Tertiary and Vocational Education Commission

Research Cell

Influencing Policy & Practice of TVET in Sri Lanka

A Study on Changing Patterns of ICT Related Occupations in Labour Market of Sri Lanka

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List of Abbreviations

TVET – Technical Vocational Education and Training

LMI - Learning Market Information

ICT - Information and Communication Technology

ICTA - Information and Communication Technology Agency

CBT - Computer Based Training

WWW - World Wide Web

SLICTA - Sri Lanka Information and Communication Technology Association

QLF –Quarterly Labour Force

WITSA - World Information Technology and Services Alliance

KE - Knowledge Economy

ICBF - ICT Capacity Building Fund

ICBP - ICT Capacity Building Program

SME – Small and Medium Scale

ITES - Information Technology Enabling Services

BPO – Business Process Outsourcing

IDC – Internet Data Center

NRI - Network Readiness Index

USD – United States Dollar

NBN - National Backbone Network

LGN- Lanka Government Network

e-SDI - e-Society Development Initiative

NESS - National Employer Skills Survey

LSC - Learning & Skills Council

BASDA - Business Application Software Developers Association

SDA - Skills Development Assistant

GCE (A/L) – General Certificate of Education (Advanced Level)

GCE (O/L) – General Certificate of Education (Ordinary Level)

Executive Summary

Demand, supply and the price are the key factors that determine shape and the behaviour of a labour market. Labour market is an intangible place where those who are in search of the labour and those who are willing to supply the labour meet together. When considering ICT labour market, it is heavily depends on the technology and the technological trends which is changing rapidly due to fast technology innovations and the quick dissemination of such information within the globe. Also this market is volatile in nationally and internationally due to high import and export volumes in the ICT field. So the studying the patterns of ICT labour market is a timely and important requirement in the context of policy making and planning in ICT related training provision TVET sector.

In this study, organizations that work on ICT projects are very few compared to the total ICT workforce, which distributed mostly among the non ICT organizations in Sri Lanka. Hence the sample was selected to cover the majority of the organizations in Colombo, Galle and Kandy districts in total of 250 ICT related office workers.

According to the survey, it has found that male contribution is higher than female contribution in ICT related occupations. When considering professional qualifications of the ICT labour market, Diploma holders contribute to half of the total and equal percentages from male and female. When employment sector is considered, the Private sector contribution is the highest with higher male contribution in the private sector ICT occupations.

When the distribution of designations are concerned, most executives are males and the females represent major portion in supporting services in ICT related labour force in Sri Lanka. The monthly income of the ICT occupation holders depend on their ICT qualifications and educational level and followed training courses.

In the study there has been an effort taken to identify areas for training requirement and the demanding specialized areas in the ICT sector. It was found that the way the skills gained is "Prior Experience" in most persons and "In-service Training" is the least method to gain skills in most organizations.

Finally this survey has provided number of recommendations for planners and decision makers of related fields and researchers for further studies.

Chapter 01

1.1 Introduction

Labour itself is the basic input but most complex factor in any of the production process. It is basic since at least a minimum level of labour is at the foundation of economic growth of a country. It is complex because unlike other factors of production, it responds to changes in the surrounding working environment. Therefore studding the labour market situation is very important for the economic growth of a country. The quality of human capital to suit the new technology is a vital factor in the labour market.

Information and Communication Technology, ICT like many other technologies can have numerous impacts on the working conditions and labour markets in general. However, changes of labour markets and working conditions due to ICT are widely discussed due to two reasons: *rapidity of its expansion* and *its extensive nature*. A careful investigation of the expansion of other types of technologies show that they took decades to have a significant impact on the labour market. Further, most of such technologies were applicable only in some selected industrial activities. Whereas, ICT is applicable in all range of economic activities and it shows a rapid expansion all over the world. Therefore, the impact of ICT on labour market conditions is widely discussed in many forums.

1.2 ICT Labour Market in Sri Lanka

ICT labour market is the most rapidly changing labour market in Sri Lanka as well as globally. The fast changing nature of the ICT is made ICT labour force market more volatile than other markets. Therefore this represents drastic changes in a smaller time intervals compared to other sectors. The impact of global changes in economies affects the ICT labour force as this market mainly depend on heavy imports and exports. When considering the rising demand survey done by SLICTA, it has found following trends with regard to ICT labour market. On average, respondents in ICT survey are more educated. However, the respondents in QLF survey report higher variation in educational achievement. Average tenure of Labour force survey is nearly 6 times higher than the average tenure of the ICT survey. Maximum length of tenure in ICT survey is 7 years whereas it is 71 years in the Labour Force Survey. Monthly earnings show very high variation. In the ICT survey earnings vary in between Rs. 10,000 to Rs. 200,000 per-month with average monthly earnings Rs. 51,735. However, earnings of QLF Survey vary from Rs. 180 to Rs. 70,000 with the average earnings Rs. 4,132.

1.1 ICT and Working Conditions

ICT can affect working site. Traditional concept of working site (factory or working place) is now in a transition. Home based workers and virtual office concepts are becoming popular. As a result of implementation of ICT devices, worker can perform their duties while staying at home. This makes the implementation of various labour regulations complicated. For example, numbers of working hours, safety standard are not easy to monitor and hence employers cannot be responsible for violation of those working conditions. From the positive side, this enables workers to do more than one job. With the expansion of ICT devices it makes easier, especially for professional level workers to hold multiple jobs. Multiple job holding definitely benefits the worker because he/she can utilize all his/her talents to make highest income from the labour market. At the same time, this also benefits the entire economy because it allows

professionals to work more than they can do otherwise and thereby they contribute maximum to the national economy.

In Sri Lanka, we were not able to meet any home-based workers except few self employed software developers. They develop various software for international-market. Therefore, they are self-employed sub-contractors rather than employees. They are stationed at home and communicate with the principal through email. Some of them were doing this as a secondary job. As they work on targets, there is no guarantee for maximum working hours. As we already described elsewhere in this paper, nearly 20 percent of ICT employees in our sample are holding multiple jobs. This is higher than the percentage of multiple jobholders in the entire labour market of Sri Lanka.

Application of ICT always improves the efficiency of production process. It saves time, reduces transaction cost, improves the quality and neatness of final products, minimizes default rates and it also enables one to perform certain tasks which would not be even imagined in the absence of ICT. In industry-visits we observed number of examples. In the telecommunication example we found that the customer services, billing and other customer related information services and breakdown services are improved tremendously. In garment industry examples, we found that the default rates were tremendously reduced, embroidery and stitching units are almost 100 percent computerized and they would never be able to open those industrial activities in the absence of ICT facility. Further, it was generally encountered almost everywhere that improvements in telecommunication facilities (e-mail, internet and many other activities) have significantly reduced the time waste and keep them updated always. Most of enterprises that we investigated are either mainly catering for international market, sponsored by an international agency or their parent company is located elsewhere. Therefore, quick and cheap communication network has become an essential infrastructure requirement even for their mere survival.

Chapter 02

2.1 Background & Rationale

According to the newspaper advertisement survey done by the Tertiary and Vocational Education Commission there has been high demand for the ICT related occupations. In 2007, there were 2,864 occupation opportunities published in the ICT field.

In Sri Lanka annually about 300,000 students leave that school without getting admission to public traditional universities of Sri Lanka. From them about 70,000 get admission to state TVET courses. Considering TVET courses that are conducted by training institutes ICT courses become attracting to school leavers.

As 'Rising Demand by Sri Lanka Information Communication Technology Association stated that 'Looking ahead, based on the demand for 2007 and projections for 2008 the IT workforce is expected to grow by about 14,500. In fact with the forward looking demand on the increase, the gap is beginning to widen'. The supply of qualified IT professionals still remains a major hindrance to the growth of the IT industry. Therefore it is important to study the human capital requirement in that field.[1]

Therefore the purpose of this study is to identify changing patterns of ICT related occupations in Sri Lankan labour market.

Chapter 03

3.1 Research Objectives

The main objectives of this study is

     i.   To identify the changing patterns of ICT related occupations and

     ii.   To identify the knowledge and skill gaps between current and expected level in ICT Related Occupations.

The first objective examines the changing patterns of ICT related occupations with regard to impact of ICT development on the labour market conditions in Sri Lanka. This will give us clear picture of changing patterns and trends related to ICT occupations in Sri Lanka. And the second objectives is to identify the knowledge and skill gaps between current and expected level in ICT related occupations, which directly give signals for policy and planning of TVET sector ICT training programs according to changing labour requirements in ICT sector.

