management and business studies, zoology, pure mathematics, physics, applied mathematics and IT. The CD ROMs will be prepared to meet the requirements of Sri Lankan schools by collating information from different sources ranging from text books to educational sites. It is also planned to train 15,000 teachers on using these education materials by 2006.

The Education Ministry has also taken steps to introduce IT studies as an optional subject for the General Certificate of Education (Advanced Level) examination from 2004. Under this programme, several schools have already introduced General Information Technology (GIT) to their students at the higher secondary education level. According to the Ministry of Human Resources and Education, the objectives of introducing IT studies to school curricula is to make students:

- Understand the basic concepts of ICT.
- Understand the potential of ICT tools and apply them appropriately.
- Identify further study paths in ICT based on their ability.
- Gain knowledge in selecting the directions towards employment opportunities in ICT and associated fields.
- Adapt ICT to enhance learning.
- Use the knowledge gained in ICT for day-to-day activities.
- Demonstrate an awareness of social, ethical and safety issues related to ICT.
- Appreciate the importance of ICT in national development.

[4.2.4] Media attempts to create ICT awareness

There have been several commendable attempts by the mass media to address the problem of low IT literacy among students and take the benefits of ICT to a large section of the community. Four such initiatives are the *Wijeya Pariganaka* Magazine, Kotmale community radio project, the TV programme '*Antharjalaya Obe Nivasata'* (Internet to your home) and the radio programme '*Antharjalayai Obai'* (Internet and you). All these efforts in their own way have attempted to bridge the digital divide by bringing information from the Internet to people who do not have easy access to these ICTs.

***Wijeya Pariganaka**,* the monthly Sinhala ICT publication goes further in providing ICT lessons to students. Through its editorials and features it also offers perceptive analysis of ICT policies and practices. Market surveys have indicated that this magazine has a circulation throughout the island, and is largely read by students.

'Antharjalaya Obe Nivasata' was a weekly television programme in Sinhala, the first of its kind. It was broadcast live during evening prime time by the national TV channel Rupavahini, taking viewers on a guided tour of interesting websites and answering their questions on the Internet and ICT-related topics. Although targeted at those who had no access to 'the Web', the programme gained a wide following and was instrumental in popularising the new medium among Sri Lankans. It registered the highest audience ratings for a factual programme during 1999-2000, but was discontinued in 2001. It has now been replaced by *'e@Shanida'*, a similar programme by the same producer, but oriented more towards promoting the 'e-Sri Lanka' initiative.

[4.2.5] ICT usage in libraries

Sri Lanka has a library network consisting of over 6,000 units, of which more than 5,000 are school libraries. However, only a few of these have been equipped with ICT tools.

A study in 2002 showed that only 54 percent of university libraries and 63 percent of research libraries had Internet facilities. The low percentage for university libraries can be because most universities provide Internet facilities to students through a computer unit rather than their libraries. Another 33 percent of university libraries and 7 percent of research libraries plan to obtain Internet facilities in the near future. It has also been observed that most university and special libraries in Sri Lanka use library automation software packages to maintain catalogues (Hettiarachchi, 2002).

Internet access at public and school libraries is extremely low. Among 643 public libraries, only 5 at the municipal level, 4 at the urban level and 7 at the rural level offered Internet facilities in 2002. [11] No comprehensive surveys have been carried out to assess the availability of Internet facilities at school libraries, but the situation cannot be much different. Some urban schools maintain CD collections for the use of their students.

The National Library and Documentation Centre encourages libraries to obtain Internet facilities and CD collections. This process began mainly with the establishment of its IT division in 1993 and the IT centre in 1995. The National Library was one of the first Sri Lankan institutions to offer Internet access facilities to the public in 1997. These facilities cost much less than what the cybercafés charged at that time. The National Library also maintains what is possibly the largest CD ROM collection available to the public in Sri Lanka (Fernando, 2002).

At present, the lending processes of almost all the main libraries have been automated. These libraries are engaged in web-based activities more actively and most offer on-line public access catalogues (OPACs). The National Union

Catalogue of the National Library and Documentation Services Board is also available on-line.

A significant number of library networks operate in the country. Some of the main library networks are the Sri Lanka Scientific and Technical Information Network (SLSTINET) coordinated by the Sri Lanka Scientific and Technical Information Centre; Agriculture Information Network (AGRINET) coordinated by the Centre for Agriculture Research Policy; Environmental Library Network (ENLINET) coordinated by the Central Environmental Authority; Health Science Literature, Library and Information Network (HELLIS) coordinated by University of Colombo, and the Medical Faculty Library and Cultural Information Network for South Asia (CINSA) coordinated by Central Cultural Fund. Within these library networks ICT tools are effectively utilized for information sharing.

[4.2.6] ICT usage in undergraduate studies

Initially, ICT facilities at the universities were only used to teach computer science and related subjects. Supported by the policy guidelines of the individual universities, teaching departments of computer science / engineering were set up in the universities of Colombo, Moratuwa and Peradeniya in 1985 (Induruwa, 1987). These departments currently produce graduates in computer science and computer engineering. The universities of Kelaniya and Sri Jayawardanepura too have started degree courses in computer science while the Open University produces graduates in computer technology at the Bachelor of Technology (BTech) level. Students following physical science courses in the general stream are also given the option to study computer science as a subject. In addition, several private sector IT institutes, including the Informatics Institute of Technology, IDM, Sri Lanka Institute of Information Technology, Singapore Informatics, Asia Pacific Institute of Information Technology (APIIT) and NIIT conduct degree level courses (Samaranayake, 2002).

All these institutes are now in the process of expanding their intakes rapidly, in order to meet the growing demand for IT professionals by industry. The University of Colombo School of Computing [17] has introduced an external degree course called Bachelor of Information Technology (BIT) that can be followed by students who failed to gain entrance to state universities through highly competitive entrance examinations. If all these programmes work as envisaged, it is estimated that about 20,000 graduates trained in computer science will pass out from the state and private universities in 2004 (Wattegama, 2002a).

Computer usage in non-computer related undergraduate study courses varies greatly. In some cases, the use of computers is confined to basic word processing and spreadsheet applications. In some science related courses like agriculture and biology, computer applications are infrequently used as tools.

However, as a policy almost all undergraduates entering universities are now given an introduction to computing irrespective of their area of study (Induruwa, 1999).

Email and Internet usage among Sri Lankan undergraduate students is well below that of their counterparts in industrialized countries. This is likely due to their lack of English proficiency and low level of computer skills. In some cases, it has been observed that the students do not even use the ICT facilities provided to them by institutes free of charge.

All Sri Lankan universities now maintain their own websites. However, the quality of these sites varies greatly. None of these provide interactive services, and only few are updated regularly. Almost all sites provide email addresses of at least some of the academic staff, but not all academics have been given email facilities. Most of the time these websites are maintained by university students. Only few provide any information about research work carried out at the university.

[4.2.7] ICT usage in postgraduate studies

The universities of Colombo, Moratuwa and Kelaniya now offer postgraduate level computer science / engineering / management courses. The University of Colombo also conducts a postgraduate diploma course in IT. The Informatics Institute of Technology, a private education institute, offers ICT-related masters programmes in collaboration with University of Keele in United Kingdom. In addition, students can study ICT-related subjects as part of the course in many other masters level degree programmes including MBAs. The number of students who follow IT related courses at postgraduate level is still very limited.

A study conducted in 2002 to test the effectiveness of the use of email and Internet facilities by part-time MBA students, for learning purposes, revealed the following (Wanigasekera, 2002) :

- More than 80 percent of students in the sample had full-time or part-time access to email.
- All students responded positively to having email access to lecture notes, queries, etc.
- Over 60 percent of students appreciated the ability to submit draft assignments for review and receive timely feedback.
- Speed and convenience of use of the Internet for group interaction was rated high by over 60 percent of students.

[4.2.8] LEARN initiative

The first attempt at internetworking in Sri Lanka was made in 1989, when Dr. A. S. Induruwa, founder head of the Computer Science and Engineering Department at the University of Moratuwa, proposed the establishment of the Lanka Experimental Academic and Research Network (LEARN). This was implemented with a few technical changes in 1992. The network connected all universities in Sri Lanka as well as some of the research institutes using the IP protocol (Firdhouse & Dias, 1996).

LEARN, established entirely using local funds and local expertise, not only provided the much-needed national interconnectivity among all academic and research institutes, but also provided international connectivity to foster international collaboration between Sri Lankan academics and their peers overseas. As the first step towards this, LEARNmail – the first IP based email system in Sri Lanka – was launched in June 1990 with the assistance of the University of Moratuwa, the University Grants Commission and CINTEC.

LEARN was initially supported both technically and financially by the voluntary efforts of several Sri Lankan students in foreign universities. This later led to the formation of LAcNet, a non-profit organization registered in the United States that aimed to promote IT development in Sri Lanka. LAcNet provided financial assistance from January 1991 to December 1994 to operate the LEARNmail service. LEARN was connected to the Internet in 1993, and full Internet facilities have been made available to LEARN users since 1995 (Induruwa, 1999).

At present, LEARN connects eight universities through leased lines and the rest using dial-up links. The importance of this network has diminished with the advent of commercial Internet connectivity at relatively low costs, but it still helps academics and researchers to share information among themselves.

[4.2.9] Distance education / e-learning

The only Sri Lankan institute that currently uses e-learning techniques is the Open University of Sri Lanka. This programme was launched in 1997 and initially distributed teaching materials to a selected group of internal students (Hoole, 1998). Now it has been expanded to offer not only teaching materials, but also question banks the students can answer on-line for several IT and science subjects.

In addition, several institutions including the University of Colombo School of Computing (UCSC) and Singapore Informatics have been planning to introduce web-based distance education services. These are yet to become a

reality. At the same time, a small but growing number of wired individuals are pursuing diploma, professional or degree programmes offered by overseas institutions via the Internet (Gunawardene & Wattegama, 2003).

In 2001, the World Bank helped to establish a distance learning centre (DLC). Located at the Sri Lanka Institute of Development Administration (SLIDA), it is part of the Global Development Learning Network [18] and addresses the training needs of Sri Lankan managers. The DLC is owned by the government, and operates in collaboration with the public and private sectors. It has commenced offering short-term courses that involve real-time interactivity between participants in Colombo and tutors or resource persons in other connected cities overseas.

[4.3] ICT Roadmap initiatives

Apart from the objectives explicitly declared in the vision statement, the ICT Roadmap also proposes a joint venture project named 'Open School Initiative'. One of the main aims of this project is to use the experience of a similar successful project in another country by a local NGO to produce educational multimedia materials for use in Sri Lanka. The other objectives include launching a distance learning programme for secondary level students with connectivity to schools being provided by LEARN, and arranging direct assistance to Sri Lankan schools for teacher training and computers.

[5.0] ICT impact on human development – gender equality and empowerment of women

[5.1] Introduction

Sri Lanka is often cited as a South Asian success story for women's emancipation. The gender development index – which ranks countries according to how well their women fare economically – has assigned Sri Lanka a value of 0.732, which is above the South Asian average. This is attributable to over five decades of government investments in health care and education – factors that have led to a relatively high level of gender development. The latest statistics reveal that the gross enrolment in primary and secondary education has been high for girls, exceeding that of boys in the secondary level (World Bank, 2003).

Due to the wide availability of health care, maternal mortality is low – it was 60 per 100,000 live births in 1995 (UNDP, 2003). With free access to prenatal care, infant and child mortality rates too have become significantly low. These achievements are attributable to the educational levels of women who are the main caretakers of children. A gender and health survey conducted in 1997 showed that in 93 percent of cases surveyed, the mother took decisions regarding the health of children in the south-west sample of the survey (Department of Census & Statistics, 2001). In the country's plantation estate sector, however, males played a larger role, and 19 percent of the time fathers alone took decisions regarding children's health. The opinion among the surveyed women was that the present generation of mothers is better educated and thus better equipped to look after their children.

While basic gender development indicators are satisfactory in Sri Lanka, the empowerment of women still remains a challenge. Gender issues have yet to be mainstreamed into the national and local policy planning process, and tend to receive little attention in national development plans. It should also be noted that improvements in the above mentioned social indicators were achieved through the universal application of social policies that did not discriminate against women, but at the same time, did not seek to actively promote women's issues or status (ADB, 1999).

According to the Human Development Report 2003*,* Sri Lanka's *g*ender empowerment index stood at 0.272 – it was ranked 67th among 70 countries. Sri Lankan women won the right to vote in 1933, when universal franchise was introduced. Women participate in politics as organizers and canvassers during elections and exercise their right to vote in large numbers. However, though the country currently has a woman head of state and produced the world's first woman prime minister in 1960, the number of women seeking election to public office remains low. Parliamentary seats held by women as a percentage of the total number of seats was just 4 percent in 2000 – a decline from 4.8 percent in

1994. There is only one woman cabinet minister in the present government (as at April 2003) and she heads the Ministry of Women's Affairs.

[5.1.1] Female labour force

The Sri Lankan economy relies heavily on women workers in three key sectors: the ready-made garments industry, the tea industry and the unskilled/semi-skilled expatriate worker community (most of whom are women employed as housemaids) in the Middle East. The apparel and textiles industry is the largest sub-sector among the export-oriented industries. In 2001, the output of the textile, wearing apparel and leather products industry was Rs. 225,000 million – about 45 percent of the value of total industrial production. Women account for more than three quarters of the workforce in the apparel industry. Similarly, 68 percent of the foreign employment placements in 2001 were women (Central Bank, 2002b).

The female labour force participation rate is 32.4 percent, while the rate for males is 66 percent (Department of Census & Statistics, 2001) The total labour force of Sri Lanka by end 2001 consisted of 33.5 percent women and 66.5 percent men. Fifty two per cent of working women (and 37.8 percent of working men) are involved in the skilled agriculture and fisheries category, crafts and related work. About a fifth of women and men workers are engaged in elementary occupations. Interestingly, while nearly 10 percent of working women are professionals, the corresponding percentage for men is less than half of this. However, only 1.5 percent of the working women are in the senior officials or managers category, whereas 2.2 percent of working men are at this level. Among the senior officials and managers in Sri Lanka's public and private sectors, 25.6 percent are women and 74.4 percent are men.

Table 5.1: Occupational Groups

Major occupational group	Total	Male	Female
Senior officials & managers	2.0	2.2	1.5
Professionals	6.1	4.3	9.8
Technicians & associate-professionals	5.1	5.5	4.2
Clerks	4.6	3.8	6.1
Sales & service workers	13.1	13.9	11.4
Skilled agricultural &fishery workers	24.0	23.1	26.0
Craft & related workers	15.3	14.7	16.4
Plant & machine operators & assemblers	6.7	8.4	3.2
Elementary occupations	21.0	21.0	20.8
Unidentified	2.1	2.9	0.5

Source: Department of Census and Statistics, 2001,
Quarterly Report of the Labour Force Survey, fourth quarter 2001

The informal sector plays a prominent role in Sri Lanka's economy, and national statistics cannot capture its full extent, nuances and outreach. Large numbers of women workers are engaged in unskilled, semi-skilled or skilled pursuits in the informal sector, either as a means of self-employment or being employed. Most of them work under harsh conditions, enjoy little or no labour benefits and safeguards, and earn modest incomes that are crucial for the sustenance of their families.

