THE ROLE OF INFORMATION TECHNOLOGY TRENDS IN PLANNING AN INFORMATION TECHNOLOGY LED DEVELOPMENT STRATEGY FOR SRI LANKA

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ABSTRACT

It is important to accurately identify the trends of a technology to formulate realistic policies relevant to it. Number of examples related to IT industry proves that this is no exception to IT. This article discusses the global trends of IT applications in areas like education, access to information, governance, public services, business & commerce, industry, agriculture, home & leisure and their relevance to Sri Lanka. The potential key impediments and trends with respect to the two main investment opportunities namely the software and IT education & training are also highlighted. Sri Lanka has the potential to take advantage of the emerging trends in many areas. This paper stresses the need to formulate a national policy on IT that would actively promote its application in as many spheres as possible and eliminate the obstacles stifling their implementation.

Keywords : IT application areas, IT trends, Software industry, IT Education and training.

INTRODUCTION

IT industry is growing fast. It affords many opportunities for Sri Lanka to address economic development and eradicate unemployment problems. India is a good example of using IT opportunities to the fullest benefit. During 1999-2000, India's software exports amounted to US\$ 4 billion and during the last decade Indian software and services sector recorded annual growth rates exceeding 50%. Any concerted effort to utilise this potential must first have a clear understanding of the IT trends, which are dynamic. A policy developed without adequate understanding of the role of the IT trends is bound to fail or deliver only partial results. This paper takes an overview of the IT development patterns from a global perspective and draws attention significantly on the successful Indian model. The underlining critical issue is to clearly identify the IT trends. It is also necessary to have a clear overview of the IT application areas in the Sri Lankan context (commerce, industry, governance, etc.) and critically analyse the unique situation in Sri Lanka compared to the accepted western application model. After such

an analysis one can determine the opportunities available to Sri Lanka in the IT industry sphere and then look at the ideal way of developing a suitable policy framework.

Trends are a culmination of technological developments and customer preferences. Accurate identification of the trends has a major impact on the outcome of implementation of the relevant policies. This holds true both at micro and macro levels. The enterprises or individuals, who accurately identify the trends relevant to its business have a tremendous competitive advantage while those who fail to see the trends often fall behind resulting in take-overs and even bankruptcies (Savoie & Raisinghani, 1999).

IT industry itself gives many such examples. Since the advent of the personal computer (PC) in the early 80s, the technological advancements enabled manufacturers to offer each new generation of computers, smaller in size but higher in memory, speed and storage capacity. This met the requirements of the market as it enabled the utilisation of computers for much wider use, which therefore was the trend of the IT sector in the 80s and PC manufacturers who identified this trend achieved remarkable success. Along with the popularity of the PC with all types of users, which included a vast number of non-technical users, a need emerged for user-friendly operating systems and application software. Microsoft™ identified this and over the years became the largest software company in the world by catering to it. Though the processors and software developed at a very rapid pace, the trend for making computers increasingly smaller in physical size did not continue beyond the 80s.

In the 90s, the market was not much concerned about computers smaller than the notebook. Those who were not able to identify this phenomenon kept on allocating their R & D budgets for developing smaller, lighter, more powerful systems, like palmtops and sub-notebooks. None of these did have the expected market acceptance. At this time, users were enjoying small and affordable computers, having features such as fast access to data, high processing speeds and large storage capabilities as well as networking capabilities. Some were able to identify an obvious trend resulting from this scenario. This was the need for a tool, which allowed access to all the data and information available in computers located worldwide. Netscape™, which identified this trend, was able to capture about 80% of the Internet users and became highly successful through the development of the browser. At present, with the availability of protocols to access networks using mobile phones, the trend may be for a mobile phone cum web access device.

MAIN APPLICATION AREAS

First of all IT is necessary to identify the potential application areas in the Sri Lankan context. In the more developed countries, the propagation of the computer application in different areas of applications took a gradual evolution over a 50 year period. In such a natural and a gradual development process, the connected links (education, telecommunication, knowledge enhancement, etc.) have sufficient time to be developed in a planned and an orderly manner. For instance, the computerisation of the Government Ministries in developed countries evolved over a time. Electronic Commerce too developed gradually. Developing countries are suddenly waking up to the potential that the IT offers and want to leapfrog two decades and obtain the

benefits. However, due to the lack of an enabling environment coupled with both human and infrastructure shortcomings, the challenge is vast. Therefore, it is first necessary to take a critical look at the potential application areas, the local shortcomings and then try to develop suitable policies.

