ICT and Decent Work: An Assessment of the Labour Market Impacts of the Advent of Information and Communication Technology in Sri Lanka

Athula Lakshman Ranasinghe
Department of Economics
University of Colombo
Sri Lanka
2004

Author wishes to acknowledge the support from all staff members of the ILO office Colombo specially Channa Hewawickrama and Srimalie, Hiranthi of the vice-chancellor's of the University of Colombo and Thanida and Yumi at ILO-JILT Bangkok office. Comments received from referees were extremely useful. All remaining errors are my own. No one else is responsible for them.

ILO/JILPT University of Colombo
Sri Lanka

Contents

ICT and Decent Work: An Assessment of the Labour Market Impacts of the Advent of Information and Communication Technology in Sri Lanka

Don't tell me technology is neutral!
I'm not blind enough to buy that one!
NED LUDD[1] WAS RIGHT!
The machine is the enemy.
SMASH IT WITHOUT MERCY!!
And from the dust, a billion flowers bloom.
http://www.insurgentdesire.org.uk/nedlud.htm

1. Introduction

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.

The main objective of this study is to examine the impact of ICT development on the labour market conditions in Sri Lanka. The paper is organised into six sections including introduction. Technical details of the study, sample survey and other sources of information are described in section two. Rapidity and extensive nature of ICT development in Sri Lanka is elaborated in section three. Empirical findings regarding the ICT and decency of work in Sri Lanka is presented in section four. Impact of ICT development on terms and conditions of labour market are analysed in this section. Namely, we concentrate on the effect of ICT on earnings, length of working day/week, worker satisfaction and the effects of ICT on workers' family and social ties are described in this section. Section five presents our findings on impacts of ICT on composition of labour market equilibrium. Job destructions, creations and changes of

[1] At the beginning of 19th century, there was a worker upheaval against new technological developments in textile industry. Workers organised under the leadership of Ned Ludd destroyed the machines.

the scope of work (degree of substitutability between work) are presented here. Paper is concluded in section six.

2. Methodology and Data Collection

In order to understand the impacts of ICT on labour market we have to investigate 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 can obtain 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 use 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. However, the number and composition of destroyed jobs and those of newly created jobs do not tally. Therefore, new jobs cannot be replaced by the workers who were formerly employed in destroyed jobs. Therefore, job creation and destruction due to

ICT can have numerous implications on the fairness and social justice. In order to understand this we will study various compositions and job creation and destruction process and evaluate the present education and ICT policies to understand to what extent Sri Lanka is ready to adjust into the rapid expansion of ICT in Sri Lanka. We start with a practical definition of ICT.

2.1 Defining ICT

Information and Communication Technology covers a vast range of technological devices and various combinations of them. In several decades back in the history, postal, radio and telephone services were also considered within ICT. However, in a modern society, ICT means only specific type of communication technology. Namely, it covers all the range of computer based communication technologies.

2.2 Defining Decent Work

What do we mean by decent work? In 1999, ILO defined it as

> Decent work means productive work in which rights are protected, which generates an adequate income, with adequate social protection. It also means sufficient work, in the sense that all should have full access to income-earning opportunities. It marks the high road to economic and social development, a road in which employment, income and social protection can be achieved without compromising workers' rights and social standards. Tripartism and social dialogue are both objectives in their own right, guaranteeing participation and democratic process, and a means of achieving all the other strategic objectives of the ILO. The evolving global economy offers opportunities from which all can gain, but these have to be grounded in participatory social institutions if they are to confer legitimacy and sustainability on economic and social policies. [Somavia, ILO Director-General, 87th session of the International Labour Conference, 1999]

This definition in general believes that decency of work depends on working conditions, availability of work without any bias, reasonable income etc.

2.3 Sample Surveys

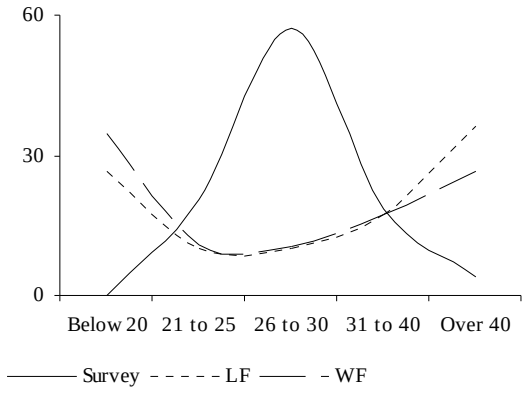
2.3.1 Employees Survey

Some selected characteristics of the respondents in our sample survey are presented in this section. For comparison we also present the similar characteristics of the entire labour force together with sample characteristics.

Table 1 summarises basic demographic characteristics of the respondents in our sample. Similar characteristics of the entire labour force and work force in Sri Lanka are also presented for comparison. Table 1 shows that the characteristics of sample respondents are highly different from the similar characteristics of the labour force and the work force.

Overwhelming majority of respondents is male (80 percent). In fact this is remarkably higher than the gender composition of the entire workforce in Sri Lanka (Over 60 percent).

Chart 1: Age Composition



Age composition of our sample is significantly different from that of the entire labour and workforce in Sri Lanka. Table 1 shows that over 50 percent of respondents in our sample are within 25 to 30 age group. In contrast, the age composition of labour and work forces in Sri Lanka show more than 50 percent of respondents are at two extremes. (Very young and very old). Chart 1 is the graphical presentation of age compositions. Continuous line represents the age composition of our sample and dotted line and line with breaks represent entire labour force and the workforce respectively.

Table 1 also shows that the majority of respondents in the sample are never married, highly educated and with some vocational training in addition to the formal education. These are again not in conformity with the similar compositions of the labour force and work force.

Indeed, this it self raises an issue for discussion. Respondents working in ICT related enterprises do not represent the entire labour or work forces. It is attributed with specific demographic characteristics and therefore most of the issues pertaining to ICT will not bear a direct implication on the entire labour market in Sri Lanka. However, it is noted that expansion of ICT sector will not benefit the entire labour market. Therefore, indirect effects of ICT development on the labour market in general are expected to be highly significant.

2.3.2 Students Survey

Level of digital divide in the labour market could be identified using the employees survey and related case studies. Whether the digital divide will remain in the long run should be assessed separately. One easy way to assess the future of the digital divide is to examine the human capital production process in IT sector. For this we need to undertake a survey among the IT trainees in major IT training institutes in Sri Lanka. Due to practical difficulties we were restricted only for three major IT training institutes offering higher qualifications in IT: two from public universities and one from private sector[2]. To safeguard the privacy of institutions we do not disclose the names of those institutes.

Purpose of this survey is to identify whether digital divide identified within the present labour market will be reinforced or weaken in the future generations.

In this regard, our major concern is gender division. As it is explored in forthcoming sections of this paper, gender division in IT sector is much higher than the other divisions. Therefore, to identify the reasons for the gender division we needed to

[2] Currently there is thousands of mushrooming IT training institutes around the country. Almost all of them are limited to offer training on Office packages and familiarisation of kids for computers (games and simple art works). Our analysis does not cover those institutes more than a observatory notes.

interview more female students get a reasonable opinion regarding their education and job prospects. For comparisons we also needed to interview some male students too. Therefore, we selected 15 female students and 10 male students from each institute.

Over 80 percent of responding students are Sinhala, living in Western province and belonged to fairly rich and educated families. Average family income of the sampled respondents is Rs. 25,000 and all the parents are with at least secondary education. Nearly 30 percent of parents are with degree of above. Nearly 30 percent of parents have computer literacy. Middle aged parents doing executive or above jobs. Table 2 shows basic socio-economic and demographic data of the students survey.

3. Evolution of ICT in Sri Lanka

3.1 A Brief History

This section is based on literature review and public data available from Telecommunication Regulatory Commission. Although there are no many writings on the issue, there are couple of papers with comprehensive coverage. Two of the classical works on this area are Samaranayake (1996) and Kularatne (1996). These two papers provide comprehensive assessment of the expansion of ICT sector up to 1996. Gunawardhane and Wattegama (2003), Shrestha and Amarasinghe (2001), Wijeya Pariganaka Journal (Draft: 2003) also explores different dimensions of the sector. For the current state of affairs in the ICT sector development, ICT, University of Colombo (Unpublished), and various documents prepared by the e-Sri Lanka initiatives are vitally useful. These literatures generally address the issue of telecommunication infrastructure, type of services mostly demanded, geographical distribution of ICT usage and potential services that the ICT sector can provide hand in hand with other stakeholders of economic development and poverty reduction in Sri Lanka.

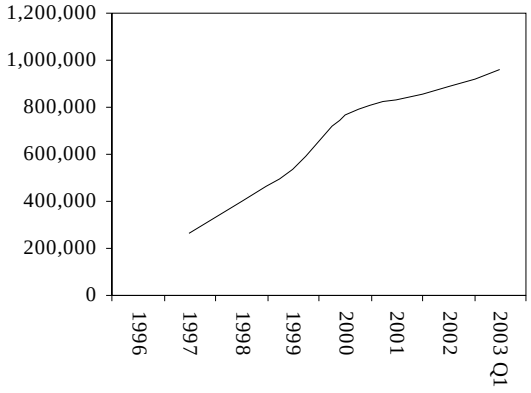
History of the evolution of ICT sector in Sri Lanka depends on how we define it. If the ICT is defined to include all different types of communication technologies including fixed phone, Sri Lanka has a relatively long history. With regard to telecommunication services Sri Lanka has a history of over hundred years [Gunawardhane and Wattegama (2003)].

According to Samaranayake (1996) and Kularatne (1996), the telecommunication services first become available in 1858. Until 1896, when the Department of Post and Telecommunication was established, the telecommunication service was under private sector.

In the modern context, ICT is defined as any communication device connected through computer technology. This definition includes ***e-mail, Internet, e- transactions, videoconferencing*** and many other types of telecommunication devices using information technology. First attempt of Sri Lanka in IT adaptation was took place in 1960' s. [Aryasinha (2002)]. In its very first phase, the IT adaptation took place at a very slow speed. For example, starting from 1960s to the end of 1970s, limited IT facility was available only in selected government institutes such as Department of Census and Statistics. The first ICT training programme was started in 1965 in the Mathematics Department of the University of Colombo.

This process was further accelerated since 1991 after forming Sri Lanka Telecom. In 1997, Japanese Telecom Company, Nippon Telegraph and Telephone Corp (NTT) bought 35 percent of the shares of Sri Lanka telecom and took over the management[3].

Chart 2: Growth of Telephone Connectivities

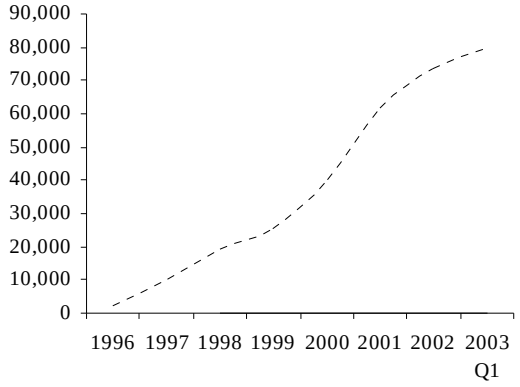


This marked a rapid expansion of the telephone services in Sri Lanka. For example, before 1998 total number of telephone lines that the Sri Lanka telecom (or its predecessor) had provided was 265,808. In 1999 alone Sri Lanka Telecom increased its customer base by 50 percent (135,233 new connections). Chart 2 represents the time trend of telephone lines since

[3] Privatisation of the Sri Lanka Telecom is considered as one of the most successful privatisation programme in Sri Lanka. More details about this process and a comprehensive analysis of the secrete of this success is available in Chandrathilake (2003).

1996. Internet and e-mail services were introduced in 1996. Chart 3 depicts its growth over time. Charts 2 and 3 show rapid increase of both telephone and internet connectivity over time at a decreasing rate.

Chart 3: Growth of Internet and email Connectivities



In fact, Sri Lanka Telecom is not the only telecommunication service provider in Sri Lanka. There are number of private companies providing fixed phones, mobile phones, Internet and email services. Data available at the Telecommunication Regulatory Commission shows that currently there are 27 ISPs (Internet Service Providers) registered. In addition to that there are many unregistered service providers. However, nearly 60 percent of market is controlled by a single ISP and four ISPs control more than 80 percent of the market.