Chapter 04

4.1 Literature Review

At present the quantity and quality of information about the Information and Communications Technology industry in Sri Lanka is, in general, limited and fragmented. This has been identified as a significant barrier to the development of the ICT industry sector. Therefore, the Sri Lanka ICT Association (SLICTA) has taken steps to initiate a very specific survey that would deliver a very comprehensive picture of the information technology workforce in Sri Lanka.[1]

Graph 1 : Overall ICT Workforce Growth Trend 2003 – 2008
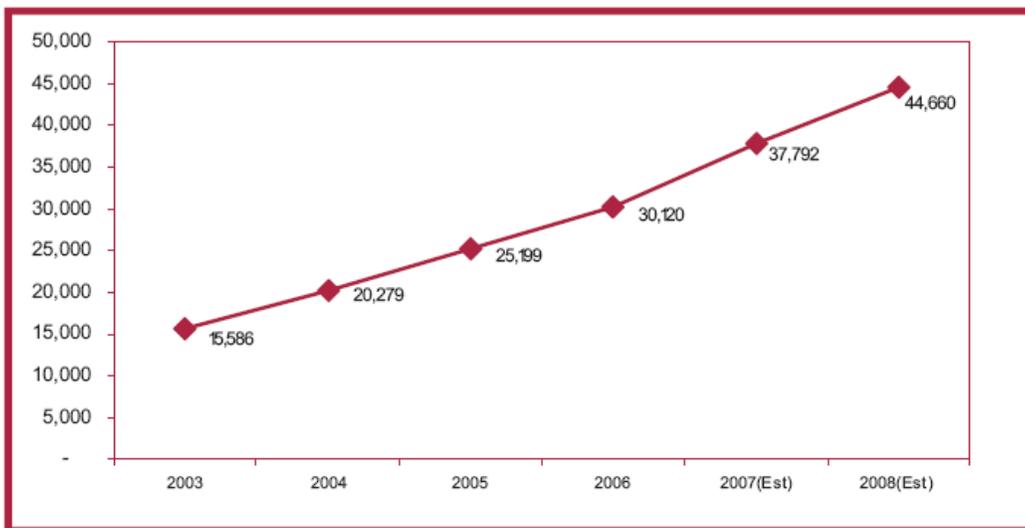
Source : ICT Workforce Survey 2004 by SLICTA

According to the ICT workforce survey, following 13 occupations were identified as highest rankers.

1. Database Administration and Development

2. Digital Media and Animation

3. Business Analysis and Systems Integration

4. Systems and Network Administration

5. Programming and Software Engineering

6. Project and Programme Management

7. Testing & Quality Assurance

8. Sales and Marketing

9. Technical Support

10. Technical Writing

11. Web Development

12. Management Information Systems/IT Management

13. Solutions and Technical Architect

The World Information Technology and Services Alliance (WITSA) a consortium of 65 information technology (IT) industry associations from economies around the world including Sri Lanka of which SLICTA is a member share the goal of significantly improving the capabilities and skills of ICT professionals in Sri Lanka by better aligning the training and educational curriculum with the anticipated demand for such professionals. WITSA has agreed to provide technical assistance in successfully implementing the survey. Achievement of this goal will enable:

- The IT industry, ICT user organizations and the government gain a realistic picture of the overall demand and supply of IT human resources
- Universities and other IT training institutions to improve their offerings
- Students to make better course selections
- Graduates and diploma holders of IT to have greater probability of employment
- Potential investors to have vital human resource related information that will help them make their investment decisions

SLICTA survey intended to produce the following information:

1.   Overall size, geographical distribution and organizational distribution of the IT workforce

2.   Predicted demand over the coming twelve months as well as anticipated gap between supply and demand

3.   Determine growing employment opportunities - by IT skills set

4.   Determine what types of education and training are needed to obtain IT jobs and how it could be best obtained

5.   Best methods in use for retaining IT workers and

6.   Relevance of knowledge of information security for IT workers

7.   Survey of all key training organizations including universities to obtain a better understanding of the supply side of IT graduates and diploma holders

8.   Starting salaries for benchmarked skills

This survey was aimed at both ICT human resource users and ICT training organizations. A local consultant with the participation from the industry representatives and stakeholders developed the survey instrument.[1]

The twin role of private sector and Information and Communication Technology (ICT) has long been recognized by the World Bank as critical to development efforts around the world. The recent World Bank flagship publication "Building Knowledge Economies" (2007), argues that, whatever their level of development is, countries should consider embarking on a knowledge- and innovation-based development process. In these times of accelerated globalization, "grey matter" is a country's main durable resource. Its exploitation for economic and social well-being is increasingly at the center of development strategies. Three key messages sum up the growing consensus:

1. With globalization and the technological revolution of the last few decades, knowledge has clearly become the key driver of competitiveness and is now profoundly reshaping the patterns of the world's economic growth and activity. Both developed and developing countries should therefore think, with some urgency, about their future under a Knowledge Economy (KE) heading.

2. To become successful knowledge economies, countries have to rethink and act simultaneously on four pillars, namely, first, their education base, second, their innovation systems, third, their information and communication technology infrastructure, and fourth,

building a high-quality economic and institutional regime. Policies for these four pillars have to reflect the country's level of development. However, experience shows that some successful KE champions have been able to achieve spectacular leaps forward within a decade.

3. Many if not most of the countries that have made rapid progress have staged nationwide KE-inspired programs of change. Such programs have been pragmatic and country-specific, yet some common points emerge: the need to promote trust and societal cohesion around the KE program; the need to work at the four pillars through a combination of top-down reforms and bottom-up initiatives; and the need for a well-communicated KE vision.

It is encouraging to see that the Government. of Sri Lanka encompasses this new paradigm as evidenced by the on-going e-Sri Lanka initiative. Efforts at varying degrees are underway towards addressing the four policy pillars: education, innovation, ICT and the prerequisite economic and institutional regime - to realize the KE agenda.

In recognition of the Government's commitment, the World Bank has provided financial and technical support to the e-Sri Lanka project for the past three years. The initiative provides access to ICT services to Sri Lanka's rural poor as well as supporting public and private sector efforts to transform the island into an off-shoring hub for the region.

Today's program focuses on ICT Education and Industry Promotion component, which is being implemented through a ICT Capacity Building Fund (ICBF). This component's principal objectives include strengthening ICT management and professional skills in the private sector; training and workforce initiatives to increase private sector competitiveness; industry promotion and market creation strategies; and strategic and innovative development. The principal target groups for this program are ICT industry, ICT training institutions, SMEs, and ICT-related professional associations according to ICTA's information.

We are happy to note that good progress is being made on a myriad fronts. Training schemes have been launched to grant vouchers to pre-workforce and new employees to obtain basic business communication/ICT literacy skills. To meet the Human Resource needs of the BPO industry, an ITES (information technology enabling services) training scheme is offering scholarships to prospective ITES employees to attend courses at accredited training institutions. SMEs have benefited from company quality enhancement grants in the form of

subsides to meet the cost of accreditation. It is hoped that these initiatives shall contribute towards enhancing competitiveness of private sector, particularly in the area of knowledge economy.

Due to ICTA's relentless facilitation and coordination with key stakeholders, several BPO companies have invested in or are in the process of investing in Sri Lanka, along with a few global IT principals. The Agency has been also engaging with global research and consultancy companies to expand Sri Lanka's profile as an IT-BPO destination. Hewitt, IDC, Springboard Research are examples. A.T. Kearney included Sri Lanka at the 29th position in their latest Global Outsourcing Location Index Report and Tholons Ranked Colombo at the 5th position for most attractive for destination for Finance and Accounting Outsourcing operations.

There are tremendous opportunities for the private sector to invest in the IT-BPO Off shoring industry. The IT-BPO Off shoring market is currently estimated at US$100 billion market and growing at more than 30 percent per annum. In India, a global leader in this area, IT exports account for close to US$20 billion and almost half of total export revenues. The total number of jobs created in the Indian IT industry is close to one million, many of them filled by women.

Developing IT and BPO opportunities should be a high priority for a development oriented country such as Sri Lanka. Not only will the development of this industry segment create job and export opportunities, it will also create positive spillovers such as: enhanced incentives for education, technology and knowledge transfer, environmental protection and an improvement in the quality of locally provided services.

Services that will be off shored in the future will go far beyond the traditional call-centers and back-office functions and will include; investment and financial services, human resources, health services, retail functions, logistics and customer support functions. It is estimated that this will result in 18 million jobs being off shored with a multiplier effect that could in turn create a further 60 million jobs in developing countries.

It is important that Sri Lanka takes advantage of this opportunity and it is well placed to do so. Sri Lanka boasts some of the cheapest labor and office rental costs in the region but high telephone and electricity charges as well as rigid labor legislation remain the key challenges.