Education and training

The importance of new technology to assist and perhaps revolutionise education and training is well understood. 'Remarkable new technology is introduced into the school system and experts predict education will be revolutionised. The technology will, as never before, allow the widespread dissemination of new concepts and ideas that stimulate young minds and free the teacher for more creative pursuits. Yet, the magic fails to materialise, and within a few years articles appear in the popular press asserting that the failure, obviously arises from the teacher not being skilled enough in the new technology' (Lewis, 1840).

The following excerpts from New York Times on the introduction of the blackboard made in 1840 holds true (if not vastly surpassed) for current opportunities made available by IT to revolutionise education. What is important to realise is that skills required to use tools made available by IT could be acquired with minimal effort and the benefits are enormous compared to the costs involved.

Though the role of teachers and parents in the education of students cannot be replaced, IT has provided tools, which make the vision of customised learning anytime anywhere a reality (Mazoue, 1999). Advancements of IT has enabled the access and delivery of knowledge and information on line using virtual classes, news groups, conferencing, virtual reference groups, e-mail, streaming audio and video multimedia, CD-ROMs, file sharing, access to data bases, hypertext, online tutorials, question and answer assignments, real-time study sessions, lecture notes, slides, frequently asked questions (FAQs) and by merely roaming the World Wide Web (WWW). These tools can be used to develop effective online instruction, which enable students to spend more time on a task and provides more opportunities for collaborative interaction, both of which research has shown to be correlated with higher student achievement (Mazoue, 1999). A comparison of conventional and IT based knowledge enhancements is shown in Figure 1. In the USA, as of 1998, 66% of the higher education institutes had taken steps to offer courses over Internet or Intranets (SIIA, 2000b) and during 2001 utilisation of web-based and computer based training was expected to overtake IT related classroom teaching in Singapore (Infocomm, 2000a). However, in the absence of adequate information infrastructure facilities, Sri Lanka cannot reap the full benefits of the above tools.

Sri Lanka is still at an infancy stage with regard to the usage of IT for education and training, but plans are underway with significant investments earmarked for both secondary and higher educational institutes (Munasinghe *et al.*, 2001a). It should be noted that factors such as trainer background characteristics, attitudes and concerns have great significance on the degree of classroom usage of IT. Also analysis of best practices in schools of one of the states in the USA indicates following as the main contributory factors for excellence (Michael, 1998): access to computers, leadership, planning, staff development, technical support and strategic hardware & software procurement. It emphasizes the importance of leadership, since all the time schools

would be having limited resources at their disposal. Though the computer is a very powerful tool in education, merely by possessing a computer, one would not be able to reap the benefits, unless skills to use it are also acquired. Therefore, unless this complete investment is made, the technology-based tools would be idling in classrooms without the students using them to the fullest potential. It is, therefore, essential to provide teachers with adequate training to use computers effectively and provide forums for teachers and education researchers to share ideas and approaches on how best to integrate technology in to the curriculum (SIIA, 2000a).

Figure 1 - Comparison of Conventional and IT based Knowledge Enhancement

A cost-benefit analysis has indicated that under many conditions, limited resources are better spent on electronic learning than other school facilities (SIIA, 2000a). It may be worthwhile for Sri Lanka too, to analyse the feasibility of using a model consisting of appropriate techniques of IT, to accelerate the process of bridging the wide gap between urban and rural schools.

Access to information

The most important benefit to humanity arising from the IT revolution is access to vast amounts of information. Developments of computer and communication technology have opened the way for current and reliable information in audio, video and text forms, to be accessible anytime anywhere. This perhaps is one of the most significant impacts of IT, influencing mankind and making the concept of global village a reality. The emerging concept of providing software as a service and the introduction of mobile devices capable of accessing information via networks, like the Internet and corporate intranets, would provide millions of people unprecedented access to information, irrespective of the location they are in and more importantly on a real time basis. These developments are starting to affect the ways the governments function and businesses run, as never before.

The access to data, software and services will no longer be restricted to the office or access to a network server, thus enabling enterprises to allow their employees to carry out a significant portion of work away from office at their convenience at anytime at home or anywhere else. The impact of such changes to the economy, in terms of saving of time and cost of travelling, improved efficiency and employee satisfaction, can be tremendous (Munasinghe & Wijayanayake, 2000; 2001; 2001a). However, fears about security and privacy of information, bandwidth and reliability of networks are some of the obstacles affecting the adaptation of available opportunities.