Expansion of ICT requires number of conditions. Availability of telephone line is one. Availability of computers is the other requirement. Gunathilake and Wattegama (2002) citing from International Telecommunications Union (ITU) report that during their survey time in 2002, there were 150,000 computers in use. This is 0.79 per 100 populations in Sri Lanka. Gunathilake and Wattegama (2002) further report that according to Telecommunication Regulatory Commission of Sri Lanka (TRCSL) there were 61,532 Internet accounts in Sri Lanka in 2001. In 2002, it is estimated that the number of Internet accounts is over 100,000.

The government of Sri Lanka established an apex authority for IT development in Sri Lanka. This is the Council for Information Technology in Sri Lanka (CINTEC). This was formed in 1984 under the direct control of the presidents office and later it was directed by the Department of Higher Education and Information Technology. Later in 2003 the Information and Communication Technology Act No 27 was enacted. This

new act provided for the establishment of a new institute for ICT development with a wider scope. As a result of that the Information and Communication Technology Agency (ICTA) was established. This is the successor of the CINTEC. The mandate of the ICTA is to facilitate the implementation of National Policy on Information and Communication Technology and Action Plan of the Government. Under this it is mandatory for the ICTA to implementation of the e-Sri Lanka progeramme.

The vision of the e-Sri Lanka programme is to ensure the overall development of ICT by taking the dividends of ICT to very village and every citizen in Sri Lanka.

3.2 National Policy for ICT Development in Sri Lanka

Need of a national policy for ICT sector development has been raised in many forums since a many years ago. History of this process started in 1984 with the implementation of the CINTEC. This process is already described in previous sub-section.

Another landmark of the ICT policy development in Sri Lanka is in 1998. In this year, a National Policy for Telecommunication (NPT) was introduced. This led to initiate many important policy decisions. For example, establishment of Telecommunication Regulatory Authority in 1998, privatisation of the Sri Lanka Telecom, provision of legal authority for wireless and cellular phone services and registration of private Internet Service Providers (ISPs) are the major steps taken under the NPT in 1998.

However, the role of CINTEC was later criticised due to many reasons. For example, in 2001 the ADB report on SME sector development has emphasised many limitations of the CINTEC and recommended a comprehensive ICT policy.

In 2003, with the enactment of the Information and Communication Technology Act No. 27, most of the tasks assigned to the CINTEC were transferred to the ICTA. Currently the ICTA is the operation room of e-Sri Lanka initiative and has become the apex implementation body of ICT policy in Sri Lanka.

The ICTA conducted number of surveys and gathered experts' opinion regarding the ICT market in Sri Lanka. Their findings confirmed the facts reported in the previous

section of this paper. Namely, that Sri Lanka is far behind the rest of the world in IT penetration. It further identified that the concentration and utilisation of ICT facilities in rural sector is extremely low. For example, it is found that nearly 20 percent of rural female respondents and 10 percent of rural male respondents in the survey have never used a telephone. Only 2.2 percent of respondents from rural sector declared that they have some knowledge in computer and only 1.3 percent of respondents declared that they have used internet and (or) email [Survey on the Present Use of ICT Tools: Deep South Region (2004) Available in ICTA web site (www.icta.lk)].

ICTA surveys also identified reasons for low utilisation of internet/email facilities by rural communities. Among them absence of any need to use such facilities (irrelevancy of the services for them), high prices of the services, poor computer knowledge and language problems were important.

Based on that the ICTA has launched a seven-pillar strategy to meet the vision of e-Sri Lanka initiative. They are namely, ***reengineering government*** (e-government programme), ***Information Infrastructure*** (provision of technical and legal infrastructure for ICT development, VGK[4] and RTN[5] programmes), ICT Human Resource Development (promotion of teaching IT in schools and higher educational institutes and increase the management and professional skills in ICT industry), ICT investment and Private Sector Development, Technical Architecture Standards and Security, e-society and e-leadership & policymaking.

3.3 ICT in Labour Market Policies in Sri Lanka

The government of Sri Lanka has been experimenting with various recruitment criterion time to time to match the demand and the supply sides of the labour market. Human Resources Placement Service (HRPS) in 1996 is a one example from the recent

[4] VGK stands for Vishwa Gnana Kendra (Universal Knowledge Centres). VGK is a telle centre partly sponsored by the government. Under this project, the government of Sri Lanka provides all required facilities to start a telle centre in a selected rural location. The VGK operator is selected on a competitive basis base on their business plans. Successful applicants for the VGK operation will be given all the facilities for a period of four years. Currently the ICTA has selected VGK locations and waiting for applications. The first VGK is planned to start within the first quarter of year 2005.
[5] RTN stands for Regional Telecommunication Network.

history of the labour market in Sri Lanka[6]. The HRPS was under the Ministry of Labour. There were district HRPS centres attached to the district labour office. According to the Draft Employment Policy Report[7] of the Ministry of Employment and Labour in 2002, this system was operational in all districts except in some areas of North Eastern provinces. However, according to the same report this system was rather inefficient. From 1996 to 2002 there were 105,080 job seekers registered in HRPS. However, this system was capable of finding jobs for only 5,000 job seekers. Throughout the six years only 3.3 percent of job seekers were effectively placed in employment opportunities. The annual recruitment rate was 0.55 percent.

In year 2002, the new policy document proposed to set up an on line recruitment agency. As a result of this recommendation, the JobsNet and ServNet, two internet portals were created under the Lanka Service Network. All these are under the direct control and supervision by the Ministry of Employment and Labour. The main objective of this system is to network all information providers and information seekers through on line connection. Any job seekers or employer can register on line in this system. This system is in operation at the moment. According to the statistics available in the JobsNet up to now (November 2004) 87,055 job seekers have registered and 1,585 job seekers are placed in employment opportunities. This amounts to nearly one percent recruitment rate per year. As compared this with the prevailed system where the average annual recruitment rate was about 0.55 percent there is a slight improvement of the mechanism[8].

[6] Before that the Job Bank system and the Graduate Placement Service (for university graduates) are the major attempts in this regard.

[7] Draft National Employment Policy For Sri Lanka (May, 2002). This policy document was published and implemented in year 2002. However, after the political changes took place in year 2004 changed the ministerial portfolio and also the employment policy of the country. However, some of the major actions implemented during this period are still in effect.

[8] However, currently there are some private sector ICT providers doing recruitment services at regional level. For example, a model VGK centre in Mathara. According to the informant of this model VGK the job recruitment service is started in year 2004. During this period, there are 55 registered job seekers. Out of that 37 people were directed for interviews and 12 people found jobs. Although the volume of the operation is very low (only 55 registered candidates) the annual recruitment rate is much higher than that of the JobsNet. Further, the informant from this VGK reported that their service is not limited to any type of business or any type of employment opportunity. Among the 12 people recruited successfully there are several university graduates and also unskilled manual workers.

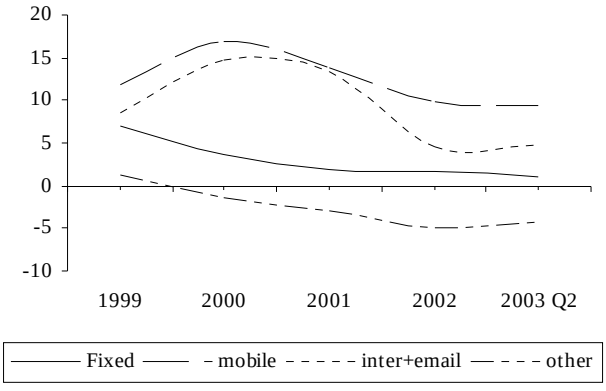
4. ICT and Decent Work

How does ICT can affect working conditions in the labour market of Sri Lanka? As we described in Introduction, this depends on number of factors. Rapidity of introducing ICT into production processes and extensiveness of ICT are two important conditions.

4.1 Rapidity and Extensiveness of ICT in Sri Lanka

As compared to many developed and developing countries, Sri Lanka is much behind the level of ICT utilisation. However, it shows a rapid expansion of it. For example, in 1996, there were only 2,504 ISP members in Sri Lanka. Population of the same year was 18.32 million. In 1996 there were 0.14 ISP members per 1,000 persons in Sri Lanka. In 2001, number of ISP members was increased to 61,532 and population was 18.72 million. Number of ISP members per 1,000 persons was increased to 3.29 in this year. This indicates more than 460 percent growth per annum. However, still the ICT utilisation is very low. Quarterly growth rates of all telecommunication devices are presented in Chart 4. Quarterly growth rate of fixed telephone lines are in a steady decline. Other telecommunication devices such as Pagers and Public Pay Phone Booths report negative growth after 1999. Mobile and internet-e-mail connectivity are increasing until the end of year 2000.

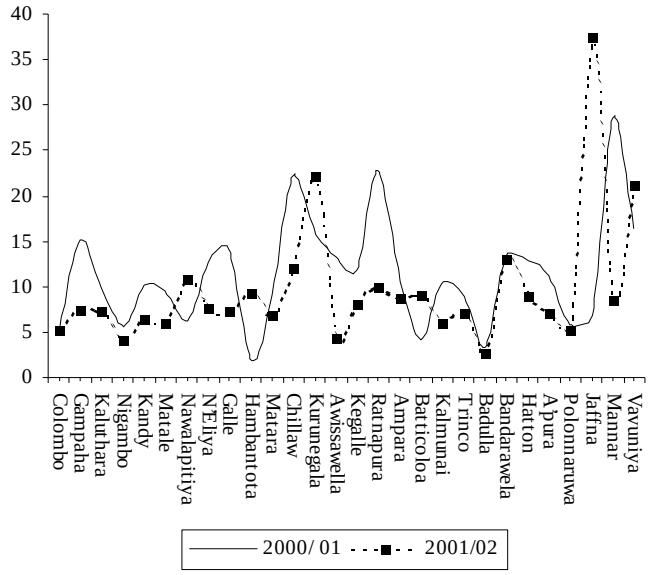
Chart 4: Quarterly Growth Rates of All Telecommunication Devices



One noteworthy feature of the expansion of ICT in Sri Lanka is that it still heavily concentrated in the Western province, especially within Colombo district. Almost all ISPs are situated in Colombo and without regional stations. Therefore, customers living outside Colombo have to pay higher calling rates (distance call rates) when they use Internet or e-mail.

Regarding the fixed telephone connections, data available from Telecommunication Regulatory Commission of Sri Lanka indicates that 50 percent of fixed telephones are still concentrated in Colombo. Although there is a small tendency towards changing the regional composition its impact on the regional concentration is still insignificant. Chart 5 presents the growth rates of fixed telephone connections by districts for 2000/2001 and 2001/2002 separately. It is observed that for most of the districts, growth rate has declined over time. Only few districts have reported high growth rates. It is notable that those districts with high concentration have low growth rates. For example, over 50 percent of fixed phones are concentrated in Colombo. Same percentage for Kurunegala, Ratnapura and Jaffna were 3.25 percent, 1.47 percent and 0.32 percent respectively. Annual growth rates for those districts (2000/01) were 5.43 percent (Colombo), 15.80 percent (Kurunegala), 22.90 percent (Ratnapura) and 6.76 percent (Jaffna). Table 3 reports geographical concentration and annual growth rates of fixed phones for 2000 to 2002 period. Highest annual growth rates are reported from North and North West provinces. Kurunegala, Jaffna and Vavuniya districts report annual growth rate over 20 percent.

Chart 5: Growth of Fixed Telephone lines by Districts



However, it is noted that the heavy concentration of telecommunication services within the Western province is still maintained. There is a very high probability that recent trends in the telecommunication market can deteriorate the geographical distribution. There is a recent trend that all major telecommunication service providers are trying to maximise the average profit (profit generated from a single connection). As a result of this strategy, they have introduced new packages, which requires minimum monthly

bill from the customer and the current practice of Sri Lanka Telecom to increase the rental and offer free 200 units will discourage rural customers.