[5.1.2] Key issues faced by women

As the National Action Plan for Women (NAPW) in Sri Lanka has noted, "Despite many achievements, one cannot feel complacent about the real situation of women, the majority of whom live under economically deprived conditions and circumstances."

The NAPW was prepared in 1995 by the Ministry of Women's Affairs, the National Committee for Women and representatives of women's organizations. It identified eight areas of critical concern, viz:

i) Violence against women, women and human rights, women and the armed conflict.

ii) Political participation and decision-making.

iii) Health.

iv) Education and training.

v) Economic activities and poverty.

vi) Media and communication.

vii) Environment.

viii) Institutional strengthening and support.

Women workers dominate the key economic sectors that rake in the highest foreign exchange for Sri Lanka: Middle East remittances, garments and tea. Yet, nearly all these women are employed at the unskilled, semi-skilled or skilled worker levels, rather than at a managerial level. Women working in these sectors remain poor and face problems of personal security, employment security and difficult living conditions. In the garments industry, the rural women who migrate to free trade zones live in substandard boarding houses and are exposed to sexual violence when travelling between their workplaces and boarding houses. Many women workers in the Middle East face physical abuse on the job, and some see their families break up during their absence. In the plantation sector, women work long hours under difficult conditions as tea pluckers, but are paid less than men who work mainly in the factory section. This gender-based disparity in wages is also seen in Mahaweli agricultural settlements where men, on average, earn 50 percent more for the same quantum and kinds of work than women.

The 20-year civil conflict has also imposed various hardships and difficulties on Sri Lankan women across the ethnic divide. Many have been internally displaced and are living in temporary camps, where they lack privacy and often face the threats of violence and sexual abuse. Those still living in the affected areas are struggling to survive as their livelihoods have been disrupted. Many women have been widowed as a result of their husbands being killed or missing in action, and face the challenge of single parenthood. It is estimated that over 20 percent of Sri Lankan households are headed by women.

The level of violence and criminal activities has risen in Sri Lankan society due to the war and political violence experienced in the past three decades. The incidence of rape has increased drastically, with many offenders not being prosecuted or adequately punished.

Violence against women is both a public and private matter in Sri Lanka, says the Committee on the Elimination of Discrimination against Women, a body of global experts that monitors whether governments are honouring their commitments to the 1981 United Nations' Women's Convention. The Committee has stated that Sri Lanka needs specific legislation to curb violence behind closed doors. Although violence affects women of every class and ethnicity, it is

seldom reported, and is not listed as an offence in the criminal penal code. Police officers are reluctant to make arrests, and courts will issue restraining orders against a brutal husband only if the wife has filed for divorce. A high level of sexual violence also threatens women's security, restricting their mobility and independence, while political violence discourages them from standing for election.

Women's organizations and the overall women's movement in this country are responding to these crises and challenges in various ways. Sri Lankan women have a long tradition of organizing and mobilizing themselves on social, economic, political and cultural issues. Some of the pioneer women's organizations are several decades old, and traditionally concentrated on the delivery of services and community development support. It was during the UN Decade for Women that their activities diversified to cover research, advocacy and activism. The existing women's organizations realigned themselves to face new challenges emerging from the liberalised economy, while a wide range of new organizations emerged. Parallel to this, many existing development-oriented NGOs added gender as a dimension or programme priority in their own work.

NGOs and women's organizations often have their own thematic focus, for example, on rural women, rural development, university women, social mobilization for collective action, credit, entrepreneur development, legal reform, research, advocacy, domestic violence, family health, environment and the media, among others. NGO networks or consortia at national and local levels have also developed in recent years.

[5.2] ICT usage in creating gender equality

In spite of the overall situation of women in development, Sri Lankan women have been traditionally marginalized in entering higher levels of employment. Their participation at decision-making levels is also limited. Gender role stereotypes in families, communities and society, cultural attitudes and gender-blind or gender-neutral policies limit women's access to ICT. Use of ICT for economic advancement, for example their participation in e-commerce, is also very low (Narendran, 2002).

There are several attempts by governmental as well as non-governmental entities to ensure that women in this country are treated with dignity and respect, and afforded equal opportunities as men in every sphere of human endeavour.

[5.2.1] Women's role in ICT industry

Sri Lanka's ICT industry is largely male dominated. Even the ICT Roadmap of 2002 has not brought the gender aspect into sufficient focus. The lack of gender

sensitivity in policy and professional bodies has led to the marginalisation of women from decision-making positions in the ICT industry.

Where women have entered ICT related studies or employment, they remain mainly at the lower levels, performing functions like data entry and word processing. This is also the trend in what aspiring young women learn: around 80 percent of those enrolled in word processing and Internet/email courses are women, while they accounted for just 15 percent of those studying programming.

Very few women professionals are engaged in management or senior official levels in ICT related institutions in both the public and private sectors. A study by the Centre for Women's Research has revealed the shocking reality that as at 2002, the boards of management or directors of top ICT establishments did not have a single woman, as seen in the table below.

Table 5.2 : Female representation in top positions in selected ICT organizations

Body	Male	Female
Sri Lanka Telecom (board)	10	0
Council for Information Technology (CINTEC)	12	0
Computer Society of Sri Lanka	12	0

Source: CENWOR report

A 2001 survey conducted by the Institute of Computer Technology of the University of Colombo on human resource mobilization in the IT field showed that women accounted for only 20.8 percent among 462 IT professionals employed in 138 organizations. One positive trend regarding professional employment in occupational categories is that 44.8 percent of the professional women surveyed were involved in software development as against 37.2 percent of men. Traditional occupational trends are visible in the IT field as well, with more women entering education and training and more men going in for technical support (Wanasundera, 2002). It appears that social perceptions of the appropriateness of employment has shaped job segregation in the IT industry too.

ICT industries are growing rapidly, creating higher demand for employment. With the government initiatives to develop and broad-base the ICT industry in Sri Lanka, more employment opportunities will arise at the higher end of the industry. The available pool of educated, unemployed women workers could be trained and utilized to overcome the shortage of professionals in the industry. However, more gender-sensitive policy-making and recruitment procedures are imperative to open up the IT industry for women and utilize ICT to combat gender discrimination and enable women's empowerment.

[5.2.2] Creating gender equality awareness

ICT can play a major role in shaping and changing attitudes and opinions; this would be a major breakthrough in women's struggle for equality. In Sri Lanka, where Internet penetration is still very low, the electronic media such as radio and television have a much wider outreach.

A survey on the use of electronic media among Sri Lankans showed that 25.7 percent of women in the sample preferred radio or TV as a leisure time activity, second only to reading, which 48.9 percent preferred (Hettige et el, 2001). This adds up to 75 percent of the women using information sources as a leisure time activity, compared to only 45 percent of males. This indicates that women spend more time at home than men. Programmes targeted at women could not only educate and develop skills, but also provide insights into women's issues and create awareness among women regarding their rights, problems, solutions and choices. This would help equip women to identify and break down barriers that restrict and discriminate against them.

[5.2.3] ICT usage in female dominated economic areas

Studies suggest that when the time spent on home production is also valued and included in the household income, women's contribution is as high as 40 – 60 percent of the total income (Wijesekera, 2002). While women's contribution in traditional economic areas of agriculture and cottage industries has continued, two key areas in the economy have come to rely heavily on female labour in the past two decades: the apparel industry and Middle East employment.

It is pertinent to look at how ICT tools are being used in these two sectors. The apparel industry is a major user of ICT based tools; these are utilized in designing, inventory keeping, material and manufacturing requirement planning, maintaining contact with suppliers and buyers, and managing human resources. It is unlikely however that most women employed in that sector directly benefit from it.

On the other hand, migrant workers directly benefit from ICT tools. With developments in international communication facilities it has become possible for expatriate Sri Lankans to easily and directly contact their families using the telephone. The recent reduction in international call rates, due to the government liberalising the external gateway access for voice communications, has resulted in several private operators entering the overseas telephony market, pushing down the rates. Frequent communication helps reassure both the expatriates and their families back home, and reduces confusion, fears and misunderstandings that were previously rampant. It is to be noted, however, that the international telecommunication rates for the Middle East countries are still relatively higher than those for North America and Western Europe. A key consideration in

formulating policies with regard to ICT should be how to make communication technology and facilities more accessible and affordable to women workers who are also making remittances that the Sri Lankan economy continues to rely upon heavily.

[5.2.4] ICT usage by women's groups

The digital divide is evident not just between different income groups, but also between the sexes. Women have less access to hardware, software, training and skills to use ICTs. Women's organizations and activists are becoming increasingly aware of this divide, and are responding in a variety of ways to harness ICTs for empowering women. According to one researcher on women's issues, the Internet provides women with a space "that did not exist earlier" to network, share information and lobby among themselves, with governments and other institutions.

Email is the most commonly used modern ICT tool by women's groups to communicate among themselves and with other like-minded groups. Some women's groups have websites but generally they have so far been slow to establish a prominent web presence. This is due to lack of training, infrastructure problems and the lack of importance attached to it.

According to the Centre for Women's Research (CENWOR), which monitors ICT uses by women's groups, enhanced networking has been one of the most useful, practical and visible results of individual women and women's groups gaining more access to ICTs. Such networking has been used in recent years, for example:

- To disseminate timely information on national and international activities for the Beijing+5 events that marked the fifth anniversary of the World Conference on Women held in the Chinese capital Beijing in 1994.

- To share updates quickly and effectively among all concerned women regarding significant court cases that raised issues relating to women's rights, violence against women and women's access to resources, etc.

- To raise action alerts among women activists – an example was a government proposal to import labour for the country's free trade zones where the workforce predominantly comprises rural women.

- To lobby with national and international human rights watchdogs on specific instances of human rights violations concerning women (e.g. the Krishanthy Kumarasamy rape case).

The Internet has also enabled Sri Lankan women's groups to become better connected with international women's groups and women activists from around the world (Narendran, 2002).

Sri Lankan women's groups are increasingly using ICT tools for education, awareness, training, advocacy and research purposes. Examples include:

- CENWOR has launched a women's electronic information network that consists of mailing lists and a website [19] and provides on-line training for women.

- The Siyath foundation provides information to women at the grass-roots level by downloading information from the Internet, translating it into their language and distributing through fax or post. Regular discussions are held among women villagers on the downloaded information at '*Gami Hamuwa*' meetings (Wanasundera, 2002).

- The Women's Economic and Legal Rights (WELR) Project in 1998 to 2001 used television and video programmes to raise awareness on the economic and legal rights of female workers in Sri Lanka's informal economy. The project commissioned a series of television documentaries that focused on the coir industry in the southern province and agricultural labour in the Mahaweli settlements.

[6.0] ICT impact on human development – creating a healthy community: providing sanitary facilities and combating major diseases

[6.1] Introduction

Since independence, Sri Lanka has adopted health care as a welfare facility. The provision of health care services free of charge and the implementation of generous health programmes fully funded either by the government or donors have greatly enhanced the health status of citizens. This has resulted in a relatively well-developed health care infrastructure that provides these facilities within a range of 2 to 3 kilometres for a majority of people, and helped Sri Lanka achieve health indicators that are on par with those of industrialized countries.

[6.1.1] *Health standards*

The country has achieved outstanding success in raising the health status of its people in spite of its relatively low per capita GNP (US$ 858 in 2002). The life expectancy at birth has consistently improved over the last few decades – it increased from 43 years in 1946 to 73 years in 2002. At the same time, the difference between male and female life expectancies has narrowed. Currently, Sri Lankan women live for an average of 75 years and men 70 years.

Infant, child and maternal mortality rates have also dropped significantly. In the second half of the 1990s, these rates were around 15, 18 and below 1 per 1000 people (World Health Organisation, 2000).

By end 2002, the number of hospital beds per 1,000 persons was 3.6 and the number of persons per doctor was about 2,300. Although the number of nurses per 100,000 people is estimated to be 121, both government and private hospitals continue to face a severe shortage of qualified nurses. Almost all hospitals report an acute shortage of qualified paramedical staff such as pharmacists, laboratory technicians, radiographers, physiotherapists and ECG technicians (Central Bank, 2003).

The use of prenatal services is almost universal in Sri Lanka. Surveys have shown that around 99 percent of mothers receive some prenatal care. Delivery rarely takes place at home – as much as 95 percent of births now occur in medical institutions. Both factors explain the low levels of maternal mortality (Somanathan & Jayawardhane, 2001).

[6.1.2] Major health issues

The following have been identified as the main issues in the health sector:

- Inequalities in provision of, and access to, health care facilities
- Inadequate attention paid to the health needs of the elderly and disabled persons
- Increased incidence of non-communicable diseases (cancer, diabetes, cardio-vascular)
- Accidents (occurring on the road, and at households and workplaces)
- Suicides
- Substance abuse
- Malnutrition

The resurgence of previously eradicated diseases like malaria and tuberculosis and the frequent outbreak of new diseases such as Japanese encephalitis and dengue haemorrhagic fever have also raised concern (Central Bank, 2002a). HIV/ AIDS, for which official infection rates are still relatively low, is another looming concern (see Chapter 7.0)

A recent phenomenon that has worried development planners and health managers is the emergence of non-communicable diseases as major causes of illness and death. The system has to cope with these diseases – including heart diseases, strokes, cancers and diabetes – while still dealing with a host of communicable diseases that are aggravated by poverty and underdevelopment. In development jargon, this is called a 'double burden' – a reality that will assume sharp focus in Sri Lanka in the years to come. It also highlights the need to shift from a mainly curative approach to a preventive one.

Meanwhile, another factor complicating the situation is the gradual aging of the Sri Lankan population, shifting the demographic pattern from predominantly young to the middle-aged. A United Nations report in 1998 stated the country's population was aging faster than anywhere else in the world, and noted that it was grossly unprepared to meet the burden of looking after its elderly. Both males and females will add five more years to their life expectancy by 2025, when the nation's population is expected to stabilise at around 21 million. By then, the current average age of 25 will have risen to 40. How fast and how well the country's health care and other systems adjust to cope with this reality remains to be seen.

[6.1.3] Health expenditure

The total health expenditure of the public sector health care services is fully funded by the government. According to the Sri Lanka National Health Accounts complied by the Ministry of Health, the share of the public sector expenditure was about 48 percent while that of households was 46 percent. The balance was financed by employers (3 percent), private insurance (1 percent), and non-profit organizations (2 percent). In 2002, government expenditure on health amounted to Rs. 24,946 million (US$ 257 million) or 1.6 percent of GDP. Public expenditure on the health care services, as a percentage of GDP, has remained at about 1.5 percent in recent years (it averages 2.4 percent for middle-income countries). Given the current budgetary constraints, this share might decrease further, enabling the private sector to play a larger role (Central Bank, 2002a). Unlike in industrialized countries, where much of the private health expenditure is borne by health insurers, individuals in Sri Lanka have to bear high costs on their own.

Nearly 70 percent of public spending on health goes towards the provision of hospital in-patient care. Private funding is used mostly for out-patient services and purchase of medicine in the private sector. Of the total in-patient admissions, 96 percent are in the public sector and the remaining 4 percent in the private sector; they share 87 percent and 13 percent of the total hospital services funding respectively. Of the total out-patients, 48 percent are in the public sector and the balance 52 percent are in the private sector (World Health Organization, 2000).