However, what is vital to Sri Lanka in the short term is to enable people access networks using desktops and landlines. Therefore, telecommunication infrastructure should be capable of widespread, faster and reliable access, using networks such as Integrated Services Digital Network (ISDN).

Though information is available on the Internet and Intranets for users to have unprecedented access, users often do not appreciate the fact that information does not create, aggregate or deliver itself without considerable costs. This is causing concern as, if the users refuse to pay for the information, the sources are likely to disappear, forcing them to make decisions on less reliable information (SIIA, 2000b).

Governance and public services

The efficiency at which the government implements its policies has a direct bearing on the rate of development of the country. Application of IT can help in many ways to ensure the efficient delivery of government policy and development programmes. Government can develop and maintain upto date databases of the economic and public sector activities to obtain most current and accurate information necessary for making decisions and formulating the future policies. It can also carry out day-to-day activities efficiently using Intranets covering all Ministries and Departments. Various processes and procedures of the public sector that emerged under years of archaic civil service

and the paper and file driven system will have to be re-engineered to improve efficiency and compatibility with IT. Merely computerising the existing systems that are presently using inefficient procedures would deny the full benefits of IT. Information on various services offered to the public can be made available on home pages of Ministries and Departments enabling users easy access.

Therefore, the government has to take timely action to prepare for e-governance as society becomes literate in IT. It will be extremely useful to make the public sector employees at all levels literate in IT and those at the top level well aware of the potential for various applications of IT.

It may also be useful to promote the establishment of private sector managed IT centres across the country for the general public to access government Departments and Ministries. Computerisation of government activities would also create a significant local demand for software and thereby help the software industry.

Business

IT is applicable to almost all functional areas of businesses, providing vast opportunities for improving productivity. Mainly due to usage of IT in businesses in the USA, the productivity growth had doubled from 1.4% between 1973 and 1995 to 2.8% from 1995 to 1999. IBM has saved US\$ 200 million in 1999 using the web to deliver instructions to its employees and Cisco has saved a total of US\$ 400 million providing customer support via the Internet (SIIA, 2000c).

For several decades, enterprises have been practicing Management Information Systems (MIS) (Liebenau & Backhouse, 1990; Lucas, 1990; Dock & Essick, 1981). However, only the advancements of IT, which enable development of systems to provide accurate, complete, concise, timely, relevant and cost effective information as required at different levels of management, made its usage truly meaningful. With the rapid reduction of prices of computers and software, most enterprises including small and medium enterprises (SME), which make up over 80% of the total number of enterprises in Sri Lanka, can afford to own computers. However, those who own computers mainly use them for routine accounting, payroll and invoicing functions (Cragg & King, 1993). The impact of IT on production planning & control, inventory control, sales & marketing, cost accounting & strategic planning and management information systems (MIS) is minimal (Goonatilake, 1983; Goonatilake, 1984). The reasons and remedies for above are discussed under the section on Industry.

Commerce

IT has totally revolutionised the commerce activities and a new concept known as electronic commerce (EC) has emerged. EC refers to a broad range of business activities, from automated voice systems that take orders over the phone, to electronic data interchange and web based business (Savoie, 1999).

IT has enabled customers to shop at any time anywhere and with the competing online vendors only a click away, the consumers are empowered with unprecedented choices and more importantly convenience (SIIA, 2000c). Therefore, most significant impact of IT is going to be on the area of EC and conversely on the living styles of people. Vendors too are adjusting to the emerging concept by shifting towards a customer-focussed model, which offers products based on the individual's purchasing behaviours.

This is possible as historical transactions of each customer can now be maintained with least effort. Such a model will enable consumers to find exactly what they need at a reasonable cost with a minimum search time, though it raises some concern regarding consumer privacy.

Businesses are also greatly benefited by EC. It eliminates geographical boundaries, greatly reduces/simplifies the marketing channels and let even small businesses access global markets with ease. EC will minimise both sales function and accompanying costs, through business to customer transactions, and purchase function & accompanying costs through business to business transactions and this will result in significant overall savings of costs (Formica & Mitra, 2000). EC also enables unprecedented market access 24 hours a day 7 days a week basis and enables vendors to provide detailed product information to customers. EC also provides an opportunity for vendors to reduce the sales overheads associated with having a shop front and related sales costs. Web based retailing reduces the overall sales costs and part of the savings would naturally be passed on to the consumer.