In addition to the geographical location of ICT facilities, it is also interesting to have an idea about the industrial composition of ICT users. As the ISP members are registered only by the name of the industry, it is not an easy task to identify the industry-wise composition of ISP members. However, the industry-wise composition of the utilisation of ICT is reported in JICA Study for BOI 1999-2000. This table is again reproduced in the ICT_ University of Colombo Report[9]. According to this information, only two types of domestic customers have reached 50 percent of ICT utilisation. They are namely, public sector other than provincial and central government, and Bank and finance sector. These sectors have reported nearly 58 percent ICT utilisation. The same table reports that ICT utilisation of various educational institutes vary between 47 percent (universities) to 17 percent (high schools).

According to the JICA study, majority of businesses using ICT facility are service sector institutes located in urban areas. Agricultures sector has a lower ICT utilisation. According to JICA study, only 19 percent of agricultural activities are based on ICT.
Regarding the ICT utilisation the ICT, University of Colombo report has the following remark.

> Although IT is a major tool for achieving efficiency and competitiveness it is hardly in use in an effective way in Sri Lanka, particularly in the Public Sector. Its use is often limited to finance and office automation activities and rarely used for decision-making and for on-line transactions…[Vocational Education and Training Plan for the Information Technology Sector, Chap. 1, Page 9].

4.2 ICT and Labour Market

Based on the knowledge of the current state of affairs of the ICT sector in Sri Lanka, we can proceed to analyse the survey data that we collected from ICT sector employees and the survey of IT students. Remaining sub-sections of section four4 of this paper are based on the ICT employees' survey. In these sub-sections we discuss survey findings

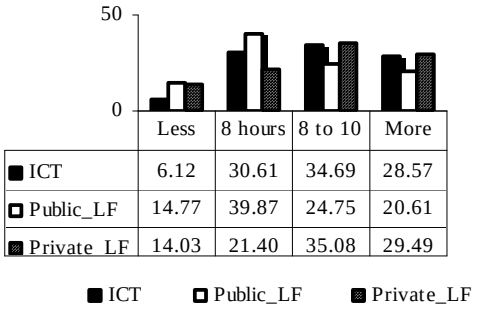
[9] However, it is not clear how does the JICA defines ICT users. Whether they count the number of enterprises with computers of whether it includes all ICT facilities is not clear.

on the impacts of ICT on the length of working day, ICT and working sites, ICT and earnings, ICT and worker satisfaction and ICT and Family and Social ties of workers.

4.2.1 ICT and Length of Working Day

In the interview, we asked the responding ICT employees to tell us number of days per week and hours per day that the respondents work in general. On average they work 5 days per week. Nearly 30 percent of respondents reported that they work more than 5 days per week. Further the majority of respondents who work less than 5 days informed that in addition to their office work they also have to engage in their duties at home or outside the office (field) in general. Therefore, the average working week is under estimated. We found that nearly 4 percent of respondents work all 7 days (including office, home and field work). Incidence of moonlighting (multiple job holdings) is significantly higher in this sector as compared to the national average. It is observed that little less than 20 percent workers interviewed hold more than one job (main job and off hours contract assignments) whereas the Quarterly Labour Force Surveys (1999) show that nearly 12 percent of workers in Sri Lanka are moonlighters.

Chart 6: Length of working Day



	Less	8 hours	8 to 10	More
ICT	6.12	30.61	34.69	28.57
Public_LF	14.77	39.87	24.75	20.61
Private_LF	14.03	21.40	35.08	29.49

Chart 6 compares the length of working day of the respondents of the ICT survey and that of the entire labour force. Information regarding the entire labour force was obtained from the Quarterly Labour Force Survey (QLFS) of the Department of Census and Statistics, Sri Lanka. As the majority of respondents of ICT survey were from private sector, we also report the breakdown of Public and Private sector situations with regard to the entire labour force. Black rectangles represent ICT-survey, white rectangles and the black rectangles with cross lines represent the public and private sector breakdown of the entire labour force respectively. Length of working day of ICT sector is very much similar to that of the

entire labour force. On average, respondents of the ICT survey works 9.33 hours per-day. In the public sector, this was 9.43 hours and the number of working hours of the private sector in Sri Lanka is 9.55 hours respectively[10].

4.2.2 ICT and Working Site

ITC 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, number 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 utilise 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.

[10] This finding goes in line with the Life without Work Hypothesis. This hypothesis asserts that the life of workers will be easier with technological development. They can enjoy more leisure hours and flexible working arrangements. For further details of this hypothesis see Section 5.1 of this report.

4.2.3 ICT and Earnings

Effect of ICT on earnings is analysed here. We estimated separate Mincerian earnings functions for the ICT employees in our sample and for the entire labour force using the quarterly labour force survey (quarter 4, 1999). Mathematical form of the Mincerian equation is given below[11].

$$\ln W_i = \alpha_o + \alpha_1 S_i + \alpha_2 X_i - \alpha_3 X_i^2 + \varepsilon_i \quad (1)$$

Where, lnW is natural logarithm of earnings, S is years of schooling, X is labour market experience and ε is random error term. There are many variations of this specification in the literature. We also add a dummy representing gender (Male=1) effect on earnings. Summary statistics of the variables used in regression analysis are presented in Table 4. Table 4 compares the summary measures of all variables used in regression analysis. ICT survey is more gender biased than the gender biasness of the QLF Survey. 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.

Wages were converted into natural logarithm values, as it is required by the methodology, before estimating the regression equation. Dependent variable of the regression equations is the natural logarithm of hourly wages, where hourly wages were calculated by dividing the monthly wage rate by number of hours worked in the reference month. Regression results are presented in Table 5.

In terms of Adjusted R-square, the ICT earnings function is better than its LF counterpart. However, efficiency-wise (number of observations) LF model is better. According to our estimates the marginal rate of return to schooling is high in the ICT

[11] Derivation of this equation is available in many Labour Economics Textbooks. See *inter-alia*, Polachek and Seibert (2002).

survey. One more year in school increases log wages by 0.24 times if you are in ICT related job whereas the increase of the log wages for a similar change of schooling is only 0.10 in general. As all the respondents in the ICT survey are with some training in ICT, this can be interpreted as a productivity increase due to ICT training.

Gender difference is widened in the ICT sector. According to regression results the average log wage difference between man and woman in ICT sector is 0.36 per hour. A typical man engaged in ICT sector earns 0.36 times higher log wage rate as compared to their woman counterpart (Rs. 1.43 per hour). However in general, the wage gap between male and female is not that much. Earnings equation based on LF survey indicates that the log wage gap between genders is only 0.07. Roughly, this indicates that the advent of ICT related jobs has increased the gender gap by 5 times.

Chart 7: Predicted Age-earnings Profiles

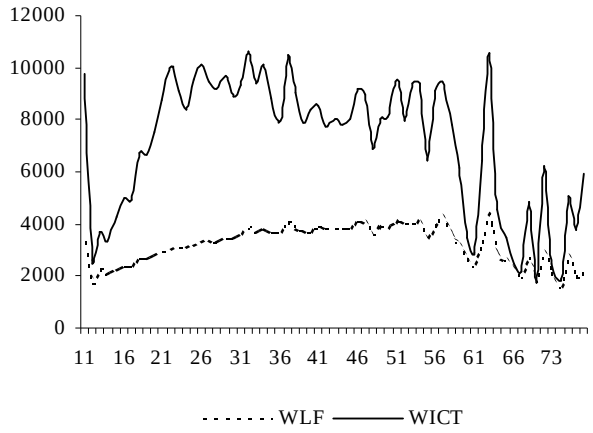


Chart 7 plots the predicted age-earnings-profiles for ICT sector and for the general population. Chart 7 represent ***age-earnings profiles*** of ICT sample and that of the Labour Force survey. WLF stands for Wages of the Labour Force and WICT denotes wages of ICT sector. Chart 7 shows that both age-earnings profiles coincide in lower and upper ends of the profiles. In all other ages, ICT sector wage is higher than that of the LF survey. It is observed that the similar age-earnings profiles are visible for both genders. However, the age-earnings profiles of women are highly volatile. There are lot of swings of the age-earnings profiles of women as compared to that of male counterparts.

In general, predicted Age-earnings profiles for ICT sector shows high volatility as compared to that of the labour force in general. This volatility is clearly visible for women.

4.2.4 ICT and Worker Satisfaction

Over 90 percent of respondents claim that they are happy about the working conditions. Majority of respondents told us that the ICT has lowered the rapidity of deterioration if it has not improved their working conditions. Most of the respondents are working in an environment where they have to deal with parent multinational corporations situated outside Sri Lanka. As they have to work according to the timetables of the parent company, most of the cases they work around the clock. Therefore, in the absence of ICT, their working conditions would be much worse than what they have otherwise. Development of ICT has made their complicated life much easier. Further, the information, entertainment and educational contents available via modern telecommunication technology have also attracted the respondents.

Four percent of respondents claimed that they are not happy. Majority of them are critical about the general labour market conditions rather than the difficulties associated in their job. Lack of professional recognition and absence of proper ladder for promotions were also provided as reasons for their dissatisfaction.

4.2.5 ICT and Family and Social Ties

Respondents of the ICT survey were asked to give a rough idea about their engagements in different activities in a typical weekday and a weekend. All their responses were classified into six broad categories: on duty, work at home (office work), on travel, leisure and other activities. Responses to those questions are summarised in Table 7 and 8 below. Table 7 summarise a typical weekday of respondents and Table 8 represents a weekends or holidays.

In a typical weekday, they spend nearly 8 hours on duty. Including their engagement of office work at home, approximately they work nearly 9 hours a day. Most of the respondents claimed that they engage in secondary employment activities. In many cases, they do self-employment projects in ICT sector. Table 8 shows that they are busy in weekends on their private businesses. Including that a typical ICT sector employee works 4 hours a day in weekends.

Unfortunately there are no comparable statistics for the general population. Therefore, it is not possible to interpret these findings in terms of effects of ICT on family and social life of workers. However, it is our opinion that the lifestyle represented by Table 7 and 8 do not indicate any deterioration.

Respondents were asked to rank what would they usually do in public holidays. Only first three ranks were summarised and presented in Table 9. Nearly 60 percent of respondents ranked that they wish to stay with their families at the first priority. Going out and Travelling, Shopping etc. was the second priority for majority of respondents. Note that for over 28 percent of respondents office work or self-employment is the third priority.

Table 10 explores another dimension of their life. Majority of respondents claimed that they are either not members of any form of organisations in the work place or there is no such organisation.

Little less than 40 percent of respondents engage office work at home and for 20 percent of respondents duty is not limited to office. They engage in their duties either at home or in the field. Nearly 20 percent respondents hold more than one job. Majority of the multiple jobholders are engaged in IT related self-employment in addition to their main job. The incidence of multiple job holdings is not a new phenomenon for the labour market of Sri Lanka. However, 20 percent multiple job holdings is higher than the national average.

5. ICT and Labour Market

Effects of ICT on decency of working conditions were discussed in Section 4 above. In addition to them, ICT can also have a direct impact on the size and composition labour market. Namely, adoption of ICT can destroy certain types of occupations and it also creates new occupations.

In order to understand the impact of ICT on job destruction and creation we conducted five case studies. Detailed reports of each case are reported in the Appendix A. For case studies we choose five enterprises from private sector. Four of them have introduced

ICT at least for some departments and the fifth one is a self-employed software producer.

5.1 Creation and Destruction of Jobs

Creation and Destruction of jobs through technological progress is widely discussed in Economic literature. While there is some extreme views that the new technological devices are invented to reduce and control the workforce, in many circumstances, economists seem more positive on the issue. All the major theoretical issues raised by economists regarding the technological changes and labour market is now compiled into two broader hypotheses as *Compensation Hypothesis* and *Life without Work Hypothesis*[12].

While accepting the job destruction hypothesis, compensation theory puts forward six conditions, which presumably create new jobs and hence counterbalancing the job destruction process. The six conditions are, *compensation through new machines, through decreases in prices, through new investments, through decrease in wages, through increase in income and compensation through new products*. This theory described that the job destruction due to technological changes will be offset through the creation of new jobs through the six mechanisms listed above.

Applying this to the ICT sector, one may argue that the job destruction in the ICT applying industries will be compensated by the new jobs created in the ICT sector. For example, advent of ICT may make the traditional printing machine operators redundant. However, it creates new jobs for computer based printing machine operators and computer managers and so on. Therefore, both the job destruction and job creation processes of the ICT sector development have to be taken into account.
For example, Marco Vivarelli (1996) quote from ILO

> "...The naive view of ICT as simply a process of automation and job destruction has its counterpart in the equally naive view of ICT as a purely positive source of new employment. Any sophisticated attempt to assess the employment effects must take into account both job destruction and job creation" (ILO, 1995, p.57).