Despite these challenges several large multinationals have set up or are considering setting up BPO operations in the country. It appears that the demand is unlimited for a small country like Sri Lanka and the only important bottleneck is being able to offer the educated human resources that will staff these enterprises.[2]

The E-Sri Lanka initiative, which became effective in January 2005 is one of the pioneering ICT for Development projects supported by the World Bank. This ambitious e-development project aims to bring connectivity to rural populations, improve the way government operates and raise awareness of the benefits of ICT for remote rural populations as well as support the development of a vibrant private ICT sector. The leadership team from Sri Lanka's ICT Agency presents the original E-Sri Lanka vision and emerging lessons and key results after the first four years of implementation experience.

Network Readiness Index (NRI) presentation, shows high percentages of ICT Literacy and Governmental readiness for ICT.

Some examples:

- Information on any Government Process, Service or Application just a phone call away
- Civil Registration (Birth, Marriage, Death certificates etc.) documents in hand within a matter of minutes
- Drive-in Vehicle / Revenue License Registration
- Government Organizational Machinery (Ministries, Departments etc.) connected, on-line and secure
- Single-window, multi-channel access to any e-service in Sri Lanka (very soon)

Highlights of Industry and Education show:

- 30,000+ new jobs created in the IT/BPO sector since 2005
- IT/ITeS becomes the 5th largest foreign exchange earner for the country – USD 250+ million in 2008
- 2009 – Declared as the "Year of English and IT"
- 2000 schools equipped with computer labs (6000 by 2010/11)

- 40 Distance Education Learning Centers set-up, offering 35 online graduate level courses

Graphs for society show:

- Increased access to ICT for citizens across the country - 600 Nenasalas (Tele-centres) set-up
- Provision of Market Prices & Crop/Agriculture information to farmers
- Providing e-health/tele-medicine facilities to rural patients
- Development of digital talking books for the visually impaired, to developing visual hearing aids for the hearing impaired
- Availability of supplementary school educational material both at primary and secondary educational level to students.
- Setting up of rural BPOs and creation of job opportunities for youth in rural communicates

Infrastructure-, e-Governance-, Knowledge-, Industry- and Rural grid.

Infrastructure grid examples:

Nenasala - knowledge centers. Both public and private ownership: entrepreneurs, religious institutions, community based organizations, rural schools and public libraries.

NBN - National Backbone Network. Objective: Deployment of affordable broadband services throughout Sri Lanka:

- Island-wide Ultra High Bandwidth Broadband Backbone
- Provision of affordable broadband connectivity to all parts of the country
- Technology Neutral, Least Cost Subsidy
- Tariff Regulation: increase competition

LGN - Lanka Government Network - Objective: Highly available, secure backbone to connect the government.

Rural grid examples:

e-Society Development Initiative (e-SDI):

- Seeks to spread the benefits of ICT to disadvantaged communities
- Solicit issues and ideas from communities, build their capacity
- Help them implement ICT projects to solve their most pressing issues
- 175 communities have had 175 sustainable ICT centers established, with over 72,00 people benefiting each month

e-Sri Lanka Vision: "Take the dividends of ICT to every village, citizen, business and also transform the way government thinks and works".[3]

ICT Industry Human Resource Development

Strengthening Management and Professional Skills:

The lack of ICT professionals has been a recurrent theme in recent reports on the industry in Sri Lanka. This issue has several dimensions. A depressed national labour market, affected by two decades of civil unrest, and higher salaries abroad influence many ICT professionals to seek a career outside Sri Lanka. While the available pool of ICT professionals is thus a concern, of particular concern for Strengthening Management and Professional Skills is the depth of the human resources pool for experienced middle and upper level managers, those with more than five years relevant experience. This shortage is felt strongly in software design, project management and software business consulting. In this cluster of activities particular emphasis will be placed on initiatives to strengthen management and professional skills where the benefits to industry are expected to be realized in the near- to mid- term.

Strengthening Workforce Skills in the ICT Industry:

This program has as its broad goal to strengthen human capital across the ICT industry workforce, enhancing the skills and competencies of those entering and those already employed in the ICT industry. Initiatives will foster innovation and growth and enhance the capacity of companies and individuals to compete on a level playing field with foreign competition within Sri Lanka, and in markets abroad; by promoting activities aimed at ensuring that a national workforce with the appropriate skill mix is available. A critical challenge for Training and Workforce Initiatives will be to establish a balance between short-term solutions for issues of immediate importance, and long term goals, which may require five to ten years before the impact is felt.

A guiding principle of the ICBP design is to promote activities and investments which will benefit the ICT industry as a whole. The ICBP is not intended to develop specific companies. Although

individual companies will certainly gain benefits from strategies under this program the objective is to invest in those activities which can demonstrate greatest benefits to the industry. Similarly the ICBP is geared to encourage diversity and provide assistance as broadly as possible. To this end assistance to individual companies will be limited at different levels.

Industry promotion has as its broad goal to provide funding and technical assistance support which will enable Sri Lanka to identify and take advantage of domestic and global business opportunities in the ICT field. The E-Sri Lanka Roadmap for ICT Development envisions a focus on emerging opportunities in three key segments; development of software products for new applications and markets, capturing of a significant share in the global software services market and, securing a dominant position in the global market for Information Technology Enabled Services, ITES, including Business Process Out-sourcing, BPO. In pursuit of this vision industry promotion will need to focus both on export and domestic markets, and develop specialized niche markets, including both software services and products and both lower and higher end BPO. The importance of the domestic market is recognized as while it small and not offering profit margins comparable to that of the export market it is likely to continue to be important as a seed bed for local firms' capacity building. Strategies supported under this program will encourage innovation and excellence, quality assurance, market specialization and market diversification. Specific strategies will build capacity and expand the utilization of ICT in SMEs and Micro-enterprises.

Creating an Enabling Environment for ICT Industry Growth

The strategies in this program of activities recognize that development of ICT human capacity and promotion of the ICT industry will require an enabling environment in which to be effective. Strategies will support quality assurance through incentives for ICT companies to seek international accreditation, and the accreditation and capacity building of national ICT training providers. Additionally strategies will seek to "repatriate" international ICT expertise through fostering links in a Global Network for ICT Expatriates and improving the profile of the ICT industry and the skill base of entrants into the ICT workforce by familiarizing career counsellors with the skills, knowledge and attitude expected by private sector ICT employers.

The program will also fund technical assistance to undertake an industry training needs analysis the results of which will be used to rank training needs in order of industry demand to create the national priority training list to be supported under the programme.[4]

Foreign Example: Review of ICT labour market in UK

e-Skills UK has published the latest issue of the e-skills Bulletin, a comprehensive review of employment and market trends for the ICT (Information and Communications Technology) sectors. [5]

The bulletin contains for the first time, data taken from the National Employer Skills Survey (NESS), which was carried out by the Department for Education and Skills (DfES), the Learning & Skills Council (LSC) and the Sector Skills Development Agency (SSDA) and contains information from over 72,000 companies across England. The survey looked at recruitment trends, skills shortages and the effect these factors have on other areas of business such as business development and operating costs.

In summary we can say there are some definite positive signs for the Industry with both ICT sales and private sector investment in IT increasing over the final quarter of 2003. In addition unemployment rates for the sector dropped below the national average for the first time in a year, whilst data from Computer Weekly and Salary Services Ltd reveal an increase in the number of positions for ICT staff advertised in the press and online over the period Q3-Q4 2004

However, things are moving cautiously, with only 25% of ICT firms recruiting to grow in numbers over the next quarter, and 15% of firms anticipated growth for ICT managers and professionals. With this in mind, recruiting difficulties resulting from skills shortages and gaps are having an impact on ICT organizations, with over three quarters of firms surveyed citing these problems as having a negative impact on business operations.

Key industry data for Q4.2003 in ICT labour market of UK:
- FTSE index for computer services rose by 8% during the final quarter of 2003.
- 61% of ICT firms surveyed by the Business Application Software Developers Association (BASDA) reported a growth in sales over the previous quarter.
- Investment in computer hardware/software in the private sector increased by 6% (£144m) over the period.
- 15% of ICT employers reported skills gaps, saying that some/all of their staff were not fully proficient in their existing jobs. This Graph stands at 32% for the telecoms sector.

- Profitability rates continue to fall across the IT and Telecoms sectors at a greater rate that the average of UK industries.

Employment outlook as at Q4.2003:
- Unemployment rate for ICT industry staff falls below the UK average for the first time in a year.
- Employment in ICT industries fell by 10,000 over Q4.03 to 864,000.
- The number of ICT positions advertised rose by 4% over the final quarter of last year.
- Notable increases were in the number of permanent internet staff (up 32%) and the number of contract PC support staff (up 24%).

