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INFORMATION COMMUNICATION TECHNOLOGY AND KNOWLEDGE SERVICES

Introduction

Sri Lanka has invested a vast amount of resources for free education since 1945. Only a very few countries in the world provide free education for its citizens from the primary school to the university. Main product of this investment is a large pool of educated youths at different levels of educational attainments which provide ideal raw material for knowledge–led development. One of the ways of utilizing this valuable resource towards economic gain is to deploy them towards opportunities available in the recently emerged two fast growing sectors of the world: Information Communication Technology (ICT) and Knowledge Services. Most of the graduates passing out from our universities with Mathematics, Physics, Information Technology, Statistics, and Biology background are ideal candidates to grab opportunities available in these sectors. Students who have reached the Diploma level or even those who have been successful in GCE Advanced Level but could not gain admission to the universities may also be trained for specific employment opportunities in these sectors.

Of the multitude of areas that come under the ICT sector, one that has already well-established in Sri Lanka is the Information Technology (software industry) and Business Processes Out-sourcing (IT/BPO). Many leading information technology research advisory companies have rated Sri Lanka as a promising outsourcing destination for the IT/BPO sector. According to the last budget speech Sri Lanka has earned $0.6 billion from the IT/BPO sector. It is expected that IT/BPO sector will become a major foreign exchange earner in the country with the potential of creating 150,000 employment opportunities by 2020. Further, Sri Lanka's IT/BPO industry has set its vision to achieve US$ 5 billion in export by 2022 while generating 200,000 jobs and creating 1,000 start-ups in this process. Even though Sri Lankan universities are producing qualified graduates who can take up opportunities in this sector, the supply rate is no match to the projected demand for next 5 years. Many universities, having understood this situation are striving hard to expand their IT/Computer science education. Another important factor is that the BPO sector could bridge the urban-rural divide as companies do not need to be based in Colombo thus paving the way forward for rural masses to get engaged from within their native environment.

Branding Sri Lanka as a fast emerging South Asian Knowledge Services Hub for selected niche areas, making critical infrastructure such as electricity cost competitive, providing attractive tax concessions, encouraging the development of infrastructure such as IT parks that will promote software companies are some of the progressive steps that may be needed to ensure the rapid development of the sector. There are several other important ICT areas such as Datafication, Big data analysis, and Financial Portfolio analysis that deserve our special attention. Sri Lankan companies may take advantage of this trend either undertaking outsourced jobs or entering into joint ventures with the well-established organizations. Bioinformatics, Mathematical Solutions to Real World Problems, Geophysical Data Processing, Architectural Computer Drafting and Designing (CAD), On-line-Legal Services, On-line-Tutoring are some of the knowledge services that we are competent to provide and make a rapid and continuous progress.

There are several new trends that are emerging in the ICT sector. Cloud computing, the Internet of things, Smart systems and 3D printing are some of them. It is often speculated that there is a strong possibility of revolutionizing the industries in the future as a result of these new trends. Cloud computing has the capability of spreading rapidly through the developing economies, with the potentially profound impacts on business costs. It may also provide opportunities for ground breaking innovations. Similarly enormous opportunities are opening up in the other areas mentioned above. It is therefore necessary to prepare future generations of Sri Lanka to make the best use of these emerging opportunities and educational institutions must take appropriate steps in capacity building in this direction.

Sub Areas, Issues and Relevant Interventions

Table 1: Sub Areas and Justifications

Focus Areas	Sub Areas	Justifications
Information Communication Technology (ICT)	**1) Information Technology(Software Industry) and Business Processes out-sourcing (IT/BPO)**	IT/BPO sector is one of the rapid developing business/industry in Sri Lanka. With proper incentives and encouragement this sector can be expanded to ensure enhancing of income in several folds while creating very high level of direct and indirect employment.
	2) Datafication (Using data as a critical resource and determinant of performance of business and government activity)	Datafication which involves data storage and analysis in business and in government activities can be used to enhance performance level and to gain competitiveness.
	3) Big data analysis (Collection and analysis of very large and complex data sets that are difficult to process using traditional data processing applications.)	Big data has a great commercial value and many companies, large and small increasingly depend on the big data analysis to take important decisions. Many governments also maintain extensive databases on citizens, businesses and organizations for national identity systems, education, health, social security etc. to identify priorities and take appropriate decisions. Very often this type of work is outsourced providing opportunities for Sri Lankan companies or joint ventures.
	4) Emerging Trends in ICT (Cloud Computing, The Internet of Things and Smart Systems, 3D Printing)	A revolutionary development in ICT is expected to happen in the future due to emerging trends such as Cloud Computing, the Internet of Things, Smart Systems and 3D Printing. Sri Lankans should be competent in these emerging trends in ICT so that they can exploit ensuing opportunities.
Knowledge Services	**5) Portfolio Analysis** (A systematic way to analyze products and services that make up organization's business plans & strategies)	Most business organizations throughout the world carry out portfolio analysis when taking important business decisions creating enormous opportunities for organizations providing such services and for those who are having the right qualifications. Required trained manpower for this endeavor is available in Sri Lanka.