12 An excellent overview of the Compensation Theory and Life without Work Hypothesis is available in Marco Vivarelli (1996).

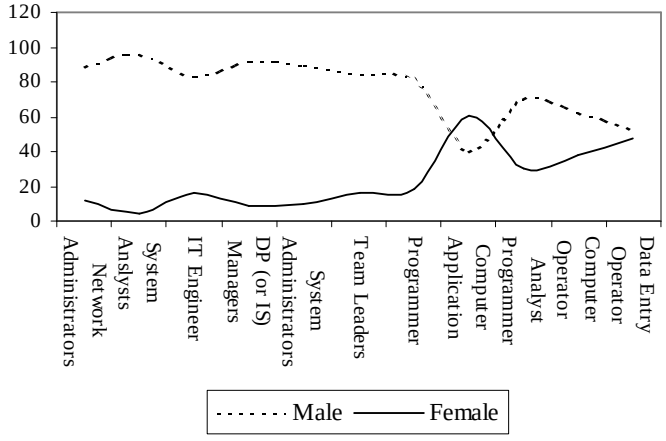
In general, everybody would agree with the compensation theory. However, there are several factors for further clarifications. First, it seems that, in deriving its six mechanisms, the compensation theory has assumed that the cost of adjustment is zero or negligible. There is no cost for an economy to adjust itself for the changes due to the new technology. However, in practice, the adjustment cost both in terms of money and in terms of time, is excessive. Second, the compensation theory has neglected the fact that it is not the job losers due to job destruction whom will be employed in the new jobs created as a result of technological change. There is a compositional difference. Job destruction takes place in one segment of the labour market and the creation takes place in a different segment. Therefore, job losers will not be perfect substitutes for newly created jobs. If there is gender or any class difference in the compositions of the employees in destructed jobs and newly created jobs, the technological development will have social and economic implications, regardless whether the number of jobs destroyed are fully offset by the number of newly created jobs. In an optimal set up where the compensation theory works perfectly, technological development may not affect the open unemployment rate, however, the composition of unemployed pool will be.

In the context of Sri Lanka, the ICT, University of Colombo report states that

> There is a resistance to the use of IT by some who fear that computerisation would lead to massive layoffs. However, in practice there has been no real loss of jobs as existing staff has been retained, increasing their skills and productivity while increasing their quality of life. …[Vocational Education and Training Plan for the Information Technology Sector, Chap. 1, Pages 9-10].

The same study further lists out all the major job opportunities created sue to the advent of ICT. This table is reproduced in this paper too (Table 11). Chart 8 represents the Table 11. Table 11 shows that majority of jobs

Chart 8: Employment Creation due to ICT



created due to ICT is semi-skilled type. Nearly 60 percent of jobs are for Computer Operators and Data Entry Operators. Chart 8 shows the gender domination of ICT related job opportunities. In general, 66 percent of jobs are for male employees. As the Chart 8 shows, the male domination is excessively higher in skilled and professional type jobs. For example, male female composition at IT engineer profession is 83 percent and 17 percent. It is 92 percent and 8 percent at IS manager level jobs. Female participation is satisfactory only for selected occupations. In many cases, their role is limited to a role of typist using a computer.

To understand the job creation and destruction process due to ICT we conducted several case studies. All the cases that we studied show that there is a significant impact of ICT on job creation and destruction. Most of the interviewees declared that no one has lost their jobs due to computerisation. All the redundant workers were assigned in different duties. However, one has to note that this is only a short run adjustment. Employers have to do that due to labour regulations and pressure from trade unions. In the long run they will adjust the labour demand such that no longer the workers for redundant jobs will be recruited. Therefore, the job destruction will be further aggravated in the long run.

In all the cases it is clearly observed that the job destruction and creation process affects the education and gender compositions of the workforce. In general the change is in favourable for educated male workers. New jobs were created for educated male at the expense of destroying jobs for women with middle level of education.

Another interesting feature that we observed in all the case studies is that the job destruction process is partly counterbalanced due to the expansion of the scale of operation. Especially in the printing and garment industries that we visited, computer based operations were implemented as a part of their expansion of production activities. For example, they doubled the production with the implementation of ICT based technologies. As a result they have also increased the demand for all the types of labour.

The Life without Work hypothesis states that the advent of new technologies increases labour productivity and hence longer working days will no longer be a requirement. As

a result it is anticipated that the length of working day will be reduced. Workers can enjoy more leisure hours and hence the level of welfare will increase. However, what we observed is somewhat contradiction with this theory. We observed that the length of working day and working week of the workers involved in ICT related jobs is nearly similar to the working day and working week of the rest of the workforce in the country. (See section 4.2.1). However, taking into account the facts that employees in the ICT sector work beyond the office hours and some people even have home based assignments and nearly 20 percent of ICT employees are moonlighters, it is our impression that the length of working day and working week have increased with ICT. However, the flexibility of work arrangements and workers' attitudes regarding their working conditions suggest that the advent of ICT has definitely not deteriorated working conditions of employees. They feel that in the absence of ICT devices they would have been worse off due to the workload they have.

5.2 Implications on Efficiency

Application of ICT always improves the efficiency of production process. It saves time, reduces transaction cost, improves the quality and neatness of final products, minimises 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 computerised 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 e-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. Therefore, all the interviewees that we met in our case studies agreed that they must be much behind their current level of performance if they had no access to ICT.

5.3 Implications on distribution and Social Justice: *Digital Divide*

Efficiency and social justice are always in contradiction in economic literature. In fact, this study is also not an exception. As we described above ICT has improved the efficiency. However, its implications on distribution, welfare and social justice are quite different and can identify some drawbacks on that ground. Current state of art of the ICT sector in Sri Lanka bears number of implications on the gender, economic, education and geographical composition of Sri Lanka.

Assuming that worker satisfaction is a good indication of welfare impact of ICT, we can interpret one of the major findings in the survey that majority of respondents declared that they are happy about their working conditions because they have an understanding that in the absence of the technology, they have to perform the same task with much effort. Therefore, according to the majority of respondents' view at lest ICT has prevented the deterioration of working conditions, if it has not improved their conditions.

5.3.1 Digital Divide

How does the advent and rapid expansion of ICT affect the social divisions? Whether it reinforces the already existing divisions or does it reduce the disparity? These are the major issues discussed under massive literature on digital divide. Even in the modern society, certain elements are less privileged. They are marginalized in modern production processes and they get smaller share from the national production and other benefits to the society in general. Generally, it is worldwide recognised that women, less educated people, poor and those who live in rural sectors are the victims of this unequal division of the society. Considering the ethnic and religious related issues, some people add ethnic and religious minorities also to this list.

In the context of ICT expansion, the issue is what happen to those segments of the society.

The answer to this question depends on whether all these segments in a society have equal access to ICT. In fact, the accessibility again depends on several factors: ICT

penetration (Technical and Economic conditions), Language and Content development. For example, unavailability of technical infrastructure for use of ICT can exclude rural population from it. Even in the presence of technical capabilities, if it is too expensive again poor cannot afford it and therefore they will be excluded. Regardless the technical and cost implications if the language being used in the ICT sector is not familiar for the people or if the content available in the ICT is not useful for them, some people will be excluded from its benefits. Therefore, in order to have a proper understanding of the digital divide one has to study those preconditions.

5.3.1.1 Preconditions for ICT Development in Sri Lanka

There are two preconditions: availability of the ICT facility (accessibility) and effective utilisation of the facility. Accessibility to the facility again depends on two conditions: technical infrastructure and price. Expansion of the ICT facility is fully elaborated in Section 3 of this paper. Our finding is that the infrastructure facilities are not equally available for all the geographical locations of the country. Still now the major operations of almost all the telecommunication facility providers is concentrated within Western province.

Even if the service is technically provided, its costs preclude most of the poor people using it. Recent survey on demand for and supply of e-services in selected rural districts in Sri Lanka shows that a high charge for e-services is one of the major obstacles for its expansion. This is further worsened in remote locations because the cost will be further high due to distance calling rates [Ranasinghe (2004: Draft)].

Absence of an information culture, lack of knowledge of IT, language problems and unavailability of relevant content in IT, on other hand further precludes effective utilisation of the ICT facility in rural Sri Lanka.

Very recently, the government of Sri Lanka initiated a massive programme to expand ICT facilities and utilisation especially in remote rural areas. [See for details, http://www.esrilanka.lk/]. This project is based on several baseline studies on the availability and utilisation of ICT in those areas. Those baseline studies provide comprehensive understanding of the present state of the preconditions of ICT

development in Sri Lanka. Following table is an extraction from one of the draft reports prepared for e-Sri Lanka initiative.

Table 12 highlights both demand and supply side constraints for the expansion of ICT in rural Sri Lanka. Same study was conducted in North and Eastern provinces [Ganeshamoorthy (2004: Draft)] and the results were quite similar to the above table.

5.3.1.2 Gender Biasness

It is evident that female participation in ICT related enterprises are very low. Table 1 shows that 80 percent of respondents in ICT sector employees' sample are male. As compared to the percentage of male workers in the entire workforce (around 70 percent)[Quarterly Labour Force Surveys: Department of Census and Statistics, Sri Lanka] this shows that the female participation in ICT related enterprises is significantly low. In fact this is a very common feature that most of ICT related studies have identified. For example, Shrestha and Amarasinghe (2001) found that in a countrywide survey 71 percent of ISP members were male. According to Wijeya Pariganaka survey (2003) over 78 percent of Internet users were male. Although these are different perspectives from our observation, all these in general give us an impression that ICT is more popular among male and due to whatever reasons more male workers are attracted.

One may interpret that this male-biasness is only a short run situation. In the long run as more female students are trained in IT related fields, gender disparity will be neutralised. However, assessment of IT training system in Sri Lanka does not give us any impression favouring this hypothesis. It is identified that the female participation in IT related higher education programmes is still very low. This indicates that the male biasness in the IT related professions will be continued at least one more generation.

Published data available from the University Grants Commission (UGC: 2002) shows that female participation in the entire university system is nearly 55 percent. This varies between 79 percent in Education stream to 16 percent in Engineering field. Female participation in IT stream is only 27 percent. This is just next to the lowest participation

rate of 16 percent in Engineering stream. This shows that in general IT stream has not become a popular study stream for female students yet[13].

Regarding the relatively low participation of girls in IT higher education we gathered information from two sources. We interviewed students and also conducted several discussions with officers in charge of admission of those institutes. All they shared the same opinion regarding the low participation rates.

According to informants, there are various reasons for this. Differences in mathematical ability/willingness, requirement of fieldwork, characteristics of jobs mostly available for IT trainees (private sector, hardware related work and specially possibility of after office hour work etc.) are the main reasons identified as major obstacles for the observed difference.

To explore further on the gender biasness in the higher education, in ICT, we conducted a small sample survey among young undergraduate and diploma students in IT field in three different locations. We selected the two biggest IT departments of public universities and one private sector IT training institute which offers various IT programmes varying from certificate courses to first degree. Since the purpose of this survey is to identify the gender biasness and reasons for that we selected more female students from each institute. Namely we selected 25 female students and 15 male students from each institute. Selection of respondents was purely random. This was a very informal survey. We asked several questions concerning the low participation by girls in IT related study programmes. Some of the basic socio-economic and demographic characteristics of the respondents are reported in Table 2.

To initiate the discussion we asked all participants to tell us about the female participation of the programme that they follow. The purpose of this question was just to give the respondent a feeling about the gender imbalance in their own group. Their responses vary between 10 percent at the lowest end and 40 percent at the highest end. On average, only 25 percent of girls are in there.

[13] One major private sector IT training institute that we visited showed the same situation. According to that in year 2000, there were 58 percent male students and this percentage was further increased to 67 percent in year 2003.

Having convinced that the gender equity is not in their study streams, we asked several questions regarding the possible reasons for this. Most of the questions are opinion type. We wanted to know their opinion about the observed difference. Whether it is due to a selection bias, due to the course structures, which is not convenient for female students or whether it is due to the labour market opportunities or discrimination of the trainees in this field.