[6.1.4] Private sector contribution

The private sector contribution in providing health care facilities has grown considerably during the past two decades. As at 2001, there were 160 private hospitals with a total of 7,000 beds. It has been estimated that about 800 qualified doctors and 3,000 qualified nurses work in the private sector. Table 6.1 shows the performance of private hospitals during the last two years (Central Bank, 2000).

Table 6.1: Performance of Private Hospitals in 2000 and 2001[(a)]

	2000	2001 (b)
Hospital beds	1,565	1,613
Number of in-patients	118,515	139,037
Number of out-patients	1,225,141	1,365,934
Number of permanent doctors	182	193
Number of visiting and part-time doctors	958	1,023
Nursing staff	2,640	2,718
Other staff	2,495	2,624

Source: Central Bank of Sri Lanka, Annual Report 2001
(a) Based on information reported by 34 key private hospitals
(b) Provisional

[6.1.5] Health facilities

Although some of the peripheral institutions are underutilized and not operationally efficient, the population-based ratios of hospital beds, doctors, and community health workers are impressive. The development of human resources for health and their distribution has continued to improve.

Table 6.2 : Public Health Services

	1999	2000	2001	2002(a)
Hospitals (practising western medicine)	558	585	585	605
Number of beds	55,436	58,423	58,883	59,781
Central dispensaries	383	389	389	385
Total number of doctors	5,957	6,873	7,235	7,459
Total number of assistant medical practitioners	1,340	1,332	1,330	1,295
Total number of *ayurvedic* physicians	15,785	16,161	16,130	16,455
Total number of nurses	14,052	14,931	15,061	16,139
Total number of attendants	7,178	7,309	7,163	6,955
Number of in-patients	3,826	4,015	n.a.	n.a.
Number of out-patients	41,325	43,329	n.a.	n.a.
Health expenditure – capital (Rs. mn)	4,456	5,302	3,987	4,713
Health expenditure – current (Rs. mn)	11,215	15,394	14,785	20,233

Sources: Ministry of Health, Nutrition and Welfare; Central Bank of Sri Lanka
(a) Provisional

The public sector national health care system is entirely based on the western, allopathic tradition. Coexisting with this is the ancient system of *ayurveda*. A survey in the early 1990s revealed that 70 percent of Sri Lankans turn to *ayurvedic* physicians for certain types of ailments at one time or another during their lives. The *Ayurveda* health care system is largely outside the state sector, and is in the hands of over 20,000 physicians, many of whom hail from traditional healer families. The state runs an *ayurveda* hospital and a research institute, and established a ministry of indigenous medicine in the early 1990s. However, official health care infrastructure, statistics and investments hardly cover the indigenous systems.

[6.1.6] Distribution of health services

Health facilities are not evenly distributed within the country. Usually the best facilities are available in the major cities while the standards and quality drop progressively as one travels away from urban areas.

The long-drawn ethnic conflict led to the denial of even basic health care facilities to a large section of the population in the Northern and Eastern Provinces. Health services do not yet fully reach the districts of Jaffna, Mannar,

Mullaitivu, Trincomalee and Polonnaruwa. Vanni District in the north has only one district hospital (in Mallavi). According to Ministry of Health specifications, there should be four base hospitals (one for every 100,000 people), one district hospital for every 50,000 people and a central dispensary and maternity ward for every 20,000 people. Mullaitivu District alone has a population of 233,000 of which about two thirds are displaced. The health services are inadequate to serve this most vulnerable segment of the population - the internally displaced families. Mullaitivu, with a population exceeding 200,000, has only one public health inspector (PHI) and 11 midwives (National Peace Council, 2002).

[6.1.7] Donor agency participation

Several multilateral agencies support the health care services in Sri Lanka. For example, UNDP, Office of the United Nations High Commissioner for Refugees (UNHCR) and United Nations Children's Fund (UNICEF) have been active in helping those affected by the war by supporting special protective measures. The World Food Programme (WFP) provides emergency food assistance. The Food and Agriculture Organization (FAO) support includes a special programme on food security, disease prevention and health management integrated into coastal shrimp culture, aquaculture development, home gardening integrated with poultry, small-scale fish culture and provision of insulated fish containers to small-scale fishermen. International Labour Organization (ILO) assists in strengthening industrial relations, human resource development, elimination of child labour and promoting occupational safety and health (World Health Organization, 2000).

Several bilateral donors have also included financial or technical assistance to the health sector in their portfolios for Sri Lanka. The World Bank has started providing increasing support to the Sri Lankan health sector, especially in relation to HIV/AIDS, which is covered in another chapter.

[6.1.8] NGOs and community support

Many NGOs, professional bodies and charity organizations are involved in health promotion activities. Health volunteers assist government health personnel, particularly in the rural areas. The services of these volunteers are used in clinics, wards, during home visits, school health activities, etc. Their services have also been invaluable in the community-based rehabilitation and care of the disabled and elderly. The Children's Secretariat has launched a countrywide programme for early childhood development with the support of NGOs, local community leaders and health volunteers. Hospital wards, medical equipment, furniture, drugs, etc., have been donated by various philanthropic groups. Medical care institutions are often maintained with community participation (World Health Organization, 2000).

Non-governmental and non-profit organizations play the major role in health education, awareness and preventive measures. Their active participation has been particularly evident in recent years, for example, in campaigns to vaccinate children against childhood diseases, to advocate a rational drugs policy, to restrict smoking in public places and in mobilizing communities to keep their homes and gardens clean.

[6.1.9] Planning and Administration Issues

The World Health Organization (WHO) country cooperation strategy report identifies the following as the major planning and management issues in Sri Lanka's health care sector:

- Inequity in access to quality health care
- Inadequate resources for the state health sector
- Absence of an integrated, comprehensive programme on prevention of non-communicable diseases
- Lack of coordination between the state health sector and the private sector
- Absence of any patient referral system
- Inadequacy of community health orientation among health professionals

Other management issues include inadequate accountability of care providers, ineffective management of human resources, weak intersectoral coordination, deficiencies in the health information system, inadequate involvement of communities and community-based organizations in health care delivery, and poor enforcement of laws and regulations pertaining to health.

[6.2] ICT in health care

ICTs are used in Sri Lanka's health care sector at an elementary level. A few state and private hospitals in Colombo use computer based systems to record and store patient information. ICTs are not used widely for diagnostic purposes in most hospitals. While almost all private hospitals use computers for administrative and financial purposes, this is not yet the norm in government hospitals where work is still done manually.

[6.2.1] ICT usage in hospitals

The Lady Ridgeway Children's Hospital in Colombo is a rare instance where a government hospital utilizes ICT to maintain patient records. This hospital – the largest of its kind in the country – daily serves about 2,000 out-patients, of whom about 150 to 175 are admitted to the hospital. The in-patient database first came into use in 1995, improved in 1998 and became fully operational in 1999. The database records information including the time and mode of admission, duration of stay in the ward, clinical diagnosis, diagnosis based on the international classification of diseases, and categories of drugs administered, etc. This information is used not only for treatment, but also in planning improvements in the service (Perera et el, 2003).

The newly established Apollo Hospital uses a software application called HIS (Hospital Information System) to integrate both the medical and administrative services. This application can be run in any computer connected to the local area network in the hospital, and contains patient details such as the diagnosis history and prescribed medicines. This information is available not only to the local medical staff but to the specialist staff at their principals in India through an on-line arrangement. Where necessary, a specialist in India can analyse the information and treat a patient in consultation with local doctors (Karunatilake, 2002). Similar packages are used by some prominent hospitals in Colombo and major cities. The private hospitals also use software applications to enable prior appointments with specialists.

Meanwhile, in the rural areas hospitals and medical units sometimes lack even the basic facilities – and ICT is yet to arrive. A survey conducted by the Institute of Policy Studies (IPS) in 2001 showed that although maternal and child health services are provided at all levels of the Sri Lankan health care system, the majority of interventions are provided at the community level in these two types of units. One mother and child health (MCH) and medical officer of health (MOOH) unit serves a population varying from 20,000 to 50,000. The study revealed that some units are not provided even a telephone for basic communication. Table 6.3 shows the percentage of units that have electricity and telephones. This shows that in some units even a telephone is not available for communication purposes.

Table 6.3 : Equipment and facilities available (or functional) in MOOH units (percentage)

	Electricity	Telephone
District	**Functional %**	**Functional %**
Colombo	100	100
Galle	100	50
Matara	75	50
Polonnaruwa	100	100
Badulla	67	67
Kurunegala	100	100
Ratnapura	100	100
All districts*	93	76

Source: The survey on maternal and child health services in Sri Lanka, Institute of Policy Studies, November 2001.
** Except North and East Provinces*

[6.2.2] Telemedicine

Telemedicine services have not yet become popular in Sri Lanka. This may be due largely to the small size of the country and the availability of health facilities within the accessible range for a large section of the population. High costs of telecommunications and slow general growth in ICT services may also be contributing factors. However, there is potential for telemedicine as the specialist services are not evenly distributed. Such services are available only in main cities, where only a fifth of the population lives. Some 40 percent of over 600 medical specialists work in Colombo where 7 of 14 teaching hospitals are located. There is a critical shortage of medical specialists in other areas, especially in the fields of neurology, microbiology and radiology (Gunawardana, 2002).

Ceycom Telemedicine Ltd., a private IT company, has introduced a low cost Internet based solution to carry out telemedicine services within a limited scope. This integrated hardware and software solution can be used to send patient information (medical history, diagnosis details such as heart and lung sounds, video clips and medical images) by the requesting physician (a general practitioner) to a specialist. The specialist can also access the patient's records at the other end. After receiving this information, the specialist can advise the general practitioner. Payments can also be made on-line using a credit card (Gunawardana, 2002).

The following have been identified as the possible bottlenecks in popularising such a solution in Sri Lanka: (Gunawardana, 2002)

- Lack of support from the state to build confidence among patients

- Inadequate computer literacy skills among some specialists
- Attitudes of patients and physicians and reluctance to deviate from traditional methods
- Affordability of the solution
- Absence of patients' records in electronic form at the general practitioner's end

Some medical specialists are optimistic about the viability of such a solution in the Sri Lankan context. As one specialist has noted:

> "In Sri Lanka the pattern of referrals from primary care gives an idea as to how telemedicine could help. With 12 million annual consultations, the Sri Lankan general practitioners have a referral rate of 1–3 percent. The majority is for obtaining an expert opinion regarding the whole patient, on X-rays, ECG/EEG tracings or laboratory investigations. Rarely, they will seek a second opinion from foreign / local tertiary care experts for major procedures e.g. coronary bypass. The geographical consideration (maximum length is 450 kilometres), telecom infrastructure, and health-seeking behaviour of Sri Lankan patients will have little scope for real-time teleconsultations. Asynchronous communication modes and store-forward telemedicine models may be the most appropriate for Sri Lanka. There is evidence that store-forward-telemedicine, especially teledermatology and telepathology, is cost-effective but clinical efficiency may be less, compared to real-time telemedicine. User-friendly web portals offering store-forward telereferrals would be one option that a doctor with even a 32kbps Internet connection may be tempted to use with a flatbed scanner and a digital camera" (Mendis, 2003).

An experimental telemedicine project was undertaken in 2001 involving the University of Peradeniya in Sri Lanka and the Saga University of Japan. A software application developed by Saga University was used for video conferencing sessions. The set-up consisted of a digital video camcorder, personal computer, network access interfaces and audio equipment. Image and voice transfer was done between the Faculty of Dental Sciences, Peradeniya, and Saga Medical School to treat patients with the guidance of Japanese experts in oral and maxillo facial surgery. Problems such as cleft lip and palate, dental implants and facial epitheses were included in the study as post-operative review cases. The patients' images were shown to the Saga experts and their expert opinions were obtained in real-time. Patients' records were transmitted as off-line PowerPoint (PPT) files and were used in the real-time sessions for discussion (Weerasinghe et el, 2003).

[6.2.3] Private sector voluntary initiatives in using ICT for health care

There are several private sector voluntary initiatives to effectively utilize ICT in health care.

One good example is the attempt by Dialog GSM – the cellular provider with the highest market share in Sri Lanka – to find prospective blood donors under emergency situations. The donor contact ability during an emergency blood requirement is weak in the country and about 25 percent of the blood requirements are not met. Dialog helped by presenting a SMS blood appeal, matching and donor management application, which enabled mobile phone users to register as blood donors through short massage service (SMS). Dialog launched its SMS donor canvass in June 2002 and has achieved nearly 800 registries since the launch. Whenever there is a need for blood it sends a message to all the donors having the matching group, facilitating the donor search within a short period (*Daily News*, 2003).

Western Infirmary Hospital Ltd., another private company, has introduced the website emed.lk as an innovative approach to telemedicine in a form that fits the existing system of medical consultations in the country. It provides medical advice and information via email, fax or a website to anyone who poses a health related query. A multidisciplinary panel of medical experts responds to these queries (Gunawardena & Wattegama, 2003).

Meanwhile, 'e-Channeling' helps patients in remote areas to make appointments with medical specialists in Colombo without the hassle of travelling long distances. A patient can reserve time with a specialist either through a website, or through a private commercial bank with 55 branches throughout the island. If the reservation is done through Internet, on-line payments can be made using a credit card. Cash or credit card payment can also be made at any bank branch. Once the booking is completed, the system issues a reservation receipt, which can be produced to the hospital. At present, reservations are only allowed for specialists working in a few hospitals, but the company expects to expand it to cover all private hospitals in the near future (Nanayakkara, 2002).

[6.2.4] ICT usage in health care research

ICT tools are used for health care research in most medical research institutions. The Medical Research Institute (MRI) uses ICT tools for research in several different ways. These include maintaining various databases for research purposes, digitally transmitting medical information such as CT scans and MRI scans via email, using specialised software packages, and using common word processing and spreadsheet applications in conducting and reporting research. MRI also uses ICT for communication among researchers and contributors in publishing the Ceylon Medical Journal. All communication processes that were

earlier carried out manually have now been computerised. An on-line edition of the journal has been published for the last few years.

The Malaria Research Unit of the Department of Parasitology at the University of Colombo Medical Faculty uses a Geographical Information System (GIS) to monitor the spread of the disease at several selected Grama Niladhari divisions at Badulla and Moneragala districts. The GIS database was developed using the data collected between 1997 and 2002. Based on this database, the unit has prepared a risk map to indicate the areas more susceptible to malaria.

[6.2.5] Role of ICT in health care education and training

Use of ICT for health care education is still limited. This is due to the overall low ICT usage among medical professionals. However, there are several instances where ICT tools have been tried out on an experimental basis for health care training. One such application is being used at the Colombo University's Medical Faculty to train undergraduates. It is a client server solution that can run on an Apache web server, with Php server-side scripting language, on a Windows NT platform. Students can log on to the server through the Local Area Network using a conventional web browser. Students are provided two approaches to follow lessons, viz:

- A pre-determined sequential walk through the lessons; or
- A pre-lesson question paper, and depending on the answers they provide, a tailor-made sequence of lessons.