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	6) Bioinformatics (Development and implementation of tools to access and manage information, analysis and interpretation of data including nucleotide and amino acid sequences, protein domains and protein structures and development of algorithms and statistics to assess relationships in large data sets)	Bioinformatics provides promising economic gain and employment opportunities for a country like Sri Lanka which possesses trained graduates and postgraduates in molecular biology, computer science and statistics.
	7) Mathematical Solutions to Real world Problems	Many real world problems including those in engineering, software development, designing, traffic flow monitoring very often involve providing solutions to relevant mathematical problems. Sri Lankans who are highly competent in mathematics and statistics can be gainfully employed if the proper business environment is created.
	8) Geophysical Data Processing	In upstream oil industry geophysical data processing, which basically involves gravity, gravity gradiometry, magnetic and most importantly seismic processing play a crucial role. Sri Lanka can be a promising destination for geophysical data processing as it has trainable graduates for this purpose. This endeavor will provide employment opportunities for trained youths while resulting a significant economic gain for the country.
	9) Architectural CAD Drafting and Designing	Maneuverability of architectural plans and other designs (archiving, retrieving and improving accessibility) can be tremendously enhanced by converting them into Auto CAD drawings. There is a very high demand for Architectural CAD drafting and designing and technically competent Sri Lankans can be trained for this purpose.
	10) On-line Legal Services	Obtaining on line legal services from real or virtual lawyers is becoming more and more popular today. A well balanced combination of legal and computer personnel can gainfully exploit this trend.
	11) On-line Tutoring	Throughout the world there is a very high demand for on-line tutoring at school level to postgraduate level. Some of these opportunities have already being grabbed by some of our neighbors. Educated Sri Lankans can exploit this opportunity if proper infra-structure facilities are provided.

Table 2: Issues/Problems, R&D Needs and Relevant Interventions

Sub Areas	Issues/Problems	Research and Development Needs	Relevant Interventions
1) Information Technology & Business Process Outsourcing (IT & BPO)	I) Lack of skilled labor force in relation to anticipated future development plans II) Lack of encouragement from the state (Tax concessions, making critical infra-structure cost effective, Establishment of IT parks etc.)	i) Identify the gap between industry needs and existing skill levels ii) Identify strategies to encourage the IT/BPO sector	**Policy Studies** a) Develop a policy document to encourage the IT/BPO sector **Capacity building** a) Bridge the gap by introducing subjects catering for industry needs
2) Datafication	I) Lack of relevant Policies II) Lack of knowledge on datafication and its applications	i) Identification of Policy needs ii) Identifying the gap between industry needs and existing skill levels iii) Identification of target groups and strategies for awareness building	**Policy Studies** a) Develop policies for Datafication **Capacity Building** a) Training on Datafication **Popularization** a) Implement strategies identified for awareness building
3) Big Data Analysis	I) Lack of awareness of benefits of big data analysis as a source of income generation and provision of employment	i) Identification of target groups and strategies for awareness building and formulation of relevant policies	**Policy Studies** a) Develop incentive policies to encourage and enhance Big Data Analysis as business ventures **Popularization** a) Implement strategies identified for awareness building among target groups
4) Emerging Trends in ICT	I) Lack of knowledge of emerging	i) Identification of target groups &	**Popularization**

Sub Areas	Issues/Problems	Research and Development Needs	Relevant Interventions
(Cloud Computing, The Internet of Things and Smart Systems, 3D Printing)	trends in ICT	strategies for awareness building and formulation of relevant policies	a) Implement strategies identified for awareness building among target groups
5) Portfolio Analysis	I) Lack of sufficient awareness and encouragement to expand the industry	i) Policy Formulation	**Policy Studies** a) Formulate a policy to create awareness, encourage and expand the Portfolio Analysis as a business
6) Bioinformatics	I) Lack of sufficient awareness and encouragement to expand the industry	i) Identification of target groups and strategies for awareness building and formulation of relevant policies	**Policy Studies** a) Formulate a policy to create awareness, encourage and expand the bioinformatics as a business
7) Mathematical Solutions, Geophysical Data Processing and Architectural CAD Designing	I) Lack of sufficient awareness & encouragement to expand the industry	i) Identification of target groups & strategies for awareness building and formulation of relevant policies	**Policy Studies** a) Formulate policies to create awareness, encourage and expand Mathematical modeling, Geophysical Data Processing and Architectural CAD Designing as business ventures **Capacity Building** a) Conduct training programs on Mathematical modeling, Geophysical Data Processing and Architectural CAD Designing

Sub Areas	Issues/Problems	Research and Development Needs	Relevant Interventions
8) On-line-Legal Services and On-line-Tutoring	I) Lack of sufficient awareness & encouragement to expand the industry	i) Identification of target groups and strategies for awareness building and formulation of relevant policies	**Policy Studies** a) Formulate a policy to create awareness, encourage and expand On-line Legal Services and On-line-Tutoring **Capacity Building** a) Conduct training programs on On-line-Legal Services and On-line-Tutoring