Responses to those questions are summarised in Table 13. Nearly 16 percent of respondents believe that there are no equal opportunities for girls in IT education. This percentage varies from 10 percent for male and 20 percent for female respondents. Majority of respondents believing the absence of equal opportunities claimed that the Mathematics combination at GCE AL exam is the entry qualification for IT degrees. This is not a popular option for girls. Therefore, girls do not have equal access to higher educational opportunities in IT[14].

Following this question, we asked the respondents for their opinion on the relative success of male and female students in IT. Out of 75 respondents in the sample, 57 percent reported that male students are more successful than female students. Gender breakdown of the responses to this question shows slight difference yet favouring the idea that male students are more successful in IT education than their female counterparts. Half of female sample and 63 percent of male sample share the opinion that male students are more successful as compared to their female counterparts. We also asked for the reasons for their opinion. As this was an open-ended question, respondents indicated various reasons. All the responses were classified in to four as Ability differences, Taste differences, Opportunity differences and Other. Ability and taste factors contribute nearly 90 percent of the reasons[15]. Opportunity differences in

[14] Only few students from the private sector institute where the entry qualification is not limited only for mathematics students believed the absence of equal opportunities.

[15] One of the popular responses was that girls do not like (or are not equally competent of) mathematical subjects and therefore they show less success in IT field. We are not in apposition to comment on the mathematical competency of girls. However, it is found that in some IT institutes, students are selected from Mathematics stream of GCE AL. It is observed that the Mathematics stream is not popular among female candidates of the GCE AL examination.

this question means the labour market opportunities, specially the time flexibility for male students.

Questions 4 and 5 should be interpreted simultaneously. Question 4 is about the respondents' anticipation of the future labour market prospects in general. As IT students how do they see their future prospects in general? Eighty percent of students (with 90 percent of males and 73 percent of females) believe that there will be no problem regarding their future. They believe that they can easily find a suitable job for their qualifications once they are graduated. Gender breakdown of the expectations of labour market prospects shows that female students are less confident about their future prospects as compared to the confidence of male students. Our next question addresses this issue directly. This is regarding the gender difference of the accessibility to IT related job opportunities. Out of the entire sample of 75 students, 39 percent believe that it is easier for male students to find a suitable job. There is no significant gender difference in this. They came up with number of reasons for this belief. For the majority it is the nature of jobs available for IT graduates. Most of the jobs available for IT qualified graduates are in local private sector or foreign jobs or self-employment opportunities in software development. In many cases, their service is not limited to fixed office hours. After office duties, home-based duties etc. are regular practices in this field. We also identified this in the employees' survey. It is the reality in this society that a woman may find more difficulties to engage in jobs like this while maintaining the family life specially after married. In this regard we had opportunities to discuss with several IT graduates and employers on the issue of employability of women workers in IT field. One IT graduates with honour class from a reputed university in the USA told us that there were no degrees locally available during the time she completed the degree. Therefore, there was a good demand for qualified IT engineers. However, she told us that she was not even invited for interviews when she submitted applications for IT engineer post in several leading IT related enterprises in Sri Lanka. Now she engages in a job different from IT sector.

Employers in general told us that they do not see any difference between male and female employees. Only what matters is the qualification. However, when we told them our experience with the above case, their response was that they give first priority to

male applicants because with the given legal structure and social customs, it is difficult for them to work with female workers.

When we asked respondents to tell us the major obstacles that they can see now regarding their future expectations, most of them came up with three reasons: heavy competition due to tiny market, communication skills and lack of industrial experience and affiliated skills such as hardware. There are several issues identified only by female respondents as major obstacles for their future prospects. They are namely, lack of industrial experience and lack of affiliated skills such as hardware knowledge. This again reflects the uneasy conditions in the labour market for female workers.

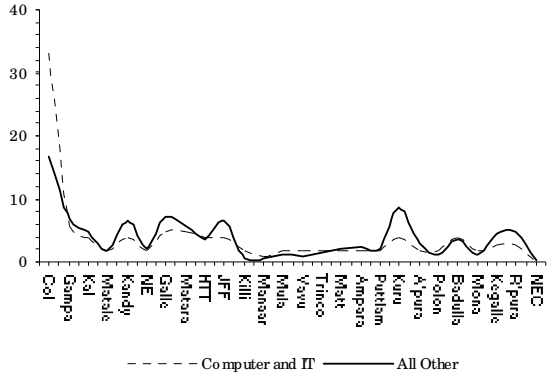
We finally asked only from girls whether they find any obstacle that they have to come across with because they are girls? Little over half of the respondents responded affirmatively.

All these indicate that the gender biasness in IT sector is due to various reasons starting from the recruitment policy for IT higher education to labour market conditions. Therefore, the observed gender disparity will not be resolved in a short time period. Without more interventions, policy changes and changes in attitudes it is hard to believe that the gender disparity will reduce drastically.

5.3.1.3 Urban Biasness

Urban biasness is another attribute that we observed in ICT technology. This is again identified in Wijeya Pariganaka Survey (2003). Wijeya Pariganaka survey is based on 5 rural districts: *Anuradhapura, Polonnaruwa, Puttalam, Matale and Hambantota.* North and Eastern provinces were excluded because the survey was conducted by a Sinhala IT magazine, which is not circulated in North and Eastern provinces where the majority speaks Tamil. They have not received any response from extreme rural districts like Monaragala. Possibly this may be due to the fact that there are no one in this district reading IT journals and using ICT. This was a survey among Internet users. Among the Internet users surveyed, it is reported that nearly 20 percent to 30 percent of respondents have informed that they cannot use Internet efficiently because of their deficiencies in English, Computer and Internet.

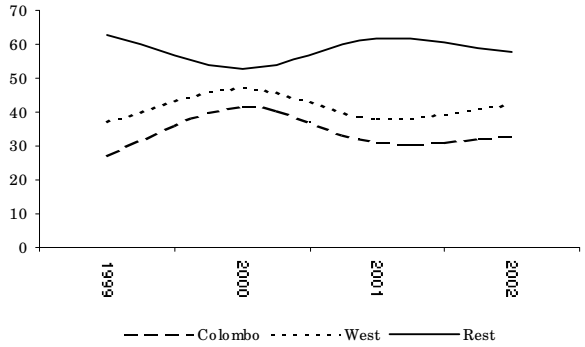
Chart 9: District wise Distribution of University Intakes 2001/2002



Will the existing education system resolve this problem soon? Currently there is large number of IT training institutes all over the country. The quality of those training programmes cannot be assessed, as there is no formal investigation is done so far. However, most of these programmes are limited to teach Office and few other software. Higher training in IT technology is still available at universities. Recruitment for IT and computer related programmes are available in UGC yearbook. Chart 9 plots the percentages of students recruited for IT and computer related degree programmes (as a percentage to total recruitment from each district).

Thick-line represents percentage of university intakes for Computer and IT programme by district, for year 2002. Dotted line represents recruitment for all other programmes. Over 35 percent of total intakes for computer and IT education are recruited from Colombo alone. IT department at Moratuwa University initiated in this year.

Chart 10: Time Trend of the Geographoical Composition of University Intakes for IT Education: 1999 to 2002



Time trend of the geographical composition of university intakes for IT education is reported in Chart 10. The entire country is classified into three as Colombo, Western Province and the Rest of the country. Thick-line represents Colombo, dotted line represents Western Province and the broken-line represent the rest of the country.

Chart 10 clearly shows that Colombo dominates the entire country throughout the period. Colombo alone supplies over quarter of students for IT training. Western province including Colombo supplies nearly 40 percent. All other districts supply the remaining 60 percent. Chart 10 also shows that the Colombo and Western province biasness is gradually increasing. For example, in 1999, Colombo supplied nearly 27 percent for IT faculties and Western Province supplied 37 percent. In 2002 these percentages was increased to 33 percent and 42 percent respectively.

Baseline information of the IT Students Survey reported in Table 2 reinforces this finding. Out of the 75 IT undergraduates selected for the survey, 36 percent is from Colombo and 50 percent has come from the Western province.

Geographical biasness of human capital production is only one hurdle that may increase the regional imbalance due to the expansion of ICT. Literature available on the ICT sector in Sri Lanka explores several other constraints that we have to circumvent in order to reduce the geographical unbalance. Lack of infrastructure facilities, IT and related knowledge, English literacy and high cost are identified as major barricades for ICT development in rural sector.

Imbalances in the industrial development among different regions will also have implications on decency of work and ICT development. As it is observed almost all major industrial establishments are currently located in Colombo or in Western province. Majority of industrial establishments located in countryside are generally defined as Small and Medium Scale Enterprises. Almost all of them are relatively backward in technological development. Based on a survey conducted by Asian Development Bank on three districts in Sri Lanka it is observed that out of 300 SMEs surveyed there were 72 percent of firms have a telephone line, 20 percent have fax facilities and only 9 percent have email-internet connections. Further, it is also observed that out of the total SMEs with telephone line, fax or email 43 percent, 84 percent and 85 percent of firms are located in Colombo district. Out of the total SMEs surveyed only 36 percent is located in Colombo. It is also very unlikely to expect that many rural industries will develop to use ICT in their businesses very soon.

Therefore, rapid expansion of ICT can destroy the rural industrial base with some devastating effects on rural employment and poverty.

5.3.1.4 ICT and Social Mobility

Education is considered, especially in less developed countries where feudalistic elements of social segmentation are still prevailed, as a ladder for the upward mobility in the social status. In this section we explore the impact of the fast advent of ICT and related education on the social mobility. Data for this section is available from the socio-demographic information of the students survey. Table 2 provides baseline information of the socio-economic background of the respondents in the IT students survey.

Table 14 reproduces the same information together with the national level comparable figures wherever available. Table 14 reports comparison of the socio-economic characteristics of the respondents in the IT students survey and national figures wherever available. Percentage of IT literate family members and parents are quite high in the students survey. Over 25 percent of family members other than the respondent are IT literate. Unfortunately we do not have national level comparable figures[16]. Average level of education of the IT students' families is reported to be 13 years (GCE AL). The comparable figure for the entire country for year 1999 is approximately 8 years. Only 11 percent of people in the entire population have reached GCE AL.

The occupational composition of the employed family members of the responding IT students and the same composition of the entire country is also provided. It is observed that over 50 percent of employed family members of the responding IT students are belong to ISOC 1 or 2 (Legislators Senior Officers and Managers or Professionals). In the national economy these occupational categories contribute only 7 percent of the total workforce.

[16] Currently the Department of Census and Statistics is conducting a sample survey on IT literacy, however, so for no national level data is available in this regard. It is our intuition that the IT literacy of the entire country must be at very low level. Our own experience with selected rural areas is that the IT literacy is almost zero in rural sector of the country.

In fact, the survey designs and the small sample sizes should have affected these results in the IT students survey. However, we believe that the figures we identified are not distorting the reality.

Majority of IT graduates are still coming from Colombo. They are belonging to upper strata of the social structure. Majority of them represent upper middle class or above. These indicate that the IT education system is not supporting the up ward social mobility. It rather reinforces the social division by strengthening the affluent classes.

6. Conclusions

Impacts of the ICT development on terms and conditions of labour market are the theme for this paper. More precisely we examined the impacts of ICT on the decent work conditions in the labour market in Sri Lanka.

The answer to this question depends on how one defined the two critical terms. What is ICT? And what is decent work? For the consistency of the definitions with other country reports we adopted the ILO definition of them.

To ascertain the major findings of this report, we used five-pillar approach. Namely, we used literature reviews, interview of stakeholders, case studies, sample surveys and theoretical developments in the field of technological development.

We have the following findings. In comparison with the rest of the world, Sri Lanka is not still a heavy user of ICT. Especially the diffusion of ICT facilities in rural sector is extremely low. With the rapid expansion of ICT related production, communication and transactions in the rest of the world this will definitely increase the vulnerability of the rural sector of the country.