Chapter 05

Research design

In research design in this study, it is proposed variables as: Gender, Education, Qualifications, Current Designations, Working conditions including working hours, preferred field of IT and job satisfaction.

The survey research method has been used to collect the data. The research attributes has been identified as follows.

Survey Attributes

Following attributes which belongs to Personal & Organizational are taken for the questionnaire survey.

        a. Gender

        b. Educational Level and Gender

        c. Qualifications and Gender

        d. Designations and Gender

        e. Occupational conditions

        f. Monthly Salary

        g. Specialized work area

        h. Preferred field of IT

        i. Working hours

        j. Job Satisfaction

Chapter 06

Research Methodology

At the first stage a literature survey was conducted. In order to identify the changing patters and required knowledge and skills, the sample of 250 job holders in ICT field have been surveyed through questionnaire as follows.

Sampling technique

Simple Random Sampling procedure was adopted for each district Colombo, Kandy & Galle to select a sample of 250 organizations including IT companies, Non-IT companies and Government sector.

Table1: Sample Allocation

District	Organizations	Sample Allocation	Received
Colombo	970	155	125
Kandy	305	60	46
Galle	175	35	17
	1,450	250	188

For the questionnaire survey, a focus group has been selected from Skills Development Assistant (SDA) attached to the particular Divisional Secretariats. Small training was given to them and distribute questionnaire and closely monitored by IS Division Research Team. But it was found that 17 questionnaires of the Galle District in poor quality and decided to exclude from the survey.

Before the actual survey, a pilot survey conducted in order to finalize the questionnaire. Stratified sampling technique has been used to select the sample. In addition to that secondary data sets also considered.

Sample has drawn from information available at Ministry of Industries. Initially ICT firms and other organizations surveyed through a structured questionnaire. ICT related officials interviewed. The data coded and entered to Access data base. Excel and SPSS software used to analyse the data and graphs and tables populated.
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In order to understand the impact of ICT on labour market we have to investigated many different aspects of the issue: evolution of ICT in Sri Lanka, impact of ICT on working conditions and job creation and destruction are the major aspects. There are several research papers on the evolution of ICT in Sri Lanka and its current state. We have obtained required information to understand the evolution of ICT in Sri Lanka through review of this literature. To ascertain the impacts of ICT on decency of working conditions we mainly used data gathered from two sample surveys. One survey was conducted among workers in selected ICT producing, facilitating and using enterprises. The second survey was among the undergraduate students in IT related faculties. In the former survey, we focused on several aspects of working conditions. Namely, we focused at working hours, earnings, and changes of work site and impacts of ICT on workers' social and family ties. Selected in depth interviews of workers reinforce the findings from the survey. In addition to the sample survey and in depth interview of selected workers in ICT sector we also carried case studies on number of firms recently introduced ICT. In certain cases we had to compare two otherwise similar firms one with ICT and the other without that. Main objective of those case studies is to ascertain the job creation and destruction due to the advent of ICT. It is obvious that certain types of jobs will no longer be required after adapting into ICT. For example, heavy clerical staff is no longer a requirement of a firm after introducing ICT because now most staff officers can prepare their own letters and send it through emails. At the same time, new jobs may be created. System Manager is a nice example for a new job created by ICT.

Chapter 07

Data Analysis

Data gathered through the questionnaires were analyzed as follows.

Graph 2: Percentage Distribution of ICT related workers by Gender
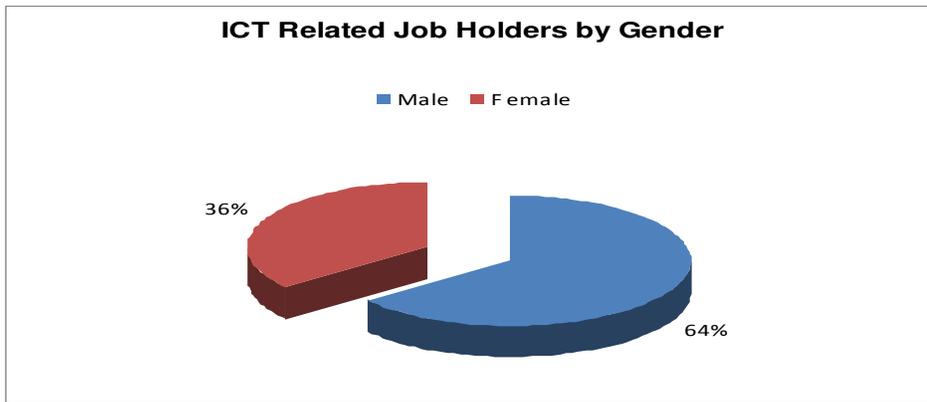
According to above graph, 64 percent of ICT related workers were male.

Table 2: Percentage Distribution of ICT related workers by Educational level and Gender

Educational Level	Gender		Total
	Male	Female	
Below GCE (O/L)	0.0	1.5	0.5
GCE (O/L)	5.8	0.0	3.7
GCE (A/L)	**57.9**	**71.6**	**62.8**
Degree & above	**33.1**	**23.9**	**29.8**
Other	3.3	3.0	3.2
Total	100.0	100.0	100.0

Graph 3: Percentage Distribution of Educational Level by Gender
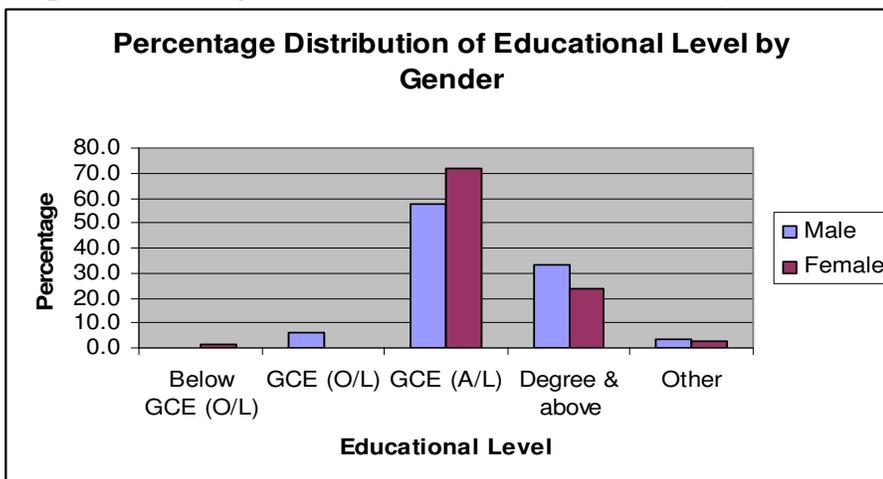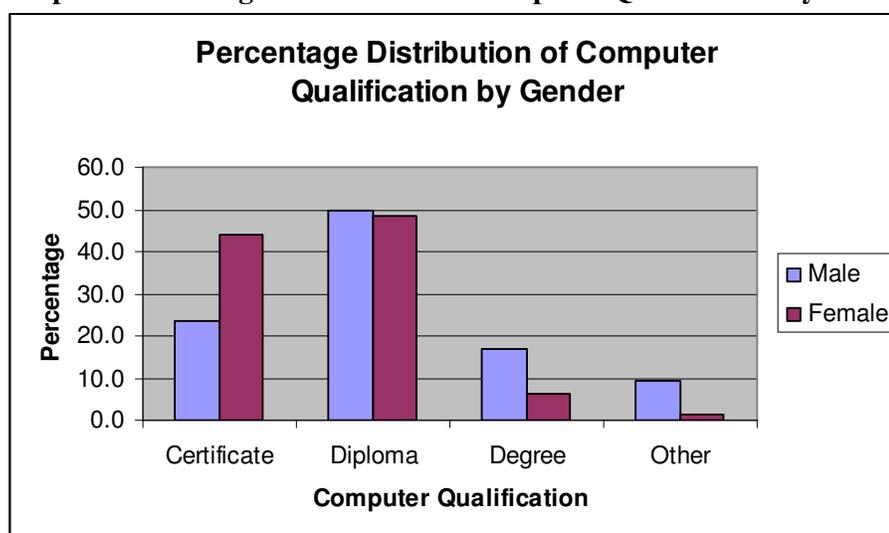
According to above table & graph, more than 90 percent of ICT related workers have higher educational qualifications.

Table 3: Percentage Distribution of ICT related workers by Computer Qualification and Gender

Computer Qualification	Gender		Total
	Male	Female	
Certificate	23.7	43.9	31.0
Diploma	**50.0**	**48.5**	**49.5**
Degree	**16.9**	6.1	13.0
Other	9.3	1.5	6.5
Total	100.0	100.0	100.0

Graph 4: Percentage Distribution of Computer Qualification by Gender

- According to above table & graph, about 50 percent of ICT related workers have computer qualification in diploma level.
- 67 percent of male ICT related workers have diploma & above level of computer qualification.
- Considering higher level of computer qualifications, male workers were higher than female.