Each lesson comprises a combination of text, images and multimedia clips. While following the lessons, random pop-up questions are presented, and student responses are recorded into the database. The tool also incorporates a search engine and a discussion forum. Pre-lesson question papers enable the system to present a tailor-made set of lessons to each student. Random pop up questions keep students alert and enable the lecturers to keep track of the students' progress as well as identify concepts that are proving to be too difficult to a majority (Premaratne, 2003).

The faculty has also started computer based multiple-choice question banks for medical students on an experimental basis. A student can use these question banks to test his / her subject knowledge prior to the exams.

Students from different medical schools in Sri Lanka have joined hands to create e-groups for information sharing. These e-groups not only provide technical information pertaining to medical studies, but also disseminate advice from seniors with real-life clinical examples.

Several studies have been conducted to assess computer usage by medical students. It was found that although the ICT literacy level among medical students is above that of other undergraduates, there is still room for improvement. One study conducted at the University of Sri Jayawardanepura in 1999 revealed that overall 70 percent of students used computers, but many (46 percent) used it rarely or only on a few occasions. Around 32 percent had access at university while only 14 percent had access at home. The students expressed a willingness to use computers more often if access was easier. Half of them had learnt computing through formal courses, and 27 percent through friends / colleagues. Only 3 percent were aware of the exact configuration and capacity of the computer they used. Most students (71 percent) agreed that computer skills were essential for doctors and 84 percent agreed that professional life could be improved by using IT. Eight out of ten also agreed that computer skills should be taught in medical school (Fernando, 1999).

[6.2.6] Role of ICT in awareness creation

Very few heath-related institutions in Sri Lanka have a website of their own. Among these are the Ministry of Health, Welfare and Nutrition, the Colombo National Hospital, University of Colombo Medical Faculty, Ministry of Indigenous Medicine and the State Pharmaceuticals Corporation. However, none of these websites is dedicated for health education or awareness.

The website of the Human Genetics Unit of the University of Colombo Medical Faculty has been on-line since early 1997. It was set up with the dual objectives of presenting information on genetic disorders and birth defects most relevant to Sri Lanka, and creating a resource which would be useful to the patients, students, doctors, researchers and the public. This website contains patient information leaflets in Sinhala, Tamil and English, a searchable bibliography of articles appearing in Sri Lankan medical journals, a collection of essays and a hypertext guide to popular sites on medical genetics, and information about the Human Genetics Unit. It is the first medical website containing Sinhala, Tamil and English content and is the most visited Sri Lankan medical website, with almost 30,000 visitors in two years (Dissanayake, 1999).

Television has proved to be a much more effective medium for health awareness creation. Almost all TV channels now have their own health awareness programmes. Among the popular health programmes are *Suva Hamuva* and *Lama Suvasetha* on Rupavahini, *Vaidya Hamuva* on TNL and *Suva Hamuva* on Swarnavahini. These are weekly programmes of between 30 and 45 minutes duration and usually involve interviews or discussions with medical specialists. Television news bulletins frequently carry health related items, including concise advice to the public on preventive measures, treatment and national campaigns. During the recent epidemics of dengue hemorrhagic fever, for example, the broadcast media played a major role in mobilizing people to

clean up their immediate environments to minimize the proliferation of mosquitoes that carried the virus.

[6.3] ICT Roadmap initiatives for health care

The ICT Roadmap recommends the implementation of a 'hospital management system' at each state hospital. This is to incorporate all elements of running a hospital, which includes:

- Patient admission system
- Room allocation and meal preference system
- Pharmacy module
- Drug store module
- Kitchen module showing meals needed for the day – depending on who is at the hospital and their preferences
- Billing, invoicing, payment and accounting system hook-up modules
- Physician and specialist availability and schedules modules
- Operating theatre schedules and the required resources for each theatre
- Resources allocation modules (i.e. medical hardware allocation)
- Patient admission and medical histories
- Types of illnesses and types of drug therapies that can be prescribed
- Index of all known/permitted surgical procedures and the material requirements for each of these procedures

This system aims not only to provide better health care services for patients, but also to use the collected information for health authorities to make better decisions.

"Health expectancy is more important than life expectancy," says Professor Ravindra Fernando, a leading health policy researcher and a former president of the Ceylon College of Physicians. He points out that as people live longer, the

risk of non-communicable disease grows. “Of course, later death is a benefit, but increased longevity without quality of life is an empty prize.”

Thus, one of Sri Lanka’s major challenges is how to add life to the years, and not just years to life.

[7.0] ICT impact on human development – combating HIV/AIDS

[7.1] Introduction

Sri Lanka is not a high-risk country for Human Immunodeficiency Virus / Acquired Immune Deficiency Syndrome (HIV/AIDS). At present, its HIV prevalence is low – below five percent among subpopulations involved in situations of risk, and under one percent among the general adult population (World Bank, 2003).

[7.1.1] HIV/AIDS prevalence

Although the Joint United Nations Programme on HIV/AIDS (UNAIDS) and WHO estimate that the number of HIV infected persons in South and Southeast Asia exceeds 5.8 million, the number in Sri Lanka was around 8,500 as at December 2000, with a prevalence rate of 0.07 percent among adults. Since 1986, only 415 cases have been reported. However, underreporting is highly likely because of the country's limited capacity for voluntary counselling and testing, along with the prevailing stigma and fear of being identified as HIV positive (World Bank, 2003).

The number of women infected by HIV nearly equals the number of men. Women comprise the majority of migrant labour to the Middle East, and as a result are required to be tested for HIV. Among the total number of cases reported from 1987 to 2000, where the mode of transmission is known, 98 percent of reported HIV cases were due to sexual transmission. Only a few cases of HIV transmission from mother to child and through blood transfusions have been reported. Transmission through injection has not been reported thus far.

Although the overall HIV prevalence is low, extensive risk factors and behaviour patterns that facilitate rapid spread of the infection are widespread and make Sri Lanka highly vulnerable to a HIV/AIDS epidemic. These risk factors include (World Bank, 2002, 2003b):

- ***Low condom use:*** Although research on sexual behaviours has been limited, a few studies conducted in the urban areas suggest low condom use among men. [20]

- ***Commercial sex activities:*** The number of commercial sex workers operating in Sri Lanka is estimated to be 45,000 (30,000 females and 15,000 males) but the actual number can be higher. The low condom use and the prevalence of sexually transmitted diseases (STDs) increase the spread of the HIV virus among those engaged in sex work. [21]

- ***Considerable sexual activity among youth:*** Although no comprehensive surveys have been conducted to support this argument, sexual activity among youth with multiple partners is believed to be high, given the relatively late age for marriage for both males and females.

- ***High mobility:*** Migration within Sri Lanka and to other countries (European, South Asian and Middle East countries where HIV prevalence is higher) has become necessary for the economic survival of many households in both rural and urban areas. Thousands of women and men live away from their families either overseas or as workers in the free trade zones and plantations. Removal from traditional social structures is known to promote the unsafe sexual practices of having multiple sexual partners and engaging in casual and commercial sex. It also increases vulnerability of women and girls to sexual abuse. This can result in a high spread of AIDS among migrant workers.

- ***Injecting drug use:*** Sri Lanka has an estimated 30,000 drug users, of whom about 2 percent inject drugs. This group is at high risk because of needle sharing.

A relatively high prevalence of STDs is evident in the country. The number of STD cases annually detected varies from about 60,000 to 200,000. Out of this, only 10–15 percent turn up at government clinics. This is a concern because STDs facilitate the spread of HIV infection and also indicate low condom use and other situations of risk in sexual behaviours. Seventy percent of male patients at STD clinics had reported visiting commercial sex workers, and 45 percent of female sex workers had experienced multiple STDs (World Bank, 2002).

Reports from NGOs working on HIV/AIDS reveal that many persons living with HIV/AIDS (PLWHAs) have reported being stigmatised and harassed, even inside hospitals, after their condition became known. The media has hounded patients, PLWHAs and their immediate family members have lost jobs, their children have been deprived of schooling and they have been forced to move out of their dwellings. Fear of widespread stigma and discrimination caused by misinformation, ignorance and the shame of having a disease strongly associated with ‘promiscuity’ and ‘immorality’ force a vast majority of PLWHAs to live in secrecy and not access services in Sri Lanka.

[7.1.2] Prevention programmes

In 1992, the Government of Sri Lanka initiated HIV prevention and control efforts through the National AIDS/STD Control Programme (NASCP), managed by the Ministry of Health. This programme is implemented in collaboration with the provincial directors of health services, STD clinics and the National Blood Transfusion Service. NASCP has made significant progress in improving STD

services by refurbishing clinics, meeting staffing and equipment norms and setting up outreach camps. In addition, the programme has helped to ensure blood safety through screening of transfusions for HIV and upgrading of blood banks, and has increased knowledge of HIV/AIDS among Sri Lankans.

To further address growing challenges, the government has formulated the National Strategic Plan for 2001-2006; this indicates a significant shift in the national HIV prevention and control strategy.

Some people living with HIV feel that the government is avoiding the responsibility of providing basic treatment that can help prolong their productive lives. Most of those infected are simply unable to afford the cost of anti-retroviral (ARV) therapy. Dr. Kamalika Abeyaratne, a HIV positive retired government paediatrician and Chairperson of the AIDS Coalition, says her ARV therapy costs over Rs. 4,000 a month or Rs. 48,000 (US$ 500) a year. Those who cannot bear this cost have to seek the assistance of philanthropists for their treatment (Hettiarachchi, 2002).

[7.1.3] NGO participation

A number of local and international NGOs are engaged in HIV/AIDS prevention work, but their work has been limited. Their collaboration and coordination with the government needs to be strengthened. In addition, the programme coverage of susceptible groups by NGOs is estimated to be less than 10 percent (World Bank, 2002).

[7.1.4] National AIDS prevention project

The World Bank approved a specific investment loan of US $ 12.55 million in December 2002 to the Ministry of Health, Nutrition and Welfare to help Sri Lanka curb the spread of HIV infection among its highly vulnerable subpopulations and the population at large and to reduce stigmatisation of those affected by HIV. The project duration is estimated to be five years commencing from January 2003. This project also aims to revitalize and expand the tuberculosis (TB) control programme to minimize the risk of an emerging HIV associated TB epidemic. The first component expands prevention programmes for highly vulnerable groups and the general population, especially youth. The second component develops programmes to sustain political and societal commitments to HIV/AIDS prevention and to reduce stigma and discrimination against people living with HIV/AIDS. It will also expand coverage and quality of treatment services and develop research. The third component intends to strengthen multisectoral involvement and capacity, enhance the information base for policy decisions and program management, and improve health care waste management.

[7.2] ICT usage in combating HIV/AIDS

In the Sri Lankan context, there are not many specific examples of ICT usage in combating HIV/AIDS. However, a few government institutions and NGOs use ICT tools to create awareness and store information on PLWHAs. The effectiveness of the use of ICT as an awareness instrument is doubtful as ICT usage is very low among the identified vulnerable groups such as commercial sex workers and lorry / taxi / trishaw drivers.

[7.2.1] ICT usage in AIDS prevention attempts by the government

The following are the main ways ICT is being used in the National AIDS/STD Control Programme (NASCP, 2003):

- Computer databases are used to collect data about PLWHAs. IT tools are also utilized to analyse the data and prepare necessary reports.

- Electronic media and equipment including television receivers, multimedia projectors, video players, etc., are used in creating awareness on HIV related issues among the general public. However, most provincial awareness programmes are still carried out using television only, due to difficulties in finding closed environments to use more sophisticated multimedia tools.

- Radio channels carry HIV/AIDS awareness programmes in local languages with technical input from NASCP.

- The head office of NASCP maintains a telephone hotline to provide information on HIV/AIDS. However, due to the lack of trained medical specialists at provincial clinics, it has become difficult to roll out this service nationwide.

These activities are expected to be further expanded in the near future under the national AIDS prevention programme assisted by the World Bank. Given below are the additional measures that will be introduced under the programme:

- Introduction of dedicated ‘mobile health education units’ to conduct HIV/AIDS awareness programmes. At present, such awareness programmes are carried out by general health education units, with other types of health awareness programmes.

- Introduction of AIDS information hotlines at the provincial level.

- Provision of Internet / email facilities to all medical specialists involved in the HIV/AIDS control programme by setting up a wide area network. These facilities will also be made available to all medical students(both at the undergraduate and postgraduate levels) who participate in the clinical sessions.

- Launch of a comprehensive website to create HIV/AIDS awareness. As an initial attempt, specific information on HIV/AIDS is now being published in the Health Ministry website. However, a separate website for this purpose is planned.

- Expansion of radio / television programmes to further create awareness.

[7.2.2] ICT usage in AIDS prevention programmes of NGOs

Although there are several NGOs working on AIDS awareness and assistance programmes, the use of ICT tools is minimal in these efforts. The following specific examples show how two leading NGOs, Sarvodaya and Companions on a Journey (COJ), use ICT to create awareness and provide assistance to PLWHAs:

- Both NGOs use multimedia tools, within certain limits, to create HIV/AIDS related awareness. These efforts go parallel with other modes of awareness creation such as distributing pamphlets, displaying posters, publishing newspaper advertisements, etc.

- Both NGOs maintain telephone hotlines to answer queries related to HIV/ AIDS and to provide counselling assistance to PLWHAs. Sarvodaya maintains close contact with two AIDS patients in critical condition through phone and email, while COJ keeps contact with several other AIDS patients. The tele-counselling service launched by COJ on HIV/AIDS related issues is a success – over 1,500 queries were received within one year. This NGO has trained a total of 50 counsellors to answer calls.

- COJ is preparing a mailing list or ‘e-group’ of PLWHAs who have Internet and email facilities. This process is spearheaded by a HIV-infected IT specialist.

These and other NGOs active on HIV/AIDS related issues face difficulties in using ICT effectively for awareness creation. For example, a programme by COJ to build a database of PLWHAs failed due to lack of financial resources and poor response to its requests for information. The low Internet penetration level is another problem. When Internet penetration levels are higher, ICTs will be ideal

tools to raise awareness. The anonymity provided by the Internet can be a very useful feature in dealing with sensitive issues of HIV.

NGOs intend launching other programmes and these plans are similar to those of the government. Launching websites in English and local languages, establishing AIDS awareness centres assisted by ICT tools, and utilizing radio / television programmes to create awareness are some of the measures in the pipeline. Sarvodaya plans to produce case study video tapes on selected PLWHAs and how they faced life successfully.

[8.0] ICT impact on human development – ensuring environmental sustainability

[8.1] Introduction

[8.1.1] Traditional Sri Lankan vision on environmental sustainability

High population growth and population density places significant challenges on the use of natural resources in Sri Lanka. Historically, the island has had advanced systems of natural resource management and conservation dating back to nearly 25 centuries of recorded history. The early inhabitants had evolved a complex system of rainwater harvesting and storage, through an intricate network of large and small reservoirs and canals. These also served as a soil and water conservation system. This harmonious coexistence with the natural environment was influenced and nurtured by the teachings of the Buddha, who once said: *"The forest is a peculiar organism of unlimited kindness and benevolence that makes no demand for its sustenance and extends generously the products of its life activity: it affords protection of all beings, offering shade even to the axe man who destroys it."* [22]

Another important message on environment was delivered by Arahat Mahinda, the son of Indian Emperor Ashoka, who introduced Buddhism to Sri Lanka in the 4th century BC. Addressing King Devanampiyatissa, the ruler of the island, Mahinda said: *"O' great King! Birds of the air and beasts on the earth have an equal right to live and move about in any part of this land as you do. The land belongs to the people and all other beings and you are only the guardian of it."* [23] Inspired by these words, the king declared one of the world's earliest protected areas in the vicinity of the forest where he first encountered Mahinda.