However, we found that the ICT diffusion is very rapid at least in some segments of the economy. Over 400 percent annual growth of ISP memberships during 1996 and 2001 is a good indication of the rapidity of the ICT-diffusion in Sri Lanka. However, this growth is still heavily concentrated in Western province, especially within Colombo district alone. As far as the industrial composition of ICT-diffusion is concerned it is

heavily export oriented industry and service sector biased. Although the government policy on the ICT development is in right track it seems that all the stakeholders in this effort are not sharing the same vision. As a result of that the present situation of the ICT diffusion would be worsened at least in the intermediate run: until the long-term strategies of the government will be in place.

The impacts of the ICT on labour market conditions in general would be insignificant as the diffusion of ICT is still at a very low level. However, among the sectors where the diffusion is fairly high we observed remarkable impacts.

It is observed that the length of working day in the ICT sector is significantly high, at least as compared to the rest of the labour market. Its effects on work-site are very insignificant. Despite some self-employed software producers, no home-based workers were found. Relatively significant percentage of workers engages their job responsibilities in weekends and holidays too. Fairly high percentage of workers we interviewed performs more than one job. However, all they earn higher salary. Earnings functions based on hourly wages show that the ICT sector workers are paid for their excessive workloads. In general, majority of respondents are happy about their working conditions and their lifestyle is also not significantly different from that of the others. Marital age of ICT workers is slightly increased.

From a broader perspective of the labour market impacts of ICT diffusion we examined the issues related with the digital divide literature. In this regard, we found that there is a significant level of gender difference in ICT relate job markets. Women participation in ICT related jobs is significantly low. Majority of women engaged in lower segment of the ICT job market. It is also observed that the observed gender difference will remain even in the long-run. This is because the women participation in ICT training is very low.

However, the present ICT national policy under the e-Sri Lanka initiative have given sufficient consideration to almost all those issues. Therefore, it is widely believed that the ICT diffusion will accelerate its expansion minimising its hazardous effect on the terms and conditions of the labour market in Sri Lanka.

Case Studies

Case 1
Industrial Classification : Service Sector
Major Production : Telecommunication Service

This is one of the largest ICT providers in Sri Lanka. Over 10,000 workforce is employed. Most of the departments and regional branches are computerised and connected through a network so that most of the information within institution is available on line. Computerisation and networking was initiated in last 5 years period. Comparison of two periods clearly indicates the effect on ICT on this case.

Efficiency and quality of services are improved as a result. Impact of ICT on employment is very significant in some departments. This depends on the level of computerisation and the occupational classification of each department.

Before networking, almost all information was available on paper sheets. There was a huge staff (Data Entry Operators) to enter all them into computer. In many circumstances, customer information and billing were heavily dependent on them. Delays and errors were quite common those days. Entry qualification for data entry operator is middle level education (GCE OL and AL). Knowledge of computer is not essential. In a professional ranking one may classify them at typists level.

After networking this staff became almost redundant. However, none of them was laid off due to labour laws and trade union pressure. Currently most of them were assigned in different tasks. Therefore, there is no significant job destruction in the short-run. However, in the long run, data entry operators will not be hired on permanent basis. Even now, they hire data entry operators on short-term contract basis whenever the need arises.

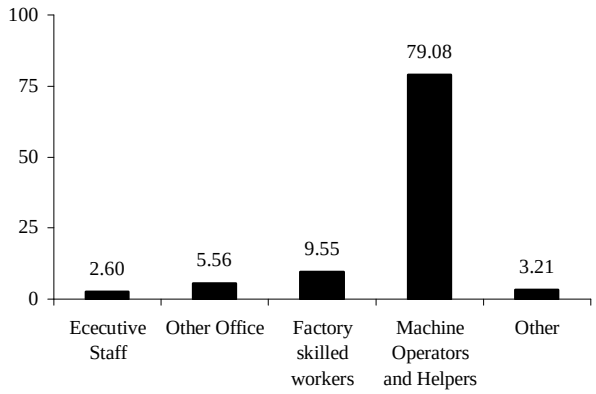
On the other side, several new jobs were created. IT engineers and network managers were two examples. All these designations require relatively high level of education (degree in IT or in computer field or high professional qualifications on network management). Currently majority of them were high paid male workers.

In comparison, this gives us an impression that the adoption of ICT destroyed job openings available for women with middle level of education and created jobs for educated segment of the workforce. Further, the current situation is also gender-biased. Job openings for men were created at the expense of destroying jobs mainly employed women.

Case 2
Industrial Classification: Industrial Sector
Major Production: Readymade Garments for export

This is one of the biggest garment factories in Sri Lanka with nearly 1,200 workforce including office staff. This was started with 40 workers a decade ago. Nearly 80 percent of the workforce is employed in production section. Chart A1 displays the employment composition. There are six separate departments excluding security department. Security firm provides security service. Most of the departments are at least partly computerised. All the departments and a sister company are connected through network so that transformation of information within the company is possible through the network.

Chart A1



Computerisation began in 1996. Before that production as well as administration is performed manually.

Job creation and destruction pattern is clearly visible. According to the records that the management provided, several categories of jobs were heavily destroyed. Manual Pattern Makers were replaced with Computer based Pattern Makers. According to their judgement, in order to perform the current level of production they would need at least 10 pattern makers if operates manually. However, with computer facilities now they can manage with 7 Pattern Makers (5 computerised PMs and 2 manual).

Another job category destroyed or reduced demand is Productivity Recorder (PR). Productivity recorders' responsibility is to monitor the performance of all production lines. In the absence of computerised system, it was told that they need about 8

productivity recorders. However, with computerised systems they can perform the same task with 4 productivity recorders.

We were also informed that Quality Assurance (QA) Department, Finishing Department and Administration and Human Resource Departments were also down scaled after computerising them. Among these departments, HR and Administration departments report the heaviest loss. With computer facilities, they can manage all duties with 2 assistants where they need at least 10 people unless computerised.

New jobs created after computerisation were Computer Marker Maker, Computer Pattern Maker, Computer Operator, IT and Network Manager and IT Technician.

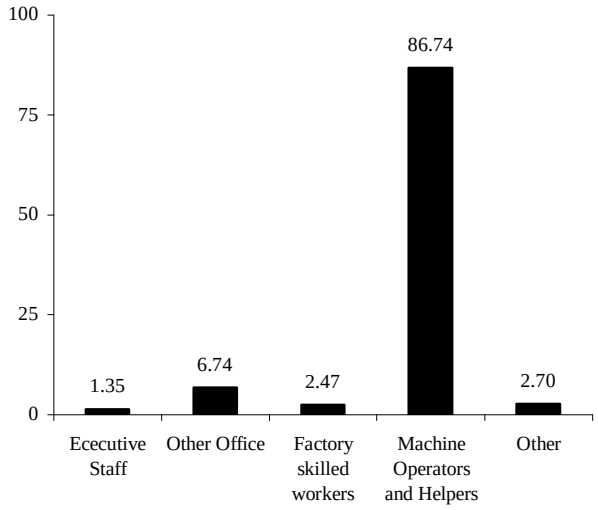
Entry education qualification for most of the jobs destroyed was GCE OL. Job categories such as Helper were not significantly affected. Therefore, job openings for less educated workers were not significantly affected. Entry qualifications of most of newly created jobs were GCE AL plus some computer knowledge. Posts above computer operator (IT Manager and IT Technician) require good knowledge in software and hardware and practical experience in network management.

Case 3
Industrial Classification: Industrial Sector
Major Production: Readymade Garments for export

This was established in 1989 under two hundred-garment factory project. It is a BOI approved project. In the present there are six departments in this operation. They are namely, Sample Room, Cutting Section, Sewing Section, Embroider Section, Merchant Section and Administration, Human Resource and Account Section. Embroider section which is fully computerised was started operations in 1998. Computer facility is available for Merchant and Account Sections as well. However, they are not networked. IT usage in those two departments is limited to Documentation(Word Processing) and Communication(e-mail). Other sections are not computerised at all.

Currently there are nearly 500 workers including management.

Chart A2



Composition of the current workforce is displayed in Chart A2. Mainly first three categories of workers are employed in computerised departments. This accounts for nearly 10% of entire workforce. As we observed in many other places as well computerisation has almost no impact on the semi-skilled and unskilled workers in the production departments. However, interviewee from the firm told us that they were able to reduce the need of staff in those departments, which are computerised. Further, the embroider section cannot be functioned without computers.

Case 4
Industrial Classification **:** Service Sector
Major Production **:** Internet-Related Software Applications

This was one of the home-based small-scale software development firms, which was operational during the time of continuous growth of internet-related products ('dot com bubble') in late 1990s. The company was a home-based firm, which undertook the development of software components for a Netherlands Based IT solutions provider. The assignment of work to the firm was on contract basis with almost all communications with the foreign party being done through emails. Sub contracts were awarded by this firm to experienced IT professionals (who were considered to be employees of the firm during the period of the contract) in the capacities of Programmer, Software Architect and Graphic/Web Designer in order to complete the work on due dates specified by the foreign party. The agreements ensured the foreign party to have the all the rights of the software components developed (including copyrights of the software code generated) while the local firm was paid significantly higher payments for the contracts in comparison to other industries in Sri Lanka. The

staff and the owner of the firm were working under flexible hours system, with a set of computers networked with Internet facilities located at the owner's house. The firm operated under the concept of completing tasks on time with required quality and functionality with employees and the owner being able to take days off in cases the work was completed in advance. This spare time was not utilised for extra work unless there were other contracts already signed. The average number of hours of work per employee was in the range of 10 hours per day. The assigning of work to employees was done by the owner of the company who was an IT expert himself. There were no separate quality control or audit personnel since the employees were given full responsibility of the work they perform. All employees were highly qualified and experienced IT professionals in the respective areas of specialisation. The firm commenced its operations in May 1998 and continued to operate with the foreign contracts until the end of year 2000. With the decline of the demand for web applications during 2000-2001 the firm discontinued its operations although it was still possible to operate profitably with foreign contracts with a smaller profit margin. The firm has made attempts during 1998/1999 to have connections and collaborations with other similar home-based IT firms in Sri Lanka, but was not successful in contacting any other firms, which indicates that probably a very few entrepreneurs in Sri Lanka has grabbed this opportunity during that time or the firms involved in this industry didn't want to make facts public.

Case 5
Industrial Classification **:** Industrial Sector
Major Production **:** Printing Industry

This is a printing firm with nearly 50 fulltime employees, registered as a limited liability company. This firm was started 25 years ago with one printing machine and three employees including the owner himself.

They have used conventional printing machines until recently. Five years ago they have upgraded the business with modern printing technology. Currently they have four departments: office, computer lab (designing and art work), pre-printing department and printing section. They mainly supply for the domestic market. Tourist hotels and

garment manufacturers are the main customers. They do all high quality printing jobs for them.

Currently the market conditions are highly favourable for them. On average monthly turnover is above four million Sri Lanka rupees. They have high expectations about further expansion of their market in the years to come. They are now planning to expand their firm with more machines and to move on to high quality requirements of printing industry.

According to the interviewees, adoption of computer based printing technology is a market requirement. Without that technology, they cannot produce to the market for which they are now catering for. Therefore, the information technology has definitely improved their efficiency. Impact on job creation and destruction is also examined and mixed results were observed. If the modern technology were not adopted, they need at least 25% more staff in order to perform current level of business (4 million turnover per month), most of the required labour would be skilled labour on manual printing machines and related professions. Therefore, one may argue that the modern technology has destroyed nearly 13 job openings. However, unless the high technological printing devices were implemented they would never be able to expand the market up to that level. Therefore, destruction of 25% of job opportunities would not be a fair judgement. It is an over estimate of the job destruction mechanism. On the other side of the coin, they have crated large number of new jobs. Computer based artwork designers, machine operators of high tech printing machines were the jobs newly created. One of the major problems that they face is the lack of skilled and trained machine operators. They are highly critical about the vocational training system of the country for not producing high quality printing machine operators.