Table 4: Percentage Distribution of Employment sector and Gender

Institutions Affiliated	Gender		Total
	Male	Female	
Government	20.7	**49.3**	30.9
Semi Government	15.7	19.4	17.0
Private	**57.0**	28.4	46.8
NGO	3.3	1.5	2.7
Self Employment	3.3	1.5	2.7
Total	100.0	100.0	100.0

Graph 5: Percentage Distribution of Institutions Affiliated by Gender

Percentage Distribution of Institutions Affiliated by Gender
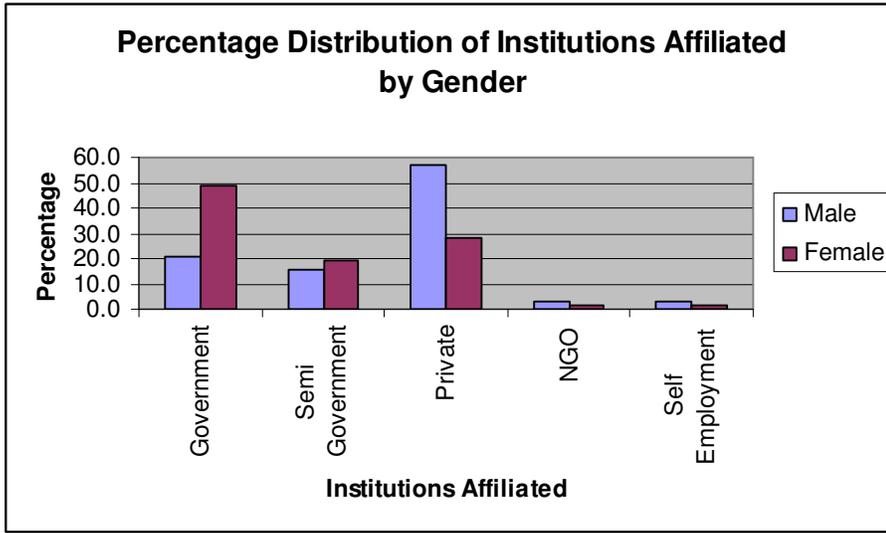
According to above table & graph, 57 percent of male ICT related workers were engaged in private sector while 49 percent of females were in government sector.

Table 5: Percentage Distribution of Designation Status and Gender

Designation Status	Gender		Total
	Male	Female	
Executive	**39.3**	12.3	29.7
Professional	28.2	29.2	28.6
Technical	23.1	20.0	22.0
Other	9.4	**38.5**	19.8
Total	100.0	100.0	100.0

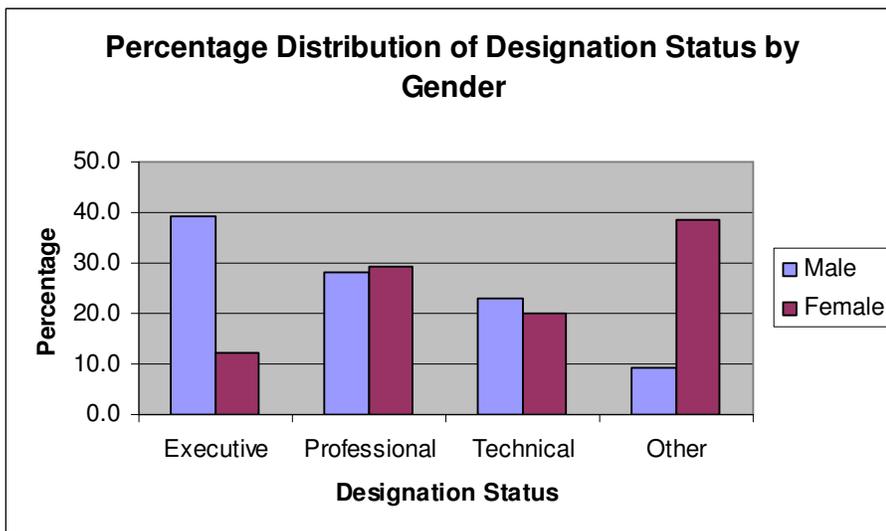
Percentage Distribution of Designation Status by Gender

Graph 6: Percentage Distribution of Designation Status and Gender

According to above table & graph, 68 percent of male ICT related workers were in executive and professional level jobs. About 60 percent of female ICT related workers were in technical and clerical related jobs.

Graph 7: Percentage Distribution of ICT related workers by occupational condition

Percentage Distribution of Job Status
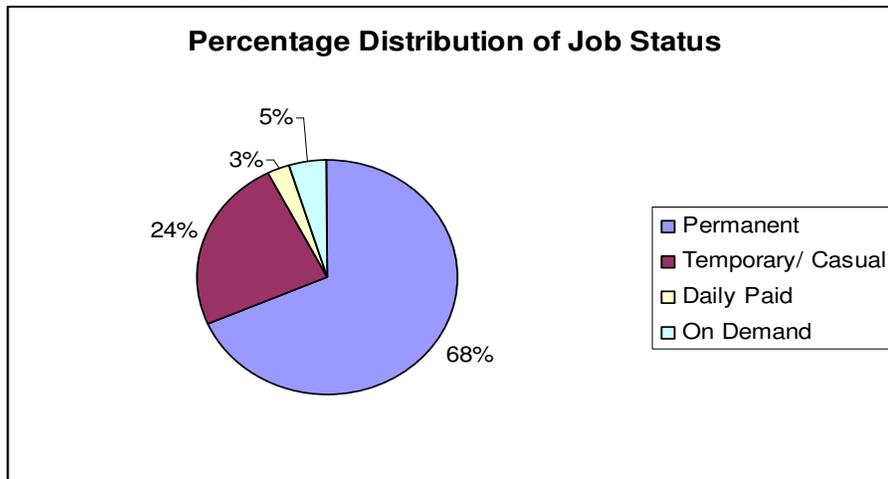
As shown in above graph, 68 percent of ICT related workers were permanent in their job while 24 percent were temporary.

Table 6: Percentage Distribution of Monthly Salary and Gender

Monthly Salary	Gender		Total
	Male	Female	
less than 10,000	16.0	28.8	20.5
10,000-20,000	39.5	43.9	**41.1**
20,000-30,000	21.0	18.2	20.0
30,000-40,000	**11.8**	6.1	9.7
above 40,000	**11.8**	3.0	8.6
Total	100.0	100.0	100.0

Graph 8 : Percentage Distribution of Monthly Salary and Gender

Percentage Distribution of Monthly Salary by Gender
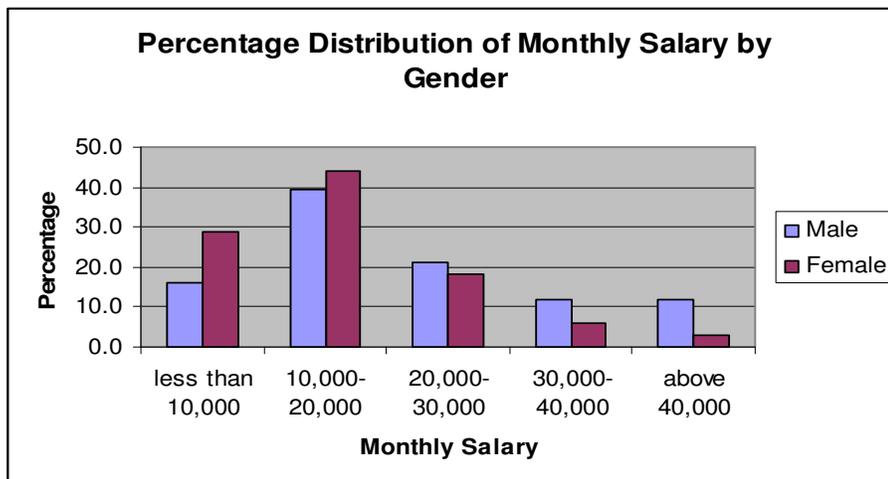
- As shown in above table & graph, 41 percent of ICT related workers have monthly earned within the range between Rs.10, 000 and Rs.20,000.
- About 24 percent of male ICT related workers have monthly earned over Rs.30,000.
- Considering higher level of monthly salary(above 30,000), male workers were higher than female

Graph 9: Percentage Distribution of current knowledge and skills of ICT related workers
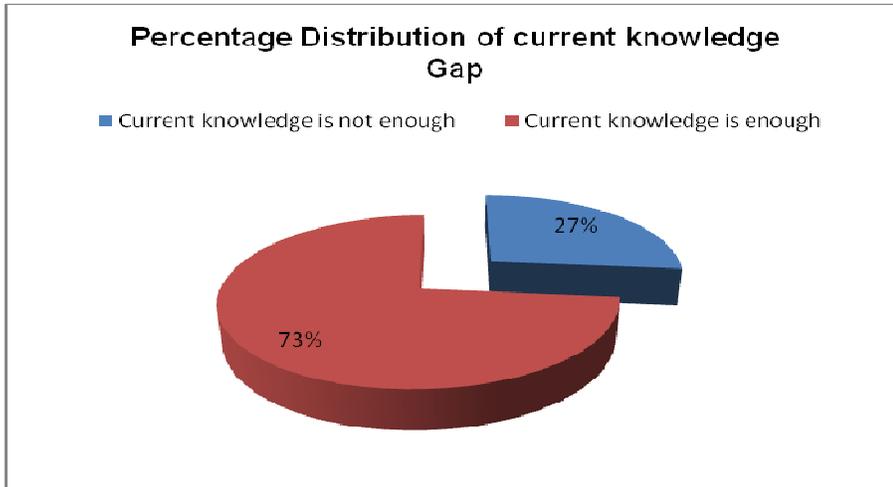
As shown in above graph, 27 percent of ICT related workers have not sufficient knowledge and skills for their current job.