In the past 400 years, however, a combination of factors including colonial rule, unsustainable economic development patterns and the increase in population have rendered traditional natural resource management practices inadequate. The challenge today is to strike a balance between the grand vision articulated in these statements with the economic and industrial development of the country.

Some of the key environmental issues Sri Lanka faces right now can be identified as:

- Deforestation – particularly within the wet zone
- The threat of extinction of several species of fauna and flora
- Sea erosion – particularly along the South-western cost of the island

- Pollution caused by the non-bio degradable material such as Polythene
- Pollution of the natural water resources
- Air pollution in the city areas
- Problems arising from the lack of proper procedures for waste disposal
- Civil constructions without proper planning

[8.2] ICT for environmental sustainability

ICT tools are increasingly being used to improve natural resource management and pursue environmental sustainability in Sri Lanka. The government, non-government, academic and corporate sectors have recognised the potential and value of tools and methodologies such as geographical information systems (GIS), aerial and satellite based remote sensing and mapping, global positioning systems (GPS), database systems and the use of personal computers and Internet for a variety of purposes; for studying, monitoring, assessing, managing, protecting or promoting natural resources, ecosystems and habitats.

As one researcher has noted, "In Sri Lanka, the interest for the traditional disciplines like surveying, cartography, photogammetry has faded away and a significant trend of involvement in the use of geospatial data is increasingly experienced. The transition from traditional surveying and mapping technologies towards geoinformatics where modern spatial science and information technology interact successfully to provide effective solutions and approaches, is not without constraints and challenges" (de Silva, 2002).

The major sectors that deal with geospatial data include research and education establishments, telecommunications, power and energy, irrigation and water resource management, environmental conservation, meteorology and climatology, agriculture, transportation and urban planning. According to responses to an exploratory survey carried out by the University of Sri Jayawardanepura and SIDA / SAREC research cooperation project, geospatial data demand is prominent in the areas of land use mapping, research and training.

Information networks and databases enable effective environmental management while Internet and email are widely used to create awareness. Efficient communication tools enable the sharing of knowledge and information among organizations and with the public, across international borders. As information from other countries becomes accessible over the Internet, Sri Lanka

has benefited from the availability of this information and access to expert advice on several occasions when faced with different types of situations.

The following are case studies showing how some government and non-government organizations in Sri Lanka use ICT for environmental conservation and management purposes. This is not an attempt to provide a complete picture of ICT use by all the relevant organizations, but more an in-depth qualitative representation of ICT use by few selected key organizations.

[8.2.1] ICT usage by Forest Department

In the public sector, the Forest Department is a key user of ICT. It uses GIS for forestry management and a database to manage the replanting of man-made forests.

The sharp decline in Sri Lanka's natural forests – comprising mainly dry mixed evergreen forest and rainforest – has been a major environmental concern. Once extensive and widespread, they have now been reduced to around 23.8 per cent of the country's land area, and even these remaining forests have been severely degraded by excessive logging and encroachment. The forests are mostly state- owned and come under the Forest Department or the Department of Wildlife Conservation.

The Forest Department established its GIS unit in the early 1990s. Its aim was to prepare new maps of natural and planted forests using satellite remote sensing techniques, and to use these maps as the basis for a national forest GIS. Satellite images were purchased from Bangkok and Hyderabad and the first generalised map was developed by 1992, followed by more detailed maps in 1994. By the mid-1990s this GIS consisted of data on protected area boundaries, government forest boundaries as well as rainfall and temperature. Information on forests, wildlife reserves, roads, towns, rivers and climate were also included in the initial dataset (Sri Lanka Forest Department, 1995).

The main source of information in preparing these maps was the American Landsat Thematic Mapper (TM) satellite images, while the Indian remote sensing satellite IRS-1's images have also been used when cloud-free TM images were unavailable. These images were visually interpreted and entered to the computer system as a digital forest map, using an image processing software named ERDAS. This made it possible to differentiate several categories of forests in these digital maps, which were then integrated with the digitalised formats of the maps prepared by the Survey Department on irrigation systems, road and railway networks, district boundaries, etc., to create complete maps to any scale less than 1:50,000.

These databases and analysis have provided a scientific basis for rational management of Sri Lanka's remaining natural and man-made forests. Forest blocks were identified and aggregated into separate management areas. The GIS can provide a variety of information depending on the type of query and layers of information available. The availability of information on climatic conditions allows the selection of suitable species for replanting on the basis of rainfall, number of dry months and maximum and minimum temperatures. The GIS enables the presentation of information in three-dimensional form and offers the possibility of better forecasting through modelling of interrelationships among various units of nature such as air, water, trees and life forms.

There were several successful attempts by both foreign and local experts to use remote sensing GIS techniques in their research work. Given below are a few selected examples carried out under different projects of the Forest Department:

- ***Satellite remote sensing of natural and plantation forest:*** Satellite image digital numbers sampled from different Sri Lankan forest types were evaluated to assess the feasibility of using automated techniques for countrywide forest mapping. This project revealed that the digital numbers for evergreen forests in the wet zone show little annual or inter-annual variation, while those for open canopy forests in the dry zone and parts of the intermediate zone vary notably according to the season in which the data is acquired (Jewell, 1995a).

- ***Planning and managing the conservation of tropical forests in the Knuckles range:*** This involved the preparation of a detailed GIS that includes topographical forest, climatic and administrative information for the Knuckles range of forests, a mountainous area of exceptional biological diversity (Legg, 1995).

- ***Application of remote sensing and GIS techniques for the detection of change in forest cover:*** In this project, two Landsat TM images from 1998 to 1992 were used to determine the deforestation in a selected area in Habarana in the Polonnaruwa District, North Central Province. GIS overlay operations revealed that more than 1.2 percent of the study area had been deforested in the four-year period. This demonstrated how effectively the combination of TM and GIS techniques could be used to gather information of operational significance related to deforestation (Palihawadana & Jewell, 1995).

- ***Use of Landsat TM data for estimating the area of 'home gardens':*** This project was prompted by the urgent need of the 1995 forestry sector master-plan for up-to-date information on the extent of tree cover outside forests. It estimated the area of so-called 'Kanyan home gardens' using a

combination of image classification and visual interpretation techniques (Jewell, 1995a).

The FORDATA (forest data) database of the Sri Lanka Forest Department enhances the administration of planted trees such as pine, teak, mahogany and eucalyptus. Functions such as the calculation of volume of trees, the annual rate of felling and assessing the value of trees are made easier because of this database. The sale of mature trees to the Timber Corporation is also facilitated by this database.

Another key ICT use by the Forest Department is a communication system that allows it to pass on information regarding forest offences with a view to intercepting such actions immediately. The network is divided into three zones, viz:

- Colombo to Anuradhapura in the north-central part of the country;
- Colombo to Hambantota in the south-east of the country; and
- Kandy to Nuwara Eliya area in the central region.
- The department's head office in Colombo can contact any zone through the network, while the provincial or local offices can only access other offices within their own zone. Mobile units of each office are accessible via a radio network. When illegal activities take place in a particular region, the respective office is contacted over the network and instructed to connect over the telephone to pass on information through a secure channel, thus avoiding the risk of third party interception of confidential information.

[8.2.2] ICT usage by Survey Department

The Survey Department has been using GIS application for several years. Within their GIS database, the map of Sri Lanka has been divided into 92 units or sheets. Each of these sheets contains five layers of information, covering transport, hydro, places, buildings, and administration. Another layer on land use is under development. Data collection is undertaken using both aerial photography and plan table methods. Information thus collected is used to build a three-dimensional model. This process involves the photography, remote sensing and airbase units of the department.

From the environment management point of view, this database is important as it provides, for example, minute details such as the start and end points of a river or the exact forest coverage in a given area. The hydro layer has information on the capacity of reservoirs and quality of water, supporting scientific management of

freshwater resources. The administrative layer divides the island into provinces, districts and divisional secretariats (formerly known as assistant government agent divisions). The beneficiaries of this information include the Urban Development Authority, Forest Department, Ceylon Electricity Board, Department of Agriculture, the universities of Kelaniya and Moratuwa, and Sri Lanka Telecom. For example, the Department of Agriculture analyses data on terrain patterns to locate areas with high soil erosion. The land use layer will further add value to the system from an environment angle.

[8.2.3] ICT usage by research institutes and universities for natural resource management

More and more research institutes and university-based teams are using ICT tools for research and analysis related to natural resource management (NRM). At a fundamental level, email and 'the Web' have enabled Sri Lankan researchers to maintain easy and regular contact with peers overseas, and to update their knowledge on the latest developments in specialised and technical topics. ICTs are also being employed to solve specific problems, contributing to the more rational management of land, water, biodiversity and other resources. Cited here are three examples that illustrate the range of ICT applications in NRM related research.

In the mid-1990s, the Colombo University's Faculty of Medicine collaborated with the Open University of Sri Lanka, University of Edinburgh in Scotland and South Asia Cooperative Environment Programme to comprehensively study malaria infections occurring in an endemic population in Kataragama in southern Sri Lanka. The multi-year research project, supported by IDRC of Canada, paid particular attention to the spatial and geographic features of the area, and used GIS as a key tool. This enabled an analysis of the malaria risk of this community with regard to three potential risk factors – location of houses in relation to distance from the forest edge and a source of water, and the construction type of houses. The findings of this study indicated that the risk of contracting malaria was on average 2.5 times greater for a resident of a poorly-constructed house than for one who lives in a well-built house. It also focused attention on the microepidemiology of the disease and the role that ecological factors play on the malaria vector, a species of mosquito. "Our ultimate goal, however, includes the development of a GIS that will be useful as a decision support system for a malaria control programme," the researchers stated in 1996 (Gunawardena, et al, 1996).

Another prominent user of ICT tools is Natural Resource Management Services (NRMS), a wing of the Environment and Forest Conservation Division (EFCD) of the Mahaweli Authority of Sri Lanka (MASL). MASL is a state body responsible for the management of the Mahaweli and Walawe river basins and related smaller river basins fed by trans-basin irrigation from these rivers. NRMS

has consolidated over a decade of practical experience gained under the MASL and has an experienced team of digital / manual cartographers, GIS and remote sensing professionals, land use planners, GPS surveyors, hydrologists, soil and water conservation experts. NRMS uses applied research in solving problems for state and private sector institutions engaged in different natural resource management tasks. Some recent examples of its assignments are given below:

- Developing a spatial database for the country's tea estates, at the request of the Tea Research Institute.

- Establishing a seedling reference collection, using GPS and GIS, for the participatory forest management project in the Matara district.

- Setting up a hydrological monitoring programme in the upper Mahaweli river catchment area, for the Ministry of Environment and Forestry. This involved installing and maintaining automatic weather stations, sediment yield monitoring and automatic sediment sampling.[24]

The International Water Management Institute (IWMI), part of the global network known as Consultative Group of International Agricultural Research (CGIAR), has its international headquarters and Sri Lanka field office located in the country. They are among the leading research institutions using ICTs for NRM. Their work is centred on maintaining freshwater resources and irrigation research information on databases and disseminating this through their extensive website. Data related to research currently underway is first stored in a relational database within the system. This database might contain many different sets of parameters in an irrigation system. Later this data is used to create three-dimensional models, and the results are fed to the organizational website. Two recent research efforts published in this manner are:

- a project to determine the possibility of utilizing the water of Walawe River immediately before it enters the sea; and

- the impact of tanks (Sri Lanka's man-made reservoirs) in spreading diseases like malaria, filariasis and dengue fever.

[8.2.4] ICT usage by civil society organizations

Email is being used extensively by many environmental NGOs in Sri Lanka not only to retrieve information pertaining to specific environmental issues in their research work but also to maintain interactive communication with similar bodies. The Environmental Foundation Ltd. (EFL), a public interest law group, has a long history of using email to share information and network with like-minded groups in Sri Lanka and overseas. It was one of the country's first organizations to use

email (in the early 1990s), even before the introduction of Windows-based email applications and before email became a household activity. EFL is a member of the Environmental Law Alliance Worldwide (E-LAW) and other international networks.

EFL cites several successful attempts of efficient email usage in their campaigns to safeguard people from being affected by development activities pursued by the government or private sector. One early example was the search for information on rock quarries, using a primitive type of email, in a successful campaign against the operation of a quarry at Weragampitiya, whose vibrations and noise pollution were damaging houses in the area. In the mid-1990s, this facility was further expanded to access databases containing environmental information at foreign universities. At a time when browsing the World Wide Web was not known or possible, this facility was a giant step forward.

Some other cases effectively fought with the help of email communication include the campaigns against a diesel power generation plant at Etul Kotte, near Colombo, and the proposed Colombo-Katunayake Expressway. In the latter case the environmental issues related to similar highways in Israel and the United States were obtained via email and were comprehensively analysed. EFL similarly used email to gather information on what happened in Nauru island in the Pacific, when confronted with a multinational company that was about to start exploiting extensive phosphate deposits in Eppawala in Sri Lanka.

EFL now receives about 100 to 150 emails everyday including information from international organizations such as the United Nations, World Bank and the Asian Development Bank. It relies heavily on information from like-minded activist groups in other countries. Since 1992, around 80 percent of the public interest court cases filed by EFL have used information obtained from other countries through email. This NGO however feels that the Internet is not the ideal medium to create awareness within Sri Lanka as the penetration levels are low. Difficulties in developing websites in local languages are another constraint.

[8.3] Internet usage for environment awareness creation

Sri Lanka's environmental organizations and activists took some time to realise the potential of the Internet. Although commercial Internet connectivity was available from early 1995, it was towards the late 1990s that they increasingly accessed the World Wide Web as a reference tool, networking mechanism, and a low-cost publishing medium that helps articulate concerns to a potentially global audience. In the few years since, the Internet has become an invaluable tool for organizations and individuals who seek to safeguard Sri Lanka's natural heritage, minimise environmental degradation and ensure rational and sustainable use of renewable resources.

The pivotal role the Internet now plays in campaigns for conservation and environmental justice can be better appreciated by comparing how such campaigns were conducted earlier:

- In the early 1970s, an ill-advised government project to log part of the Sinharaja forest – Sri Lanka's best known rainforest – was opposed by concerned scientists and activists using mainly print media exposure and outdoor protests. The project was later stalled and abandoned; the forest is now protected by national laws and recognised as a natural 'world heritage site'.

- In the early 1990s, there was mass agitation against the construction of the Kandalama tourist hotel on the banks of the historic Kandalama reservoir. The print and broadcast media were widely used in this campaign that also included sit-in protests and marches. Although the private company, supported by the then government, went ahead with this project, public protests compelled it to be more environmentally-friendly than was proposed initially.