ICT and Decent Work
ILO Sponsored Survey
University of Colombo

(This questionnaire consists of 10 pages and 2 Main Questions. Main Question 1 has 12 sub questions and Main Question 2 has 14 sub questions. Please provide your answers to all these 26 sub questions)

Use the appropriate code(s) for the relevant questions where answer codes are provided. You may write your own answers to questions where no codes are provided. Hints to answer each question will be provided with each question for your convenience

1. Personal Information

Gender

2.8 Age: (Years)

2.9 Marital Status

2.10 If you are married, do you have any children? (Number)

2.11 If you are married, what does your spouse do?*(Hint : Mark 'x' in the appropriate box)*

Employed		Retired	
Searching for a job		Other	
Do not want a job		Over 50	

2.12 Educational Qualifications:

2.13 You are an (Hint: Mark 'x' in the appropriate box)

Owner of business using ICT	
Employee in the ICT department of a business using ICT	
Owner of an ICT Facility Providing business	
Employee of an ICT Facility Provider	
Owner of Software Producing Company: Self-employed (Producing, Consultancy, Sales, Maintenance)	
Employee of a Software Producing Company (Producing, Consultancy, Sales, Maintenance)	
Owner of Hardware Producing Company (Assembling, Repairing, Producing, Maintenance, Consultancy,, Sales)	
Employee of Hardware producing Company (Assembling, Repairing, Producing, Maintenance, Consultancy, Sales)	
Apprentice/student undergoing training/ performing duties at an ICT related company as part of course curriculum / industrial placement / under a student work contract with the company	

1.7 When (year) did you join the current job? (Hint: Enter the number of years involved in the current capacity/position of the current job)

1.8 The type of organisation you work at present is: (Hint: Mark 'x' in the appropriate box)

A private company at which you are an owner/shareholder	
A private company at which you are an employee	
A sole ownership/partnership business where you are the owner/partner	
A state sector/ semi-government organisation	

1.9 Before the present job I was a [Please state number of years engaged in this activity in the appropriate cell]
(Hint: Enter the number of years involved in other capacities/positions/jobs before the current capacity/position)

	Years
Employed in the same place in different designation	
Employed in a different place	
Full-time student	
Unemployed: Searching for a job	
Self employed	
Other	

1.10 Your total labour market experience (starting from the date of your first appointment)
(Hint: Enter the number of years involved in the labour market at any capacity)

1.11 Are you satisfied with your current job/work considering the effort you put into it and the benefits you obtain from it? *(Hint: Enter the answer 'YES' or 'NO')*
Give reasons for your answer:

1.12 Do you have a Secondary Employment?

2. Working Conditions and Job Environment

2.8 Please report your total earnings in last 3 months period.

Item	Month1	Month2	Month3
Basic Salary			
All Allowances (including EPF, ETF and any other benefits)			
Total income before tax			
Total after tax income			
Income from other sources (other than rent and interest receipts): Before tax			
Income from other sources (other than rent and interest receipts): After tax			

2.2 How many hours do you work per-day? (Office hours + Overtime + home/field based working hours) *(Hint: Enter the total number of hours of actual work per day)*
How many days per-week do you work to earn the above income?
(Hint: Enter the number of days of actual work)

2.4 Give the exact name of your designation that you are currently employed**:**
(Hint: Enter the designation in the organisational hierarchy)

2.8 Please describe your duties: *(Hint: Enter the duty specific activities)* Duties: in descending order of priority: (Number 1for highest priority). Please add more rows to the table if you it needed.

2.6 Are you a member of any trade union and (or) welfare organisation at your work? (Hint: Mark 'x' in the appropriate box)

Yes, I am a member of the Trade Union/welfare organisation	
No, I am not a member	
We do not have a union or welfare organisation	

2.7 Do you have any of the following ICT devices at your work or at home?
(Hint: Mark 'x' in the appropriate box)

	At Work	At Home
Regular Phone (Land Phone)		
Fax machine		
Mobile Phone		
Pager		
Computer (Desk top)		
Computer (Portable)		
Email and Internet connection		
Other communication devices (Please name)		

2.8 Do you use those devices at home for official purposes? (State number of hours per-day in the cell provided) [0 for non-users] *(Hint: Enter the average number of hours of usage of personal ICT devices for office purposes)*

2.9 How do you perform your duties? *(Hint: Mark 'x' in the appropriate box)*

I perform all duties only at office	
I work in field. No physical office space given	
I mainly work at home.	
I attend duties whenever my service is required.	

2.10 Please fill the following table indicating your time allocation between different work last weekday before you fill this questionnaire (from Monday to Friday other than holidays) *(Hint: Enter the relevant code for the actual time spent for the appropriate work)*

Time	My engagements in this time **(PLEASE USE THE CODES GIVEN BELOW)**
From 6.00 to 8.00 AM	
8.00 to 9.00 AM	
9.00 to 10.00 AM	
10.00 to 11.00 AM	
From 11.00 to 12.00 NOON	
From 12.00 to 1.00 PM	
From 1.00 to 2.00 PM	
From 2.00 to 3.00 PM	
From 3.00 to 4.00 PM	
From 4.00 to 5.00 PM	
From 5.00 to 6.00 PM	
From 6.00 to 8.00 PM	
From 8.00 till you go to bed	

Please note that a.) We need your actual time allocation. Therefore, please take note of all the activities that you performed before filling this table, b.) Use the following codes to fill this table.

Activity	Code
On duty: Office, field including regular hours and OT as well	1
Office work at home	2
My private business: Self-employment	3
On travel	4
Stay with my family	5
Leisure time	6
Other	7

2.11 What is your usual timetable for weekends? *(Hint: Enter the relevant code for the actual time spent for the appropriate work)*

2.12 What is your usual timetable for public holidays? *(Hint: Enter the relevant number accordingly so that the activity with highest priority number 1 and the activity with lowest priority number 5)*

I stay at home with my family	
Going out	
No difference. I go to the office as usual working day	
I engage in my self-employment	
Other – Travelling, Shopping, Leisure Activities	

More than one is possible. In case of more than one, please use numbers 1 to 5 to indicate the most frequent to least frequent engagement (1 for most frequent and 5 for least frequent one).

2.13 How do you assess the impact of ICT devices on your lifestyle? *(Hint: Mark 'x' on appropriate box and if 'x' marked for 'It makes my life more difficult', write down the reasons to say so)*

It makes my life easier because it saves my time	
It makes my life more difficult (Give reasons)	

2.14 What is your opinion on Internet and computer technology becoming a part of your daily life and its impact on your job and private life? *(Hint: State your opinion. You may use extra space if necessary)*

Digital Divide and Gender: ILO Survey on ICT and Decent Work: ILO – Bangkok and University of Colombo.

Respondent Identification

1. Name of respondent:……..

Respondent's Demographic Data

Serial Number	Name of household members who are elder to respondent	Sex	Age	Ethnicity	Level of Education	Computer Literacy	Main Occupation	Income
1	2	1	2	3	4	5	6	7
01	Respondent							
02	Father							
03	Mother							
04	Elder Sister 1							
05	Elder Brother 1							
06	Elder Sister 2							
07	Elder Brother 2							

Col 1	Col 3		Col 4		Col 5	
Male…..1	Sinhala	1	Primary (1-5 years)	1	Illiterate	1
Female …2	Tamil	2	Secondary (6-10 years)	2	Literacy	2
	Muslim	3	G.C.E. O/L passed	3		
	Other	4	G.C.E A/L passed	4		
			University degree	5		
			Post Graduate	6		

Respondent's Educational and ICT Training Background

4. From which district did you sit for the O/L Examination?
5. What are the basic entry qualifications for this IT Course?
   1 Secondary (6-10 years)
   2 G.C.E. O/L passed
   3 G.C.E A/L Passed
   4 Other ……..
6. Why did you decide to speclise in ICT?
7. Do you think that girls and boys have equal opportunities for study ICT?
   1 Have equal opportunities
   2 Do not have equal opportunities.
   3 Not Sure
   4 Do not know
8. Do you think that boys are more successful in ICT related studies than girls?
9. If yes for Q 8 above, why do you think so?
10. According to your knowledge, after completing this course, what would be the jobs available for your qualification?
11. Do you think that boys can find ICT related job easily as compared to girls?

Yes		Answer Q 12
No		Skip Q 12

12. Why do you believe so?
13. After completing of this programme what do you intend to do?
14. Do you think that you can find this job easily? Why (if the answer is NO for the previous question)?

15. What are the major obstacles that you may have to face in order to achieve this goal?
16. Do you think that you have to face these obstacles because you are a girl?
17. Can you give us a rough idea about gender composition in your batch? (% of Male & % Female)
18. What is your opinion about this situation?

Table 1 Basic Demographic Indicators of Sample

	Survey (a)	Labour Force (b)	Work force (c)
Percentage of Male	79.60	49.20	61.85
Age Composition			
Below 20	0.00	26.51	34.75
21 to 25	20.40	9.88	10.72
26 to 30	57.10	10.14	10.44
31 to 40	18.40	17.20	17.48
Over 40	4.10	36.27	26.62
Civil Status			
Never Married	63.30	39.70	50.50
Currently Married	34.70	52.15	46.13
Widow	2.00	7.29	2.59
Divorced		0.17	0.18
Separated		0.69	0.61
Formal Education			
Less than OL		75.30	72.67
OL	6.12	15.91	16.80
AL	14.29	7.41	8.63
University Degree	32.65	1.34	1.85
Post-graduate	46.94	0.04	0.04
Vocational Training	71.43	11.39	15.95

Source: a.) Decent Work Survey b.) And c.) Quarterly Labour Force Survey 4th Quarter 1999

Department of Census and Statistics (Calculations are our own)

Table 2: Basic Socio-economic and Demographic Data of Student Survey

Indicator	Number	%
Ethnicity		
Sinhala	44	88.00
Other	6	12.00
Districts		
Colombo	20	40.00
Gampaha	5	10.00
Kalutara	2	4.00
Kandy	4	8.00
Matale	1	2.00
Kurunegala	4	8.00
Puttlam	1	2.00
Matara	6	12.00
Hambantota	2	4.00
Galle	2	4.00
Batticalao	1	2.00
Kegalle	1	2.00
Monaragala	1	2.00
	50	
Mean Family Income: Rs.	24,975	
Mean Family Education: Years	13	
IT literate Parents	28	28.00
IT literate Family Members other than respondent	42	35.00
Occupational Background of Employed Family Members		
Legislators Senior Officers and Managers	24	28.57
Professionals	29	34.52
Technicians and Associated Professionals	5	5.95
Clerks	11	13.10
Service Workers and Shop and Market Sales Workers	0	0.00
Skilled Agriculture and Fishery Workers	0	0.00
Craft and Related Workers	1	1.19
Plant and Machine Operators and Assemblers	0	0.00
Elementary Occupations	3	3.57
Military Services	3	3.57
Not elsewhere Classified	8	9.52
Average Age of Parents	54	

Source: IT Students survey 2004

Table 3: Geographical Concentration and Annual Growth of Fixed Phones

	Geographical Concentration of Fixed-Phones			Annual Growth Rates		
	2000	2001	2002	2000/ 01	2001/02	Overall
Colombo	52.37	51.01	50.20	5.43	5.09	5.40
Gampaha	4.28	4.56	4.59	15.22	7.42	11.89
Kaluthara	6.16	6.25	6.28	9.87	7.28	8.93
Nigambo	3.59	3.51	3.42	5.69	4.12	5.02
Western	**66.41**	**65.33**	**64.49**	**6.48**	**5.40**	**6.12**
Kandy	6.49	6.60	6.59	10.12	6.51	8.64
Matale	1.66	1.68	1.66	9.50	6.04	8.06
Nawalapitiya	0.25	0.25	0.26	6.23	10.70	8.80
N'Eliya	0.63	0.66	0.66	12.73	7.71	10.71
Central	**9.03**	**9.18**	**9.17**	**10.08**	**6.62**	**8.68**
Galle	3.28	3.45	3.47	14.04	7.35	11.22
Hambantota	1.08	1.01	1.04	1.89	9.35	5.71
Matara	2.39	2.41	2.41	9.13	6.94	8.35
Southern	**6.74**	**6.87**	**6.92**	**10.36**	**7.50**	**9.32**
Chillaw	1.56	1.76	1.85	22.22	11.99	18.43
Kurunegala	3.25	3.48	3.98	15.80	22.12	20.70
North West	**4.81**	**5.24**	**5.82**	**17.88**	**18.71**	**19.97**
Awissawella	0.97	1.02	0.99	13.32	4.34	9.12
Kegalle	1.62	1.67	1.69	11.90	8.03	10.44
Ratnapura	1.47	1.67	1.72	22.90	9.87	17.51
Sabaragamuwa	**4.06**	**4.35**	**4.40**	**16.22**	**7.87**	**12.69**
Ampara	0.38	0.39	0.40	10.49	8.72	10.06
Batticoloa	1.05	1.01	1.04	4.07	9.14	6.79
Kalmunai	0.99	1.01	1.00	10.41	6.00	8.51
Trinco	0.92	0.92	0.93	8.85	7.02	8.25
East	**3.34**	**3.34**	**3.36**	**7.99**	**7.55**	**8.07**
Badulla	1.30	1.24	1.20	3.30	2.73	3.06
Bandarawela	0.87	0.91	0.96	13.18	13.04	13.97
Hatton	0.47	0.49	0.50	12.77	8.94	11.42
Uva	**2.64**	**2.64**	**2.66**	**8.23**	**7.43**	**8.13**
A'pura	1.38	1.41	1.42	11.22	7.02	9.51
Polonnaruwa	0.77	0.75	0.74	5.89	5.11	5.65
North Central	**2.15**	**2.17**	**2.16**	**9.30**	**6.35**	**8.12**
Jaffna	0.32	0.31	0.40	6.76	37.54	23.42
Mannar	0.10	0.12	0.12	28.53	8.55	19.76
Vavuniya	0.41	0.44	0.49	16.46	21.11	20.52
North	**0.82**	**0.87**	**1.02**	**14.17**	**25.34**	**21.55**
Total	100.00	100.00	100.00	8.24	6.79	7.79