Graph 10: Percentage Distribution of Specialized work area of current job
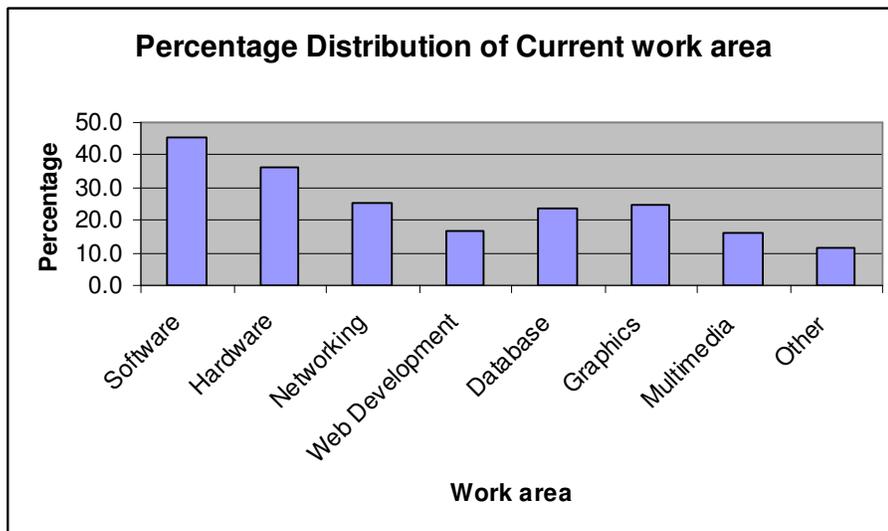
* Multiple responses have given

As shown in above graph, most of the ICT related occupations were specialized in software, hardware and networking fields.

Graph 11: Percentage Distribution of required knowledge for current Job
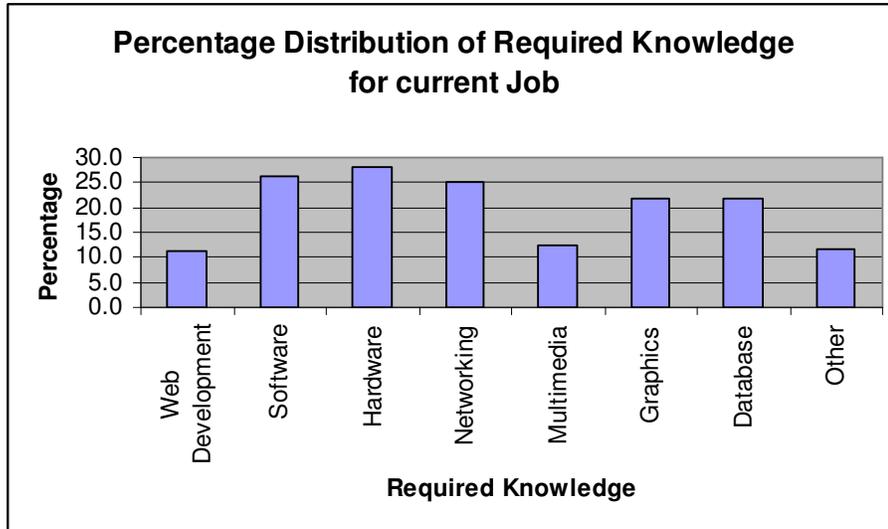
* Multiple responses have given

As shown in above graph, most of the ICT related workers required software, hardware and networking knowledge for doing their job.

Graph 12: Percentage Distribution of Preferred Computer fields
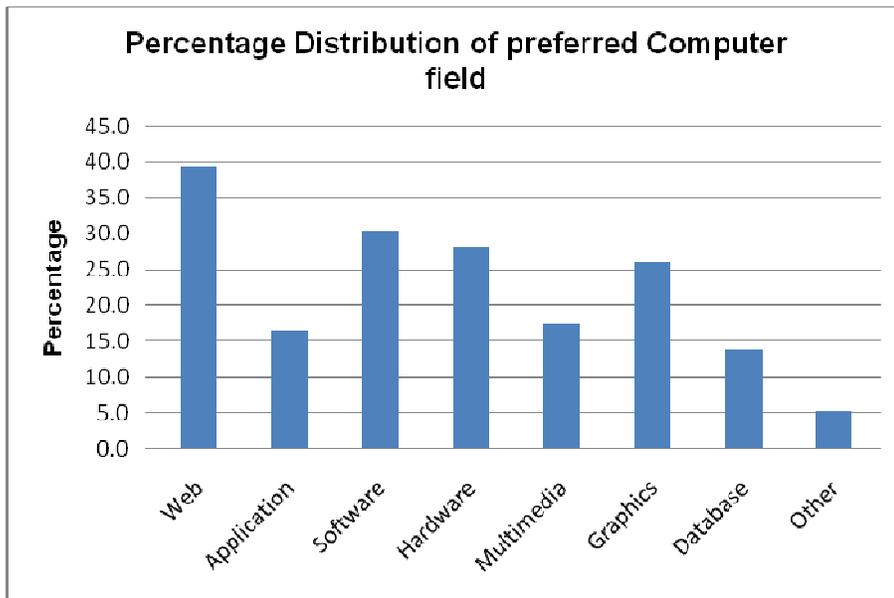
* Multiple responses have given

According to above graph, most of the ICT related workers were preferred to learn web development, software and hardware fields in future.

Graph 13: Percentage Distribution of number of working hours in a day

Percentage Distribution of No. of working hours in a day

- 12% less than 8
- 75% 8 to 10
- 10% 10 to 12
- 3% above 12

Legend:
- less than 8
- 8 to 10
- 10 to 12
- above 12
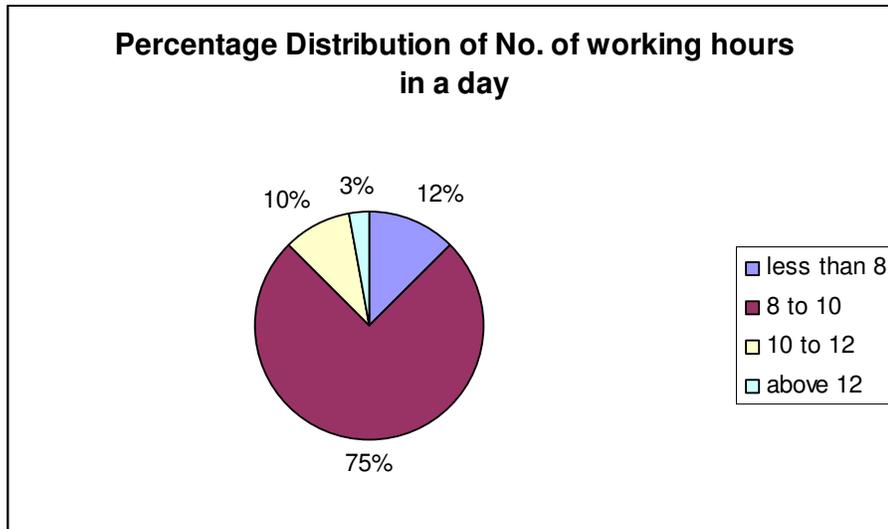
Table 7: Percentage Distribution of Job Satisfaction by Gender

Job Satisfaction	Gender		Total
	Male	Female	
Satisfy	83.5	89.4	85.6
Not Satisfy	16.5	10.6	14.4
Total	100.0	100.0	100.0