- In the late 1990s, citizen groups involved in both natural and cultural heritage conservation opposed the handing over of Sri Lanka's largest known phosphate deposit in Eppawala, in the North Central Province, to a multinational mining company. Activists have effectively used email and websites to explain their views and to lobby international support against the project. Several dozen websites or webpages have been created, and on-line petitions and email campaigns have been used to pressurise the Sri Lankan Government and its donors to abandon this mining project in an area with several archaeological and natural sites. The campaign continues.

Apart from campaigns, the Internet is being used for a variety of education and awareness purposes by a growing number of state, academic and civil society organizations. The number of such websites is too large for each one to be presented individually, but the following few selected examples show the extent to which these organizations use the new medium.

- ***Manawa Sinhala Science and Environment Magazine***:[25] This website launched as a non-profit venture in early 1996, within one year after commercial Internet access became available in Sri Lanka, was not only one of the earliest attempts of this nature, but the very first to distribute environment related knowledge in Sinhala through 'the Web'. It mainly focused on students but presented environment as well as biological information required by everybody in lucid language supported by appropriate images and photographs. However, probably due to financial considerations the web edition is published infrequently and irregularly.

- ***Wildlife Heritage Trust of Sri Lanka (WHTSL):*** [26] This is a non-profit organization focusing on environmental issues. Its website augments on-line its books and quarterly journal *Sri Lanka Nature*. WHTSL's areas of focus include research into the country's freshwater fish, lizards, amphibians and small mammals – and the complex interrelationships they have with their varied natural habitats and ecosystems. This work is supported mainly by earnings from WHTSL Publications, the publishing arm of the organization. It is commendable that the organization has been able to sustain its multiple activities from such income without depending on foreign donors and donations. The website describes how WHTSL's publications programme is being expanded. Meanwhile, this site performs a very useful service; it offers free downloads of many legislative and policy documents pertaining to Sri Lanka's biodiversity.

- ***Green Lanka Nature Conservation Association (GLNCA):*** [27] This is an organization with non-profit status in Sri Lanka operating at a national level on environment related activities. GLNCA was formed with the primary objective of having a complete environmental services facility under one roof, which is not so common in Sri Lanka. Its website provides information on its various projects ranging from environment education centre operations, reforestation activities, eco-tourism activities, plant nursery operations and social development / welfare initiatives. It also shows how an individual or organization can benefit from the consultation services provided by GLNCA.

- ***Sinharaja forest site:*** [28] Sinharaja forest reserve is a biologically unique lowland rainforest. It was declared a 'national wilderness area' in 1988 and later a natural 'world heritage site' in 1989. This website dedicated to Sinharaja forest presents information about it including many lesser known facts, laying special emphasis on its flora, fauna, ecosystems and endemic species.

- ***Sri Lanka Wildlife:*** [29] This is a good example to represent the large number of environmental websites maintained by interested individuals. It presents information not only on wildlife, but even about the history of wildlife conservation in Sri Lanka, including details about the first sanctuary in the island established in the 3rd century B.C., which is claimed to be one of the world's oldest.

- ***Forestry Department of the University of Sri Jayawardanepura:*** [30] This is more an academic site, but it also provides information for the layman. The website discusses key environmental issues faced by the country and presents some of the case studies. It also provides links to many other environment sites, both local and foreign.

However, as one observer points out, a majority of sites remain amateur efforts. The information is often superficial, incomplete, and sometimes even inaccurate. Presentation – both text and imagery –- is plain and not user-friendly. Wildlife and forests seem to be the favourite themes of websites covering Sri Lanka's environment – this probably reflects the popular perception of the subject. Missing or lacking are discussions on complex issues such as the environmental impacts of land management, industrial development and population growth. There is also little attention paid to how global environmental problems like the greenhouse effect, ozone depletion or desertification affects Sri Lanka. Instead, the focus is on the island's diminishing forest cover, declining wildlife and depleting natural resources – all important topics on their own, even if they are only part of the bigger picture. The government agencies responsible for environmental management and conservation still have a very limited on-line presence, although the Department of Wildlife Conservation and the Central Environmental Authority recently developed their own websites. This lacuna is only partially filled by civil society or non-profit groups maintaining websites to the best of their ability (Gunawardene, 2001).

[8.4] ICTs in natural resource management : remaining challenges

The utility and value of ICT tools for better managing Sri Lanka's environment and natural resources have been demonstrated by the many applications including those mentioned in this chapter. ICTs can play an even bigger role in the country's attempts to achieve scientifically based, rational approaches to NRM in the coming years. Their optimum use and maximum benefits will depend, however, on several factors.

Using ICTs is no longer a choice but an imperative for Sri Lankan NRM. Tools and techniques such as GPS, GIS and remote sensing are now commercially available, and at decreasing costs. In theory these can be accessed by everyone, including those who may use these tools for exploiting natural resources for short-term, commercial gain. State agencies managing natural resources have been slow to realise this, and have sometimes been outsmarted by individuals or entities armed with better technology and expertise. For example, while wildlife rangers in protected areas still rely on outdated equipment for communication and protection, some poachers use mobile phones, GPS and night-vision goggles. Fears of bioprospecting and biopiracy have been raised by concerned environmentalists who allege that foreign pharmaceutical and horticultural companies have been illegally exporting plant and animal products, extracts and sometimes even live specimens in violation of existing laws and regulations. To remain vigilant against these and other threats to Sri Lanka's natural resources and ecosystems, the state and civil society groups have to arm themselves with the appropriate technologies, expertise and practices. ICT tools become part of this solution.

Another concern is the proper management of increasing volumes of data amassed by ICT-assisted processes. In the past decade, Sri Lanka's forests and other ecosystems have been systematically studied to assess their biodiversity and a large national database has been developed. Parallel to this, databases have been built by research institutes and/or environmental groups, for example, on coastal and marine biodiversity, migratory species of birds, medicinal plants and indigenous systems and knowledge using plants for therapeutic, pest control, cosmetic and other purposes. Some of these databases contain commercially valuable information, yet most custodians of such data are uncertain or unaware about how much access they should permit, and to whom. There is an urgent need to define access protocols to natural resources related data in order to facilitate access to legitimate researchers and managers while safeguarding against potential abuse.

Use of certain ICT tools sometimes complicates existing resource use patterns. An example is cross-border migration of small and medium scale fishing boats in the Indian Ocean. Sri Lankan fishermen from the south of the country – mainly from Negombo – travel all over the Indian Ocean, prompted by the lack of productive fishing opportunities in their waters and the abundance of tuna resources in exclusive economic zones of neighbouring countries, mainly India and the Maldives. This unprecedented migration of fishing vessels has been facilitated by technological development in the small-scale sector. Improved and affordable technology to the small-scale sector to target fisheries resources even in distant waters became available in the 1990s. GPS and radio communication; hull, nets, hooks and rope made of stronger and lighter material; and growing markets for fish and fish products, have emboldened the small-scale fishermen to venture into distant fishing grounds. This has led to fishermen being shot, arrested or detained by law enforcement authorities in neighbouring countries, sometimes leading to bilateral tension. This example illustrates the potential for resource-based conflict that has been enhanced by ICT and other technological tools coming into wide use (Mathew, 2001).

There are also unresolved issues in the management of ICT-aided geospatial data. While GIS applications have risen in recent years in sectors like natural resource management, town planning and utility management, there are no enabling and comprehensive policies and legislation. Given the large number of institutions that now use geospatial data through GIS, the Survey Department's sole authority and regulatory monopoly have come under pressure. As one researcher has noted, the enactment of comprehensive legislation for geospatial data could no longer be delayed by the government. The Urban Development Authority, National Aquatic Resources Research and Development Agency, Water Supply and Drainage Board, National Building Research Organization, Geological Survey and Mines Bureau, Central Environmental Authority, Mahaweli Authority and several other state organizations claim the shared leadership in establishing national standards for geospatial data (de Silva, 2002).

The demand for geospatial data is high and diverse. Some institutions prefer to acquire raw geospatial data while the majority require value-added or processed products of geospatial data. However, most of these demands for geospatial data could be summarised to present in the form of a digital geospatial database for natural resources of Sri Lanka. The major sectors which deal with geospatial data include research and education establishments, telecommunications, power and energy, irrigation and water resource management, environmental conservation, meteorology and climatology, agriculture, transportation and urban planning. According to an exploratory survey by the University of Sri Jayawardanepura and SIDA / SAREC research cooperation project, geospatial data demand is prominent in land use mapping, research and training.

At present, both the state sector and private sector own and manage separate digital databases for their individual needs and operations. Most collaborative work initiatives are based on personal contacts and understanding, rather than through an overall national framework. Researchers have stressed the need for a far-sighted national geospatial data policy which ensures the right of access to the public domain digital data for development and planning decisions in Sri Lanka.

[9.0] ICT impact on human development – developing a global partnership for sustainable development

[9.1] Introduction

Sri Lanka's policies on foreign trade have changed from time to time, depending on the governments in office and international market conditions. Initially it was more an open economy with dualistic features – a modern plantation sector and a subsistence agriculture sector. But the economy during 1960-1977 was characterised more by inward-looking policies. Except for few attempts during 1965-1970, trade was not allowed to play the role of a growth engine during this period. As a result, Sri Lanka's exports showed a sluggish growth of 3.4 percent annually in US$ terms during this period, and its export market share in the world economy drastically fell from 0.39 percent in 1956 to 0.07 percent in 1977(Central Bank, 1998).

The situation changed dramatically after 1977, the year Sri Lanka decided to adopt open economic policies. Several important international trade reforms were undertaken in the late 1980s and early 1990s. Quantitative controls on imports were totally eliminated during this period. Spurred by these reforms, exports grew by nearly 10 percent annually after 1977 and kept pace with the growth of world exports. Sri Lanka also slightly increased its export market share to 0.08 percent by 1996 (Central Bank, 1998).

The country presently follows an open economic policy where the trade sector is considered a dynamic force. This is revealed by the fact that aggregate imports and exports accounted for 68 percent in GDP in 1996, compared to just 34 percent in the pre-1977 era. The export structure has diversified but industrial exports led by textiles and garments is the largest contributor accounting for 54 percent in 2001. The major export markets include the US, UK, Germany, Belgium, Japan, India, and United Arab Emirates. Major importers include the US, UK, Australia, Germany, Japan, Iran, China, Taiwan, Hong Kong, India, South Korea, Malaysia, Singapore and Thailand (Central Bank, 2002b).

[9.2] ICT in building global partnerships for sustainable development

Prior to 1995, when commercial and unrestricted Internet access became available, the use of ICT for international communication purposes, apart from telephone calls and sporadic fax messages, was minimal. The internal telecommunication network was not fully developed, international bandwidth available was limited and many organizations did not even have international direct dialling (IDD) facilities. In many cases, computer usage was limited to a few selected applications and documentation/accounts work. Most organizations relied on telex to be in contact with their international partners.

The availability of commercial and unrestricted Internet and email facilities has radically transformed how business is conducted with foreign parties. The Internet and email have provided an easy and cost-effective means for Sri Lankan business firms to communicate with foreign suppliers, partners and buyers. The cumbersome post and facsimile transmission have been replaced by speedy and economical email communication. In a parallel development, many business ventures here have also started using Internet to promote their products and services in the global market. Among the key players who pioneered Internet promotions are SriLankan Airlines, Lion Brewery, Ceylon Tourist Board, Associated Newspapers of Ceylon Ltd., nearly all the major commercial banks, prominent telecommunication service providers and leading hotels.

Some business organizations now maintain either on-line or near on-line (data transmissions on hourly and daily basis) communication channels with their partners. These include shipping companies, commercial banks, telecommunication companies, manufacturing organizations (including those involved in the apparel trade), travel agents, major computer vendors, software developers, digital service providers and other trade organizations. Some of these companies maintain 24-hour continuous links with their foreign counterparts for the business operations.

Local commercial banks and Sri Lankan branches of foreign banks use a wide range of international payment systems for dealing and money transfer purposes. These include the Society for Worldwide Interbank Financial Telecommunication (SWIFT), Western Union, Reuters and Bloomberg. Most of these developments have taken place relatively recently. For instance, it was only in 1994 that Sri Lanka joined the SWIFT network for efficient international transactions. At present, over 15 banks in the country benefit from this sophisticated automatic message exchange system (Induruwa, 1999).

[9.2.1] Partnerships with global/regional organizations

Sri Lanka benefits greatly by maintaining global partnerships with some of the international or regional communication and media organizations. Information on some such key organizations in the ICT arena and the nature of the linkages are given below.

(a) Asia-Pacific Broadcasting Union (ABU) [31] is a membership organization that brings together state and private sector radio and TV broadcasters in the region. The mission of ABU includes:

- Assisting the development of broadcasting in the region.
- Organizing joint activities among members.

- Providing various types of services to member organizations.

ABU was founded in 1964 and now has 100 members in 49 countries and territories, including a number of associate members in Europe and North America. Several Sri Lankan electronic media organizations have become members of ABU; these include Sri Lankan Broadcasting Corporation (SLBC), Sri Lanka Rupavahini Corporation (SLRC), Sirasa Media Network and Independent Television Network (ITN). The ABU provides skills training, scholarships, programme exchange and other services for member broadcasters. It also organizes regional conferences, award schemes and advisory services for needy members.

(b) Asia Pacific Tele-community (APT) [32] was established in May 1979 as a regional telecommunication organization by an intergovernmental agreement. The APT secretariat began functioning in Bangkok from July 1979. The APT now has a strength of 32 members, 4 associate members and 96 affiliate members.

The main aim of APT is to foster the development of telecommunication services and information infrastructure throughout the region, with a particular focus on expansion in less developed areas. Sri Lanka has played an active role in APT, which succeeded in bringing together telecom policy and decision makers and key operators in the region on a common platform to share expertise and experiences at regional level. In addition to the TRCSL, Sri Lanka Telecom, the largest telecommunication service provider in Sri Lanka is a member of APT.

(c) Asian Media Information and Communication Centre (AMIC) [33] is a major resource for communicators in the Asia-Pacific region. It aims to spearhead the development of media and communication in the region. It serves as a clearing house of information, an initiator and implementer of research activities and conferences, and a publishing house specialising in communication issues. Based in Singapore, AMIC is a non-profit NGO founded in 1971. It is a membership organization attracting media and communication practitioners from 40 countries worldwide and enjoys a close collaboration with the School of Communication. Sri Lanka has actively participated in regional communications research and analysis work of AMIC for many years.

(d) Asia-Pacific Institute for Broadcasting Development (AIBD) [34] is a unique regional intergovernmental organization servicing countries of the United Nations Economic and Social Commission for Asia and the Pacific (UN-ESCAP) in the field of electronic media development. It is hosted by the Government of Malaysia. The AIBD is mandated to achieve a vibrant and cohesive electronic media environment in the Asia-Pacific region through policy and resource development. The institute seeks to fulfil this mandate by mobilizing the intellectual and technological resources available within the national

broadcasting organizations of its member countries as well as regional and international bodies through a well-established infrastructure and networking mechanism that includes government agencies, NGOs, institutions of higher learning, the private sector and individual professionals. Sri Lanka has been participating in AIBD since the 1970s.