Source: Telecommunication Regulatory Commission: Sri Lanka

Table 4: Summary Statistics of Variables used in Regression Analysis

	ICT Survey					Quarterly Labour Force Survey 1999 (4)				
	N	Min	Max	Mean	Std.	N	Min	Max	Mean	Std.
Gender	75	0.00	1.00	0.80	0.41	3146	0.00	1.00	0.67	0.47
Education	75	11.00	20.00	16.76	2.28	3146	0.00	22.00	8.43	3.82
Tenure	75	0.08	7.00	2.73	1.75	3146	0.00	71.0	17.32	13.08
Monthly Wage	75	10,000	200,000	51,735	40,241	3146	180	70,000	4,132	3,698

Source: ICT Survey 2003 and Quarterly Labour Force Survey, 1999(4), Department of Census and Statistics

Table 5: Earnings Functions

	ICT Survey			LF Survey		
	B	Beta	t	B	Beta	t
(Constant)	1.09		1.46	1.36		20.54
EDU	0.24	0.66	5.79	0.10	0.52	23.30
X	0.01	0.02	0.06	0.26	0.59	8.30
X-square	-0.006	-0.09	-0.26	-0.04	-0.41	-5.72
GENDER	0.36	0.18	1.55	0.07	0.04	2.08
Adjusted R^2	0.45			0.25		
F-Stat	10.17			151.32		
Number of Observations	75			1820		

Source: LF Data: Department of Census and Statistics. Calculations are our own.

Table 6: Worker Satisfaction

I am happy about present working Conditions	95.90
I am not happy about present working Conditions	4.10

Source: ICT Sector Survey 2003

Table 7: Timetable of a given working day

	On duty	Work at home	On travel	With family	Leisure	Other
From 6.00 to 8.00 AM	2.00		67.30	20.40		10.20
8.00 to 9.00 AM	61.20	6.10	30.60	2.00		
9.00 to 10.00 AM	87.80	8.20	2.00	2.00		
10.00 to 11.00 AM	87.80	6.10	6.10			
From 11.00 to 12.00 NOON	85.70	6.10	4.10		2.00	2.00
From 12.00 to 1.00 PM	65.30	2.00	2.00		24.50	6.10
From 1.00 to 2.00 PM	79.60	6.10	2.00		8.20	4.10
From 2.00 to 3.00 PM	91.80	6.10	2.00			
From 3.00 to 4.00 PM	91.80	6.10	2.00			
From 4.00 to 5.00 PM	87.80	6.10	6.10			
From 5.00 to 6.00 PM	53.10	4.10	38.80		4.10	
From 6.00 to 8.00 PM	2.00	2.00	55.10	20.40	12.20	8.10
From 8.00 till you go to bed		4.10		51.00	36.70	8.20
Average Number of Hours	7.98	0.75	2.85	2.69	1.98	0.74

Source: ICT Survey 2003

Table 8: Time table for weekends

	On duty	Work at home	Private	On travel	With family	Leisure	Other
From 6.00 to 8.00 AM	8.20			8.20	42.90	24.50	16.20
8.00 to 9.00 AM	10.20	2.00	4.10	10.20	38.80	20.40	14.20
9.00 to 10.00 AM	20.40		2.00	4.10	36.70	14.30	22.40
10.00 to 11.00 AM	20.40		8.20		30.60	16.30	24.40
From 11.00 to 12.00 NOON	20.40	2.00	6.10		24.50	18.40	28.50
From 12.00 to 1.00 PM	18.40	4.10	2.00	2.00	26.50	18.40	28.50
From 1.00 to 2.00 PM	18.40	2.00	4.10	6.10	24.50	18.40	26.40
From 2.00 to 3.00 PM	18.40	4.10	6.10	2.00	20.40	26.50	22.40
From 3.00 to 4.00 PM	14.30	2.00	8.20	8.20	20.40	26.50	20.30
From 4.00 to 5.00 PM	14.30	2.00	8.20	6.10	22.40	24.50	22.40
From 5.00 to 6.00 PM	10.20	2.00	4.10	6.10	32.70	24.50	20.30
From 6.00 to 8.00 PM	6.10	2.00	4.10	6.10	40.80	30.60	10.20
From 8.00 till you go to Bed		10.20			36.70	36.70	16.30
Average Number of Hours	1.88	0.63	0.57	0.67	5.51	4.35	3.38

Source: ICT Survey, 2003

Table 9: Workers' Choices for Public Holidays

	1	2	3
I stay at home with my family	59.20	22.40	6.10
Going out	20.40	53.10	18.40
No difference. I go to the office as usual working day	4.10	10.20	16.30
I engage in my self-employment	8.20	4.10	12.20
Other – Travelling, Shopping, Leisure Activities	6.10	24.50	22.40

Source: ICT Sector Study, 2003

Table 10: Selected Indicators of Social and Family Ties

Union Member	40.8
Not a Member	53.1
Do not have any form of Organisation	6.1
Engagement of Office Work at Home	
Never	63.30
Less than 1 hour	18.40
Less that 2 hours	6.10
Less than 3 hours	10.20
More than 3 hours	2.00
Work Station	
Only at Office	79.60
Field Work. No Physical Office	4.10
Work at Home	2.00
Office, Field and Home	14.30
Multiple Job holdings	20.00

Source: ICT Sector Survey 2003

Table 11: Distribution of IT Employees by Gender

Employee Category	Male	Female	Total
IT Engineer	25	5	30
DP (or IS) Managers	55	5	60
System Administrators	46	5	51
Network Administrators	23	3	26
Team Leaders	42	8	50
System Analysts	67	3	70
Analyst Programmer	101	43	144
Programmer	100	23	123
Computer Operator	196	117	313
Computer Application Assistant	17	26	43
Data Entry Operator	310	276	586
Total	982	514	1496

Source: Vocational Education and Training Plan for the Information Technology Sector. Table 2.19

Table 12: Difficulties with provision of e-services

Supply Side Constraints	No.
No Leased line/ADSL	2
Inefficiency of connection	7
Finance	6
High charges	6
Labour	2
Demand Side Constraints	
No Market	4
Fluctuate Demand	2
Lack of IT knowledge (community)	9
Total	38

Source: Ranasinghe (2004: Draft) p. 9.

Table 13: Students' Opinion about IT sector

	Number			%		
	Male	Female	Total	Male	Female	Total
1. **Do you thin that there is a gender disparity in IT training opportunities?**						
Have Equal Opportunities	27	36	63	90.00	80.00	84.00
Do not have	3	9	12	10.00	20.00	16.00
2. **Do you believe that Boys are more successful in IT education?**						
Boys are more successful in IT education	20	23	43	66.67	50.56	56.67
No difference in success	10	22	32	33.33	49.44	42.67
3. **How do you interpret the difference in success?**						
Ability Differences	6	12	18	30.00	52.17	41.86
Taste Differences	11	9	20	55.00	39.13	46.51
Opportunity Differences	2	1	3	10.00	4.35	6.98
Other	1	1	2	5.00	4.35	4.65
4. **Do you believe that it is easy to find a job relevant for your qualification?**						
Easy to Find Jobs	27	33	60	90.00	73.00	79.80
Not Easy	3	12	15	10.00	26.67	20.00
5. Do you believe that boys and girls have equal accessibility for relevant jobs?						
Easier for Boys to Find Relevant Jobs	12	17	29	40.00	37.78	38.67
There is no Gender Difference	18	28	46	60.00	62.22	61.33
6. **Do you believe that there are more obstacles for girls in this field?**						
Yes		25			55.56	
No		20			44.44	

Source: IT Students Survey 2004

Table 14: Socio-economic Background of the Respondents in IT Students Survey: Comparison with National Level Figures

	%	
	Students Survey	National
Legislators Senior Officers and Managers	28.57	1.46
Professionals	34.52	5.71
Technicians and Associated Professionals	5.95	5.07
Clerks	13.10	4.02
Service Workers and Shop and Market Sales Workers	0.00	12.62
Skilled Agriculture and Fishery Workers	0.00	18.79
Craft and Related Workers	1.19	14.69
Plant and Machine Operators and Assemblers	0.00	5.92
Elementary Occupations	3.57	27.17
Military Services	3.57	0.84
Not elsewhere Classified	9.52	3.71
Monthly Income Per-capita Rs:	7,346	
Mean Family Education Years	13	7.98
IT literate Parents	28.30	
IT literate Family Members other than respondent	35.00	

Sources: IT Students Survey 2004 and Quarterly Labour Force Survey 1999_4

REFERENCES

Chandrathilake, K.L. (2003), Social Dialogue in Action: Experience of Sri Lanka Telecom in 'Best Practices in Social Dialogue' edited by A. Sivananthiran and C.S. Venkata Ratnam and published in 2003 by the ILO Sub-regional Office for South Asia in New Delhi.

Chemonics International Inc. (2001), Final Report: Sri Lanka SME Overview: Small and Medium Enterprise Assessment: Asian Development Bank

Gunawardhane N. and Wattegama C. (2003), Sri Lanka.lk, *Digital Review of Asia Pacific 2003 Sri Lanka*

ILO Web site, Decent Work Index - Workers' Activities.htm, General Activities

ILO Colombo(2004), National Plan of Action for Decent Work: Sri Lanka

Information and Communication Technology Institute (2004) Survey on the Present Use of ICT Tools: Deep South Region, http://www.esrilanka.lk

Institute of Computer Technology, University of Colombo: Vocational Education and Training Plan for the Information Technology Sector (Unpublished)

Irving L. (1998), *Falling Through the Net*, National Telecommunications and Information Administration (NTIA) U.S. Department of Commerce, http://www.bls.census.gov/cps/computer/computer.htm

Ministry of Employment and Labour (2002), Draft National Employment Policy for Sri Lanka

Nihal Kularatne, A.D.V. (1996), Telecommunication Development in Sri Lanka: An Independent Assessment, Chapter 21

Polachek S.W. and Seibert W.S.(1993), *The Economics of Earnings*, Cambridge University Press

Ranasinghe Athula (2004: Draft) Survey on Demand for and Supply of Telecentres in Selected Districts in Sri Lanka: Report on Matara, Galle, Hambantota Monaragala, Badulla and Ratnapura Districts, Draft reported Prepared for ICTA, Sri Lanka.

Samaranayake, V.K. (1996), Fifty Years of Information Technology, Chapter 20,

Shrestha G. and Amarasinghe S. (2001), *Perspectives of the Use of the Internet in Sri Lanka*, LCS Technical Report, Laboratory for Computer Science, Massachusetts Institute of Technology (January, 2001)

Vivarelli Marco (1996): Technical Change and Employment: A Twofold Critique, http://www.geocities.com/SoHo/Cafe/8460/Marco_Vivarelli_index.htm

Wijeya Pariganaka Journal (2003), *Internet Usage Pattern in Rural Areas of Sri Lanka* (Preliminary Report)