Graph 14: Percentage Distribution of Job Satisfaction

Percentage Distribution of Job Satisfaction

Male: Satisfy 83.5, Not Satisfy 16.5
Female: Satisfy 89.4, Not Satisfy 10.6

Legend:
- Not Satisfy
- Satisfy
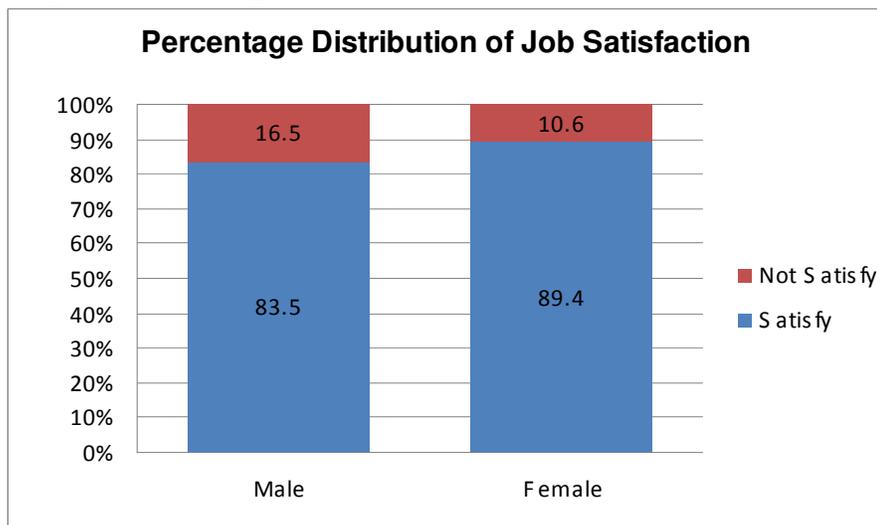
According to above table & graph, about 86 percent of ICT related workers are satisfy in their job.

Graph 15: Percentage Distribution of gained skills for the current Job
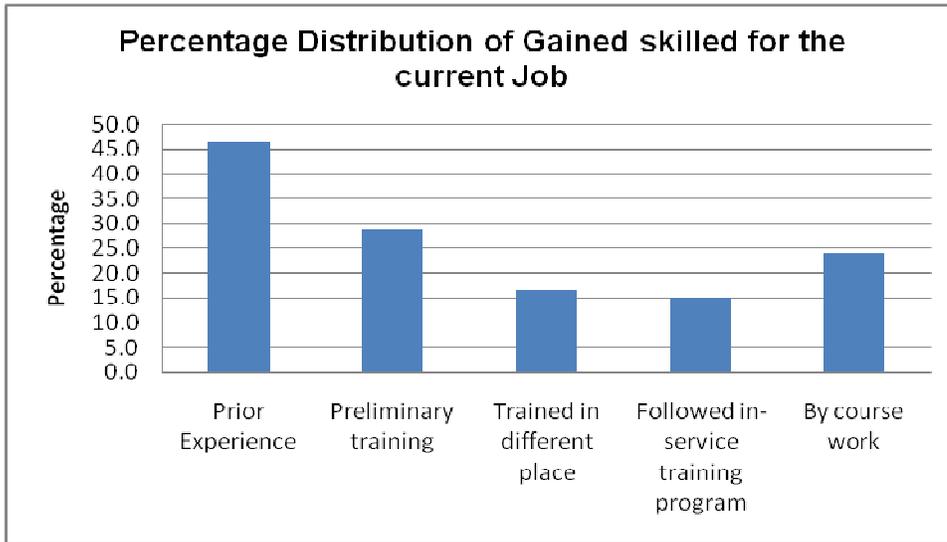
* Multiple responses have given

Table 8: Percentage Distribution of ICT related workers by Educational level and Income

Income level	Educational Level					Total
	Below GCE (O/L)	GCE (O/L)	GCE (A/L)	Degree & above	Other	
Low	0.0	42.9	25.0	9.1	16.7	20.5
Medium	100.0	57.1	45.7	27.3	50.0	41.1
Average	0.0	0.0	**19.0**	**23.6**	33.3	20.0
High	0.0	0.0	6.9	**18.2**		9.7
Very High	0.0	0.0	3.4	**21.8**		8.6
Total	100.0	100.0	100.0	100.0	100.0	100.0
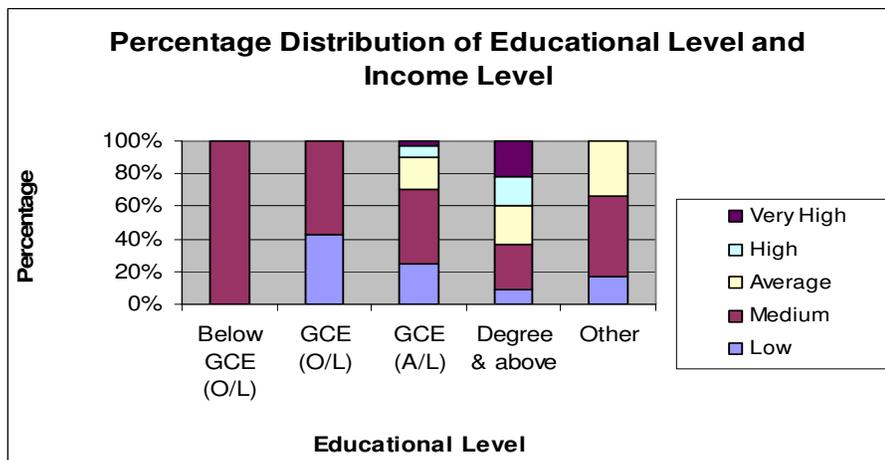
Graph 16: Percentage Distribution of Monthly Salary and Educational Level

According to above table & graph, about 64 percent of ICT related workers who have degree & above level of educational qualification have earned (monthly) more than Rs.20,000 and 40 percent of them have earned more than Rs.30,000.

Considering lower educational level, monthly salary has not more than Rs.20,000. Therefore, monthly salary has increased when educational level is high.

Relationship between Educational level and Income level

Therefore, further analysis (Non-Parametric test) was carried out to test whether there is a significant relationship between educational level; and income.

Statistically analyzing whether there is a relationship between Educational level and Income level

Hypothesis Testing

H0: There is no relationship between Educational level and Income level

Table 9: Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	35.917(a)	16	**.003**
Likelihood Ratio	37.718	16	.002
Linear-by-Linear Association	18.650	1	.000
N of Valid Cases	185		

a 16 cells (64.0%) have expected count less than 5. The minimum expected count is .09.

Since Pearson Chi-Square P-value = 0.003< 0.05, reject H0

i.e. There is a significant relationship between education level and income level of ICT related workers.

Table 10: Percentage Distribution of ICT related workers by Computer Qualification level and Income

Income level	Computer Qualification level				Total
	Certificate	Diploma	Degree	Other	
Low	32.1	20.0	4.2	9.1	21.0
Medium	48.2	41.1	33.3	18.2	40.9
Average	12.5	**22.2**	**25.0**	27.3	19.9
High	7.1	8.9	**16.7**	9.1	9.4
Very High		7.8	**20.8**	36.4	8.8
Total	100.0	100.0	100.0	100.0	100.0

Percentage Distribution of Computer Qualification level and Income level

Graph 17: Percentage Distribution of Computer Qualification Level and Income Level

According to above table & graph, about 63 percent of ICT related workers who have degree level of computer qualification have earned (monthly) more than Rs.20,000. 38 percent of them have earned more than Rs.30,000.

Therefore, monthly salary has increased when computer qualification is high.

Relationship between Computer qualification and Income Level

Therefore, further analysis (Non-Parametric test) was carried out to test whether there is a significant relationship between Computer qualification and Income Level which is presented in the next section.

Statistically analyzing whether there is a relationship between computer qualification level and Income level

Hypothesis Testing

H0: There is no relationship between computer qualification and Income

Table 11: Chi-Square Tests

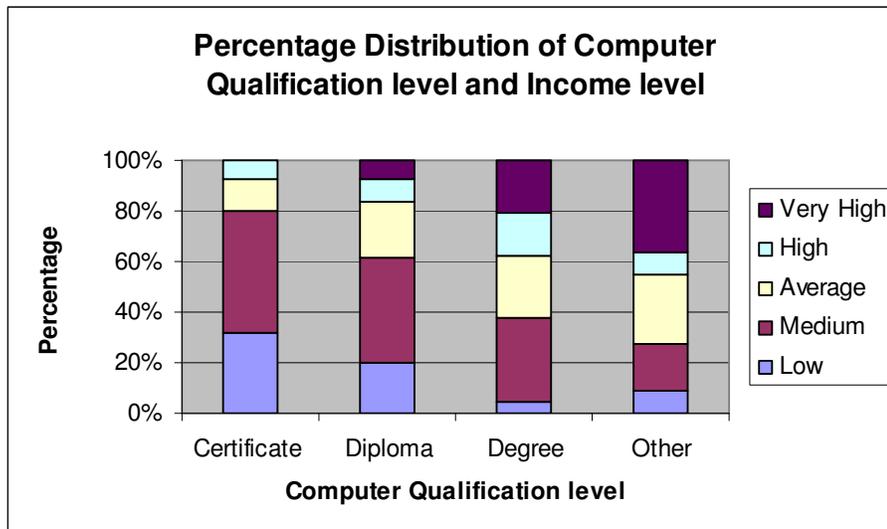|	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	32.273(a)	12	**.001**
Likelihood Ratio	33.604	12	.001
Linear-by-Linear Association	26.443	1	.000
N of Valid Cases	181		

a 9 cells (45.0%) have expected count less than 5. The minimum expected count is .97.