(e) Asia Pacific Network Information Centre (APNIC) [35] is one of four regional Internet registries currently operating in the world. It provides allocation and registration services that support the operation of the Internet globally. It is a not-for-profit, membership-based organization whose members include Internet service providers, national Internet registries, and similar organizations. APNIC represents the Asia-Pacific region, comprising 62 countries. Sri Lanka is represented in APNIC at the national level.

(f) Asiavision [36] – a project of ABU – has been a major source of news for and about Asia since its launch in 1984. It brings together many of the region's leading national broadcasters. Its members are in Bangladesh, Brunei, China, India, Indonesia, Iran, Japan, Malaysia, Nepal, Pakistan, Singapore and Sri Lanka. Asiavision has its operations centre in the Malaysian capital, Kuala Lumpur. It is transmitted daily as a 30-minute news package. Sri Lanka Rupavahini Corporation has maintained a strong link with Asiavision for over 15 years for news sharing.

(g) The International Television Trust for the Environment (TVE International) [37] is an international not-for-profit organization working globally and locally to raise awareness on environment, development, health and human rights issues through the media. Established in 1984 by the UN Environment Programme (UNEP) and World Wide Fund for Nature (WWF), TVE is both a producer and distributor of quality television programmes on all the above issues. It now holds the world's largest collection of copyright-cleared environment and development programmes that are available to television broadcasters and non-broadcast users. Hundreds of television stations and thousands of NGOs, universities, schools and activist organizations use these programmes for education, awareness, advocacy, training and activist purposes.

TVE Asia Pacific was set up in 1996 as an autonomous regional programme, as part of the non-profit organization's decentralisation process. TVE Asia Pacific is registered as a non-profit organization in Sri Lanka, but its work is carried out much at an Asia-Pacific regional level. It engages NGOs, civil society organizations (CSOs), media organizations and development agencies across the region to use the media to inspire discussion and debate on sustainable development and social justice issues. In particular, it works with 18 national partner organizations – all autonomous media NGOs – in 14 countries: Bangladesh, Cambodia, China, Fiji, India, Indonesia, Laos, Nepal, New Zealand, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam. Where programme

interests match, TVE Asia Pacific also works with UN agencies, regional NGOs and networks of media professionals and broadcasters.

(h) Lanka Academic Network (LAcNet) [38] is a NGO active at an international level. It evolved in June 1991 from Sri Lanka Network (SLNet), an electronic gathering of people from and / or interested in Sri Lanka. LAcNet is a non-profit organization registered in the United States.

The activities of LAcNet include:

(a) Developing worldwide electronic networks within and outside Sri Lanka.

(b) Disseminating information on, and of interest to, Sri Lanka.

(c) Enhancing educational facilities and opportunities within and outside Sri Lanka.

LAcNet has an interesting history. It funded and operated the telephone / modem electronic mail relay for the Lanka Experimental and Academic Research Network (LEARN) from 1990 to 1995. Funding to run this relay was mainly through donations from the readership of SLNet. LAcNet also encouraged Wijeya Newspapers and InfoLabs Ltd., of Sri Lanka to start a weekly on-line edition of *The Sunday Times* of Sri Lanka on 'the Web'. Launched in March 1996, the site grew very rapidly and achieved a weekly readership of about 8,000 (more than 200,000 hits per week) within a short period of time. LAcNet continued to host it until Wijeya Newspapers itself assumed the operation. Currently LAcNet electronically publishes its own news site, which is inappropriately named *The Lanka Academic*. In contrast to the meaning given by that name, it is not a site which caters only to academics; and publishes news stories relating to Sri Lanka which might be of interest to the international readers.

(i) Young Asia Television or YA-TV [39] operates from production centres in Malaysia, Sri Lanka, Bangladesh, Nepal, Thailand, India and Pakistan. Collaborating with partners, YA-TV produces a range of programmes from 30-second television spots to 5-minute stories to soap opera style programmes on issues relevant to the particular partner. YA-TV has covered issues pertaining to children's rights, human rights, social issues of the developing world and peace and conflict resolution.

A key contribution from YA-TV's Sri Lankan team was *'Sthree Satahan'*. The title literally translates to 'a woman's notes', but also suggests 'the marks women make'. Produced as a pilot venture and targeted at the Sinhala-speaking majority in Sri Lanka, it was intended to be a thought-provoking programme. It must also

be mentioned that '*Mihisara'* and '*SivuSeta*', two of YA-TV's programmes broadcast on Channel Eye in Sri Lanka, were short-listed for the 'Best Youth Programme' in Asia at the Asian Television Awards 2001.

[9.2.2] Electronic data interchange (EDI) networks

Although electronic data interchange (EDI) was first initiated by CINTEC and Sri Lanka Export Development Board (SLEDB) as early as 1987, it was much later that the necessary standards frameworks were put in place. An important step in this direction was the formation by CINTEC, in 1995, of a working group to function as a national EDI forum with the following main objectives (Induruwa, 1999):

- Formulating national EDI policies for Sri Lanka.
- Implementing a national EDI system.
- Promoting and facilitating the use of EDI in Sri Lanka.
- Developing and improving infrastructure facilities necessary for the growth of EDI facilities.
- Promoting EDI-related research.

Among the important milestones in the promotion of EDI activities in Sri Lanka are the setting up of MARINET by the Sri Lanka Ports Authority (SLPA), linking it with shipping agents and the approval of some UN / EDIFACT (EDI For Administration, Commerce and Transport) standards. CINTEC also worked towards establishing an integrated banking and financial network with a shared automated teller machine (ATM) switch, which would have formed an interbank EDI system, but it has not materialised so far largely due to the lack of cooperation from some of the commercial banks (Induruwa, 1999).

Sri Lanka also became a member of Asia EDIFACT Board (ASEB), re-designated as the Asia Pacific Council for Trade Facilitation and Electronic Business (AFACT) in June 1995. The National EDI/EC Committee organized the 15th ASEB meeting and related events, which were held in Sri Lanka in November 1997 (CINTEC, 2003).

[9.3] ICT Roadmap initiatives

Apart from the few recommendations to form global partnerships to develop the local software industry, the ICT Roadmap of 2002 does not specifically mention

the use of ICT in forming global partnerships. The following are the recommendations to develop the local software industry:

- ***Promoting software industry abroad:*** A two-fold marketing approach is recommended to promote the Sri Lankan software industry abroad. This includes hiring foreign marketing professionals to sell Sri Lankan products overseas and forming small trade missions housed in Sri Lankan Embassies in targeted markets to facilitate the efforts of Sri Lankan firms in those countries. It is also recommended to hire marketing firms in integrated markets (Middle East, Scandinavia, US, and elsewhere) to create a brand awareness of Sri Lanka as a technology centre for software services and ICT-enabled clerical services.

- ***Engaging the services of the diaspora:*** In key markets abroad, it is proposed to engage the services of Sri Lankan expatriates in seminars, on-line discussion groups, distance learning projects, and other activities aimed at creating new business opportunities for Sri Lankan software products and services.

[10.0] Critical assessment and recommendations

The ICT Roadmap, illustrating the 'e-Sri Lanka' concept, is a document covering a broad spectrum of concerns, highlighting not only the vision but also the mission and objectives to optimally use ICTs for the development of the country. It can also be considered the most comprehensive ICT policy document so far published by the Sri Lankan Government. However, possibly due to the haste in which it was prepared, it fails to address several vital issues that are too important to be ignored; addressing these are critical for overall success. This chapter covers some of the aspects overlooked, and presents recommendations for the government, ICT industry and civil society to take note and adopt, in pursuit of transforming Sri Lanka into a "smart island with smart people".

(a) Focus more on human development aspects in taking ICT to grass-roots level:

The ICT Roadmap presents an elaborate plan to take technology to grass-roots level. However, it covers mainly the technical and financial aspects, and neglects certain other factors necessary to make it a reality. As explained in chapter 3, resources and technology are not the only bottlenecks in promoting ICT in Sri Lanka. Other important factors include the low computer literacy, inability to handle English, and a perception that computers and other modern technologies threaten the employment security of some people.

To overcome these concerns, which are neither directly financial nor technical, it is necessary to provide an effective interface between ICT and the community. In other words, there should be another 'human layer' between the two. This layer should not only be able to extract the benefits of ICT and pass them on to the end-users, but also educate the masses on the many and varied benefits of their judicious and appropriate adoption. In other words, any attempts to take ICT to the grass-roots level should include a substantial human development effort in addition to creating the ICT infrastructure.

This interface could for example, be created by involving large numbers of educated youth who are currently unemployed. Among those who have completed secondary education, some 16 percent are without jobs (whereas the overall unemployment rate is about 8 percent of the labour force). There are also at least 30,000 unemployed or underemployed graduates.

It is recommended that ICT promotion focus more on development aspects and that adequate numbers of young graduates or secondary school-leavers be recruited and trained to create an effective interface between the end-users and ICT at the village level.

(b) Further bring down the cost of ICT

As noted in chapters 2 and 3, cost is a major limiting factor that prevents more people from using ICTs, and discourages even current users from utilizing these facilities more widely and regularly. Both the capital and recurrent costs remain high, although the cost of personal computers and accessories has declined over the years due to intense market competition. Home-based individual users of Internet are the worst affected, as they have to pay for telephone charges as well as the Internet service provider's charges, both of which are still counted and billed on a per-minute basis in most cases. Given the low speeds of web access, surfing remains an expensive option even for middle class families. In the public sector, many government officials at lower and middle levels are still not given easy and unrestricted Internet access due to cost control concerns. While the corporate sector is a better user of Internet and other forms of ICTs, small and medium enterprises operating on tight budgets find they have to carefully monitor and control the use of phone and Internet facilities. Meanwhile, most schools that have already acquired computers are effectively excluded from Internet use as the school authorities simply cannot afford telephone and ISP charges.

Sri Lankans will be unable to reap the full benefits of using Internet and other ICTs as long as the capital and recurrent costs remain high. A major anomaly is that telecommunications service providers do not differentiate between the voice and data communications use of phones – both are charged at the same rate. Companies that publicly boast of higher profits fail to realise that part of their profits have been earned unfairly by charging one of the highest telecom tariffs in South Asia. It is lamentable that the telecom regulator has not sufficiently asserted its powers and instead allowed large telecom providers and former monopolies to virtually dictate terms and tariffs that merely serve corporate bottom lines. As long as rates remain high, the user volume will remain low; when rates come down, higher volumes will more than compensate for lower profit margins.

The market-friendly government may be reluctant to intervene any more than is absolutely necessary to correct these anomalies, but the telecom regulator has statutory powers that can be invoked to implement these recommendations:

- Insist that all telecom service providers have differentiated tariff rates for voice (higher) and data communications or Internet access (lower). These lower tariffs should be available even when customers amalgamate services from different providers (i.e. Sri Lanka Telecom should not offer cheaper rates only to those who use SLTNet Internet services).

- Subsidised tariff structures for both voice and data communication use of phones should be introduced for educational, library and research

institutions. This will enable schools, universities, training centres and public libraries to become regular users of Internet.

It would further promote the use of computers if the ministries in charge of ICT – which in the current demarcation of responsibilities includes the Ministry of Science and Technology and the Ministry of Telecommunications and Media – negotiate with the Ministry of Finance further fiscal incentives such as tax benefits and duty concessions for:

- Manufacture or assembly of personal computers in Sri Lanka.
- Import of assembled computers, accessories and software.
- Manufacture and/or import of telecommunications equipment and spare parts.

In the macroeconomic scenario, the lowering of capital costs would unleash hitherto untapped potential in the use of ICTs for economic, social, cultural and educational activity which, in the medium to long terms, is likely to more than compensate for the short-term reductions in revenue to the state.

(c) Control the 'digital divide' between the urban and rural sectors

In Sri Lanka, there is a danger that the digital divide itself could become a new dimension to poverty if allowed to widen unchecked. This would have serious consequences for a country already suffering from the effects of war and several youth uprisings in the north and south of the country.

In order to avoid such adverse repercussions, the poorer sections of society too should be given due consideration in the formulation of an ICT strategy. Initiating subprojects to capture the imagination of the poor and convincing them of the benefits of ICT will be vital in averting opposition against ICT expansion and re-engineering.

As low productivity in rural areas perpetuates poverty, ICT could be utilized to improve the situation by providing information on markets, prices, new farming methods and technologies, high yield crops, inputs and related organizations. To achieve this, it is recommended that ICT tools be used in a more effective manner within agricultural communities, thus enabling the farmers to market their produce at competitive prices.

Another problem arising from low productivity and low income in rural areas is the migration of the rural population to urban areas in search of better

prospects. This leads to numerous problems in urban areas, including poverty and overpopulation. In order to arrest this trend and provide better employment opportunities in the rural sector, it is recommended to assist the rural population to move into off-farm activities that yield higher returns by providing them with information on employment opportunities.

(d) Urgently establish the necessary legal framework for effective ICT use

Although the ICT Roadmap has addressed this issue, it has not laid sufficient emphasis. As pointed out in chapter 2, Sri Lanka at present has achieved only very limited progress in this regard. Many proposals in the ICT Roadmap cannot be implemented until the necessary legal framework is established. The absence of laws and regulations to resolve issues in data security, cyber crime, copyright, etc., can lead to situations where time, effort and money will be spent on prolonged legal battles that divert from achieving development-oriented results. Establishing a proper, adequate and enabling legal framework is an urgent priority before implementing various activities outlined in the ICT Roadmap.

Sri Lanka currently has no laws and regulations to prevent software piracy. Pirated software copies are used without any restriction or hesitation, not only by individuals but by the vast majority of private and public sector institutions including the judiciary. No comprehensive studies have been conducted to estimate the prevalence of pirated software in Sri Lanka, but a 'guesstimate' by the authors places it around 95 percent of all software used. In every major city, software shops openly sell pirated software on CDs for prices varying from Rs. 150 to Rs.300 (US$ 1.50 to US$ 3.00). Some of these shops even publish newspaper advertisements promoting pirated products. Government authorities, including CINTEC, have tried to address this situation but their progress has been very limited due to the lack of relevant laws.

Sri Lanka can never hope to become a world-class software creation centre as long as this situation persists. The country needs to urgently introduce laws to further safeguard intellectual property. This will not only protect the local developers but will also encourage foreign companies to select Sri Lanka for future investments. Once laws are in place, vigilant enforcement will be required to ensure that piracy is not continued in different forms.

(e) Pay special attention to the needs of the Northern and Eastern provinces

As noted in chapter 3, the Northern and Eastern provinces of Sri Lanka are currently faring poorly in terms of human development – a direct result of the

two decades of civil conflict that has caused massive loss of life and property and endless human suffering among all ethnic groups. The contribution of the Northern and Eastern provinces to national GDP dropped from 15 percent in the early 1980s to as little as 4 percent in 1997. The infrastructure has been damaged or completely destroyed in some areas; basic facilities such as electricity and telephones have been lacking in many parts of these provinces for years. The human resource base has been depleted due to a vast exodus of educated and skilled residents to other parts of the island, or abroad.

The accelerated development of the physical infrastructure as well as human resources in the Northern and Eastern provinces will be essential to consolidate the peace process and ensure that the political solutions now being negotiated will be sustainable. The international donor community has shown much interest in supporting the reconstruction and rehabilitation of post-conflict Sri Lanka, with special emphasis on the rebuilding of the two badly-affected provinces.