Since Pearson Chi-Square P-value = 0.001< 0.05, reject H0

i.e. There is a significant relationship between computer qualification level and income level of ICT related workers.

Graph 18: Percentage Distribution of Computer related qualification by entity Type

Percentage Distribution of Entity Type

14%

86%

- Local entity
- Foreign entity
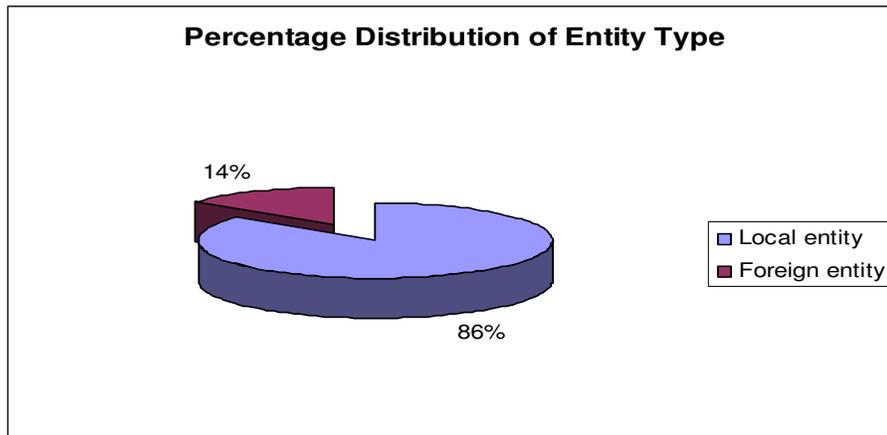
As shown in above graph, 86 percent of ICT related workers have obtained their computer qualification by local entity while 14 percent were obtained by foreign entity.

Table 12: Percentage Distribution of Income and obtained computer related qualification (local and foreign)

Income level	Entity		Total
	Local	Foreign	
Low	24.3	3.8	21.3
Medium	42.1	26.9	39.9
Average	19.7	**23.1**	20.2
High	7.2	**23.1**	9.6
Very High	6.6	**23.1**	9.0
Total	100.0	100.0	100.0

Percentage Distribution of Income level and Foreign or Local Computer Qualification

A bar chart titled "Percentage Distribution of Income level and Foreign or Local Computer Qualification" showing Percentage (y-axis, 0.0 to 50.0) versus Income level (x-axis) with Local and Foreign series.

Income level	Local	Foreign
Low	24.3	3.8
Medium	42.1	26.9
Average	19.7	23.1
High	7.2	23.1
Very High	6.6	23.1

Graph 19: Percentage Distribution of Income Level and Local and Foreign Qualification

According to above table & graph, about 70 percent of ICT related workers who have obtained computer qualification by foreign entity have earned (monthly) more than Rs.20,000.
Therefore, monthly salary has increased when computer qualification obtained by foreign entity.

Relationship between Income and obtained computer related qualification (local or foreign)

Therefore, further analysis (Non-Parametric test) was carried out to test whether there is a significant relationship between Income and obtained computer related qualification (local or foreign) which is presented in the next section.

Statistically analyzing whether there is a relationship between Income and obtained computer related qualification (local or foreign)

Hypothesis Testing

H0: There is no relationship between Income and obtained computer related qualification (local or foreign)

Table 13: Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	18.330(a)	4	**.001**
Likelihood Ratio	17.380	4	.002
Linear-by-Linear Association	17.331	1	.000
N of Valid Cases	178		

a 2 cells (20.0%) have expected count less than 5. The minimum expected count is 2.34.

Since Pearson Chi-Square P-value = 0.001< 0.05, reject H0

i.e. There is a significant relationship between Income and computer related qualification obtained by locally or foreign.

Therefore, according to above results we have to promote students with higher educational level and we have to provide higher level of computer related courses with upgrading standard of those courses as foreign courses. Then they can be occupied at executive or professional level jobs with high income level.

Chapter 08

Highlights of the Study

In this study, organizations that work on ICT projects are very few compared to the total ICT workforce, which distributed mostly among the non ICT organizations in Sri Lanka. Hence the sample was selected to cover the majority of the organizations in Colombo, Galle and Kandy districts in total of 250 samples representing 1450 organizations.

- According to the sample 64% were male and the 36% females. And the top most contributor to this labour market is GCE(A/L) holders which comes to 63% and 30% in the Degree and above category and the other categories are minimal such as 3%. Also there is significance participation of females in GCE(A/L) category which comes to 72% out of the total.

- When considering professional qualifications of the ICT labour market, Diploma holders contribute to 50% of the total and equal percentages from male and female. When employment sector is considered, the Private sector contribution is the highest as 47% with male contribution of 57% in the private sector ICT labour force.

- When the distribution of designations are concerned, most executives are males and the females represent major portion in supporting services in ICT related labour force in Sri Lanka. In this survey 68% of the total ICT workforce is in permanent job status and 24% in temporary or casual and daily paid and on demand labour force is very minimal. And the salary mostly distributed in Rs. 10,000 to 20,000 ranges in Sri Lankan ICT labour force which represents 41% of the total ICT labour force salary ranges.

- In the study there has been an effort taken to identify areas for training requirement and the demanding specialized areas in the ICT sector. When inquired about the how skills gained and most of them answered in "Prior Experience" and very less number mentioned "In-service Training" which is lacking in Sri Lanka in most organizations.

Therefore, according to the survey results recommendations are given for researchers, planners and decision makes and for future studies.

Chapter 09

Limitations

Limitations have been experienced due to various internal and external factors during the research study. Some of the identified limitations are as follows.

1. Limited to 3 districts, due to logistics issues. Only Colombo Kandy and Galle districts were taken in to study and this was a limitation factor for the study.
2. Sample size was limited to 250 and received questionnaires were 201 and this was a limitation factor for the study.
3. The survey was limited to ICT related occupations and other areas were not considered for the survey.

Chapter 10

Recommendations

When considering ICT labour market, it is heavily depends on the technology and the technological trends which is changing rapidly due to fast technology innovations and the quick dissemination of such information within the globe. Also this market is volatile in nationally and internationally due to high import and export volumes in the ICT field. So the studying the patterns of ICT labour market and giving recommendations is a timely and important requirement in the context of policy making and planning in ICT related training provision TVET sector. So according to survey highlights following recommendations could be made.

- There are lower female rate with higher level educational qualifications in ICT sector labour force and therefore it is recommended to encourage acquiring higher educational qualifications for females. Also when considering Degree level qualifications in ICT labour force there are very low female rates.

- When compared with the government sector, private sector female labour percentage is lower. This has to be considered when making ICT labour related policies in the country.

- In ICT labour market, higher level designations are mostly occupied by the males (three times) than the females. Therefore females shall be encouraged to promote to higher designations and also these facts to be built in to future policies.

- When job status is considered, tendency for permanent employment is higher than other categories like temporary/casual, daily paid and on demand. Therefore to increase the ICT labour turnover it is recommended to promote daily paid, piece rate, on demand and casual ICT labour force and thereby increasing productivity of the ICT industry.

- It was observed that more than 20 percent required hardware, software, networking, database and graphics knowledge than other areas of ICT. Therefore it is recommended to specialize ICT training on those areas in TVET sector.

- It was found that the way the skills gained is "Prior Experience" in most persons and "In-service Training" is the least method to gain skills in most organizations. Therefore it is recommended to promote in-service training in organizations.

- Also it was confirmed that employees having higher education level and qualifications get more income according to the survey and therefore it is recommended ICT labour force to acquire higher educational and professional qualifications.

- According to survey results students with foreign based qualifications get more income than the local based qualifications. This may be due to recognition of such qualifications in international ICT labour market as well as local ICT labour market and marketing of such qualifications within the industry. Therefore it is recommended to conduct further research to find out factors influencing the recognition of such qualifications.

Chapter 11

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