ICTs can play a major role in this recovery process, and in some situations can help these provinces leap-frog into newer and smarter technologies without going through the incremental introduction of new technologies that other parts of the country have experimented with in the past two decades. For example, it is no longer necessary to lay hundreds of kilometres of copper wire to provide telephone services when wireless loop and mobile telephony can offer the same service cost effectively. Similarly, digital technologies and standards should be adopted even if the rest of the country is still using analogue systems or combinations of analogue-digital systems.

While the vast and urgent developmental needs of the Northern and Eastern provinces cannot be summed up in a brief report such as this, the following recommendations are offered to illustrate the potential of integrating ICTs in this process.

- Invest in the latest telecommunications and computer technologies, and adopt digital standards that allow sufficient expandability and upgradability in the future.

- Assign the highest priority to improve telecommunications services in all parts of the Northern and Eastern provinces to enable the easy, low-cost and free flow of information and communication within these areas, and with the rest of the country. This alone will help reduce tensions, suspicions and apprehensions that have for long fuelled the conflict.

- Ensure that the national and international radio and television broadcasting services are easily accessible with clarity of signal reception in all parts of the Northern and Eastern provinces. Encourage private

sector broadcast media to expand their transmission networks to similarly cover the provinces.

- Integrate ICT-based facilities into all public offices and facilities being rebuilt in the Northern and Eastern provinces, so that ordinary people can easily access information from other parts of the country and the world, while communicating their concerns to the authorities, the media and diaspora groups using email, telephones or other means of communication.

- The private sector may initially hesitate to invest in infrastructure and services including ICTs in these areas (in fact, this reluctance is evident even in relation to other less developed areas of the island). Wherever possible, fiscal and other incentives should be offered to spur private sector investments especially in ICTs.

- Provide incentives as well as technical and financial support where necessary for the development and maintenance of Tamil language websites that cover not only social and political but also economic, educational, cultural and developmental content. [40]

- The Tamil diaspora in the West played a key role in technically and financially supporting the LTTE's use of the Internet for information and propaganda campaigns during the latter half of its 20-year struggle. Now every opportunity must be explored for involving these ICT-skilled expatriates in rebuilding the Northern and Eastern provinces. Given the globally networked nature of today's world, they need not even physically relocate themselves in Sri Lanka to play a role in this process.

(f) Incorporate ICT subjects and ICT tools into the school curricula

To get the best out of ICT education and education assisted by ICT at the primary and secondary levels, it is necessary to introduce several macro level changes to the current educational policies and practices.

A salient feature in all 'ICT for education' programmes past, present or planned for the future is that focus is always on the use of ICT to teach ICT related subjects (or using computers to learn about computers). Little or no attempt has been made to exploit the ICT tools to teach other subjects such as biology, mathematics, physics, history and music, etc. Another reality is that, while the need for ICT education is widely recognised, the general perception is that ICT related subjects should be taught outside the curricula; at best it is an optional subject within the curriculum. There has been no serious attempt to integrate ICT studies as a compulsory subject within the curriculum.

As a result of these procedures, ICT training has been separated and isolated from the overall learning process. Today most of the ICT centres in schools are run either by an instructor who had been employed for that special purpose or by a staff member specially trained on ICT, without much involvement in other teaching or activities in the school. In a large majority of schools, computers are treated as a rarity used only to teach ICT subjects and to familiarise students on computer usage.

Other entry points for ICT in the educational sector have been so far largely ignored. For example, school libraries play a little role in providing ICT facilities to students. This is ironical as many schools are equipped with libraries which can easily be developed into ICT centres if the equipment is provided and the necessary training is given to the library staff.

In this environment, to get the best use of ICT for primary and secondary education, the following is recommended:

- Make ICT a compulsory subject at the General Certificate of Education examinations, at least at Ordinary Level (i.e. after 11 years of schooling).

- Use ICT facilities as means to teach not just computers, but also other subjects

- Integrate the functions of the ICT centres and libraries in schools so that the libraries can become depositories of knowledge not only in text-based print medium, but also use CD-ROMs, and web access.

- Train the schools library staff on ICT so that they can help in providing ICT facilities to students and guide students in navigating new knowledge sources accessible using ICTs..

(g) Promote the development of local language fonts, standards and software

A major constraint in popularising the Internet and other ICTs has been the unavailability of standard fonts in the local languages. Though Unicode maps for both Sinhala and Tamil have been developed by academics, many font developers have ignored these and evolved their own standards. Some content developers in Tamil have adopted fonts developed in India, which has a much larger Tamil-speaking population. As Sinhala is unique to Sri Lanka, it has presented additional challenges in font development (Wattegama, 1997).

The lack of a universally standardised Sinhala font set has largely constrained Sinhala content generation on-line. At present, visitors to Sinhala

websites have to first download fonts and install it in their PCs before perusing the content. Only a few Sri Lankan websites make significant use of either Sinhala or Tamil fonts and content. Although Sinhala and Tamil are the official languages of Sri Lanka, most governmental websites use only English. The dominant native language websites are the web editions of several Sinhala and Tamil daily and weekly newspapers.

In this context, the following is recommended:

- Urgent action should be taken to bring together the scattered font developers in Sinhala and Tamil to explore how acceptable common standards might be adopted. If this means that the unilaterally adopted Unicode mapping is revisited and revised, then that too should be undertaken.

- Technical and financial support should be offered to the few individuals and small-scale companies engaged in Sinhala and/or Tamil font development. It should be emphasised that factors such as user-friendliness and aesthetic appeal be taken into account when adopting and promoting local language font standards.

- As part of the national integration process, all state sector institutions and organizations should be required to generate their content and citizen services in Sinhala, Tamil and English, thus properly implementing the official languages policy that has for so long been observed in the breach. This should cover government and semi-government websites that are currently only in English (or in a few cases have limited content in Sinhala). At the same time, research should be supported for developing on-line translation software that enables automatic translation of Sinhala content into Tamil and vice versa.

(h) Promote Sri Lanka as an open source software development centre:

One direct consequence of introducing and enforcing anti-piracy laws will be the immediate increase in software costs that many Sri Lankan users – both individuals and organizations – will have difficulty. In such a scenario, it will make sense for the country to move towards using open source software instead of licensed software. Sri Lanka can emulate the example set by other countries in the region, most notably Malaysia. This also implies the need to gradually move towards open source software in every respect including user training and standardising.

Although the ICT Roadmap identifies the importance of developing open source software, it does not elaborate on the steps to be taken to achieve this.

Legal and economic factors will compel the country to take several measures in the near future.

It is recommended that the government:

- Encourage open source software development at every possible level, by small, medium and large-scale industries
- Help ICT training centres to focus more on open source software applications and to move away from the current dependence on a few proprietary software, especially Microsoft Windows
- Introduce clear policy guidelines for all government institutions to acquire and use open source software packages. If some public institutions have to invest in specialised open source or proprietary software, that cost will have to be justified
- Introduce open source software training at school level
- Build a skilled human resource pool that is fully familiar with, and proficient in, the use of open source software

(i) Decentralise central government structure using ICT and introduce necessary administrative reforms to enable telecommuting:

The transport network in Sri Lanka is not well developed. In spite of massive investments in developing the road and railway networks during the five decades since independence, the transport facilities are inadequate to meet current demands. Only a quarter of the total road network is weather paved, and a larger part of these roads, particularly at the provincial level, is not routinely maintained. During the last few years, the number of motor vehicles on the roads has increased drastically, without corresponding expansions in the road network. This has led to traffic congestion in major cities, especially in and around Colombo. The cost of traffic congestion – in terms of fuel wasted and the number of productive person-hours lost – is enormous.

Although Colombo is a medium-sized city compared to South Asian metropolises (with a resident population of 1.3 million), it attracts a large commuter population who converge on the city every working day for a variety of needs and purposes. One reason for this is the concentration of a large number of central government institutions within a small area of the capital city. The central government employed over 850,000 individuals in 2001, making it the largest employer in the country. A significantly high percentage of this workforce, except the armed forces personnel, works in Colombo, commuting daily using the inefficient and

inadequate public transport services. There are special trains for office workers that travel to Colombo from the provinces early morning and leave Colombo to the provinces immediately after office hours. Some of these trains start from places more than 100 kilometres away from the city. Some office workers spend three to six hours every day in travelling to workplaces where they work for eight hours. This reduces productivity and leads to other social and human problems. Similarly, ordinary citizens are compelled to commute dozens or hundreds of kilometres to visit Colombo-based government offices offering various citizen services and benefits. Even though some functions of government were decentralised after the establishment of provincial councils in the late 1980s, the Colombo-centric government services continue.

Effective use of ICT for managing government systems and delivering citizen services can help reduce such difficulties. The following is recommended:

- Gradually decentralise the central government's administrative service by setting up a network of offices provincially, and connect them through a communication web, so that every government employee need not travel vast distances daily to perform his/her duties.

- Enable and encourage the use of telecommuting, wherever possible, so that employees have more flexibility in their movements and working styles.

- Allow and encourage citizens to interface with different arms of government using ICTs (phone, email or Internet), at least for initial functions such as public information, clarification of matters and obtaining basic services or benefits. Some citizen services may require face to face contact, but this can be minimised.

(j) Create ICT awareness and attitudinal changes among the general public on ICT; use the mass media for this purpose

As pointed out in chapter 2, ICT penetration rates are still relatively low in Sri Lanka. Even at the conservative estimate of 3 users per Internet connection, the number of individuals who use Internet is around 300,000 – or one in every 60 people. The computer ownership and tele-density levels are also low.

Therefore, it is imperative that several initiatives should be launched to:

- Create a reasonable ICT awareness in all levels and age groups of society.

- Increase the percentage of the population that can work in English, particularly among adults.

- Take steps to make ICT tools like the Internet more attractive to those who do not currently use it (e.g. by creating more websites in the local languages, providing greater interactive services, etc.).

The ICT Roadmap addresses this issue at several points, but should go further. For example, though it mentions using the electronic media to create ICT awareness, it ignores the role of the print media.

Against this backdrop, the following measures are recommended:

- Launch countrywide informal short term education programmes ('crash courses') directed at adults and school-leavers to educate them in both ICT use and the English language.

- Take an initiative to popularise 'the Web' by introducing more local language content and educational and entertainment programmes.

- Utilize print and electronic media to create ICT awareness.
- Launch special programmes to educate print and electronic media journalists on ICT, so that they can play a better role in educating the general public.

[10.1] Conclusion:

As discussed above, the ICT developments specially aimed to raise the economic and social levels of the population takes place in Sri Lankan at a pace much lower than what it is in the developed world. This can be due to several complex reasons. One reason can obviously be the high cost of ICT, but it will be difficult to think making ICTs financially viable - provided it is a feasible solution - only will be a panacea for all woes.

Put into a practical example, just introducing Internet kiosks at villages level will not help to make rural communities to get the best out of Internet. The more important questions will be what sort of benefits the rural population can gain from Internet and how convenient and economical Internet can be in that, compared to the traditional means they are used to. At present, the answers to both these questions are hardly satisfactory. Internet presents little that can practically be any help to Sri Lankan rural community and still the traditional channels are not only more economical but also more convenient.

It is also extremely important to give due consideration for MDGs while devising plans for ICT developments. As shown earlier, in some cases the existing policies have not given the due recognition to the developments aspects. It is essential that the policy makers are educated in these lines to make the policies directed not only at achieving the economic development, but to ensure that the benefits gained by such a development is equally distributed among all the sections of the society as well.

In this context there are three important players who can contribute towards making the ‘e-Sri Lanka’ dream a reality. They are the public sector, private sector and civil society. These three parties can act in their own, but this is more a time for collaboration. If the objectives are correctly unidentified and there is a workable action plan, there would not be any unconquerable barriers on the way of making an information rich and developed society in Sri Lanka in near future.

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End Notes

[1] Data refer to Census of Population and Housing -1981, the last complete census carried out in the country. In the Census - 2002, no enumeration was done in three districts of the Northern Province and only partial enumeration was done in four districts of the Northern and Eastern provinces due to civil disturbances. Hence the 2002 data can be misleading.

[2] 2002

[3] Male 94 percent, Female 89 percent

[4] CINTEC was known as Computer and Information Technology Council prior to 1994

[5] The e-government solution also aims to facilitate effective decentralisation and broadening of public participation in development policy formulation and programme implementation in a cost-effective and citizen-centred manner.

[6] The national infrastructure will be linked to global infrastructures through all the major optical fibre backbones traversing the Indian Ocean and the Bay of Bengal, and through satellite based communications.

[7] Sections 118 and 120

[8] Sections 285-287 and 291 A & B

[9] However, these figures are based only on the Internet accounts provided by licensed ISPs, and do not count the Internet accounts provided by corporate servers and unlicensed ISPs. Factoring all these, the total number of Internet accounts in Sri Lanka in mid-2002 can be estimated to be around 100,000. Using a conservative figure of three users per account, there are approximately 300,000 regular Internet users in Sri Lanka.

[10] It also does not take into account the number of Internet / email accounts provided by unlicensed ISPs. However with the relaxing of the annual licensing fee, the number of unlicensed ISPs has shown a drastic reduction over the past few years, and this amount can be safely ignored.

[11] Television was introduced to Sri Lanka in 1979. In 1999, the latest year for which full information is available, there were 813 television sets in Sri Lanka. That amounts to 45 televisions per every 1,000 people. This number should be much higher now.

[12] Excluding the Northern and Eastern provinces, which were not covered in the study

[13] In addition to this, there are about 1,500 rural bank branches

[14] http://www.jobsnet.lk

[15] http://www.slbfe.lk

[16] Some of the schools had only one computer.

[17] UCSC – earlier Institute of Computer Technology or ICT

[18] GDLN, http://www.gdln.org

[19] http://www.cenwor.lk

[20] For example, a survey conducted in 1997 reveals that only 4.7 percent of men between the age of 15-49 in Matale and 9.6 percent of men in Colombo reported ever having used condoms, although about two thirds of them had heard about these. Among men who declared that they have had sex with casual partners during the last 12 months, only 26.3 percent in Matale and 44.4 percent in Colombo reported using a condom.

[21] In one study, 45 percent of female sex workers had experienced multiple STDs, and 70 percent of male patients at STD clinics had reported visiting sex workers.

[22] Dhammapada

[23] Mahavamsa

[24] http://iri.columbia.edu/application/sector/water/Mahaweli/projectinfo/nrms.html

[25] http://www.maanawa.com

[26] http://www.wht.org

[27] http://members.fortunecity.com/glanca

[28] http://www.mysrilanka.com/travel/tour_sinharaja

[29] http://www.sriwildlife.8m.com

[30] http://lihini.sjp.ac.lk/forestry

[31] http://www.abu.org

[32] http://www.aptsec.org

[33] http://www.amic.org.sg

[34] http://www.aibd.org.my/

[35] http://www.apnic.net

[36] http://www.abu.org.my/asisvision/asiavision

[37] http://www.tveap.org

[38] http://www.lacnet.org

[39] http://www.yatv.net

[40] Unlike the Sinhala language which is affected by the absence of standards in the development of fonts and software, the Tamil language has the advantage of font and software development already carried out in southern India, which can be easily adapted for Sri Lankan Tamil needs.