'One bar code scan at a counter leads to an order to restock inventory from a product warehouse, to an order from the manufacture and, to an order for more raw materials. All of this can happen in an instant, with every step of the chain tracked and the information instantly accessible from anywhere in the world (Figure 2). (SIIA, 2000d). This is the sort of technology the international businesses are now using, against whom local businesses have to compete. Therefore, Sri Lankan businesses, especially those engaged in exports have to embrace EC and take advantage of the opportunities it offers.

Sri Lanka is very much at an infancy stage with regard to the implementation of EC. However, a good starting point for most enterprises would be to get access to the WWW and establish home pages. Home page could provide company profile, product information and customer services. On the short term, application of EC in Sri Lanka will be limited to sectors like banking, hotel reservations and travel reservations, where the clientele will have access to appropriate communication facilities. Implementation of EC has to be approached in a systematic manner starting with digitising existing data and then computerising front-end (sales) and back-end (order processing) activities, gradual integration of front-end and back-end activities and developing customer profiles based on their web searching patterns, past purchase patterns and other personal data. The main impediments for implementing EC in Singapore according to the findings of the IT usage survey of 1998 were the costs involved, security issues, inadequate IT infrastructure, lack of market awareness, lack of management commitment, difficulty with delivery set-ups, lack of role models/case studies, non availability of solutions, incompatibility with existing sales methods, inability to make small trials, non-use by competitors and national/cultural barriers (Infocomm, 2000b). While aforesaid impediments are applicable to Sri Lanka, lack of required manpower and appropriate EC friendly legal framework are other key barriers for implementing EC.

Based on the latest progress reports of member countries of Asia Council for the Facilitation of procedures and practices for Administration, Commerce and Transport (AFACT), Sri Lanka occupy a very low level of achievement with respect to the rest. Measures such as legal status, infrastructure readiness, awareness and education occupy a low status of achievement, while e-commerce investments are at a very low

level. With an overall rating of 2.75, Sri Lanka only occupies the 11th position out of 14 member countries (Table 1).

Figure 2: Actions that could be triggered by one bar code scan at a retail shop

Table 1: Status of EC in Sri Lanka in comparison to other AFACT countries

Country	Legal status	Infrastructure readiness	Awareness, Education	EC investment	Overall rating	No. of EC users
Japan	High	High	High	High	9.63	60,000+
Singapore	High	High	High	High	9.75	22,800
Hong Kong	High	High	High	High	9.13	75,000
S. Korea	High	High	High	High	9.13	15,000
Taiwan	High	High	Medium	Medium	7.25	7,000
Malaysia	Medium	Medium	Medium	Medium	6.00	1,000
Thailand	Medium	Medium	Medium	Low	5.25	1,000
Philippines	Medium	Medium	Medium	Low	5.25	1,000
Indonesia	Medium	Medium	Medium	Low	5.25	1,300
India	Medium	Medium	Medium	Low	5.00	3,000
Sri Lanka	Low	Low	Low	Very low	2.75	<100
Iran	Very low	Very low	Low	Very low	1.75	<100
Pakistan	-	Low	Low	-	1.50	-

Source: AFACT, 2000

Industry

The ongoing information revolution poses many opportunities for industries in developing countries. In the industrial sector, the application possibilities of IT can be divided into two key areas, i.e., Computer Aided Design/Manufacture (CAD/CAM) and Computer Aided Production Management (CAPM) (Goonatilake, 1987). High technology oriented large scale manufacturing facilities competing in the global market place would ideally benefit from CAD/CAM. By the same criteria, CAD/CAM application possibilities in developing countries would be minimal. On the other hand, the key problem in the manufacturing sector in SMIs is the shortcomings resulting from inadequate production management. As such, application of CAPM provides a golden opportunity for industrialists to improve their competitiveness and growth potential to leap frog (Munasinghe & Jayawardena, 2003).

Figure 3: Categories of application of IT in business enterprises

The application of IT in business enterprises fall in to five main categories (Figure 3); Transaction Processing Systems (TPS), Office Automation Systems (OAS), Management Information Systems (MIS), Decision Support Systems (DSS), and Executive Support Systems (ESS). Most of the enterprises in Sri Lanka that have made an attempt to implement IT solutions have only focussed on TPS, OAS and MIS. Though DSS and ESS too offer many opportunities to enhance the competitiveness, only an insignificant number of enterprises have made an attempt towards implementing them.

Lack of understanding of the key factors, which influence the success of application of IT is the main reason for low level of IT application in Sri Lankan enterprises. These key factors are commitment of management, efficient manual procedures, company wide computer literacy and adequate knowledge of management techniques of the Systems Analysts (Munasinghe & Jayawardena, 2003). Thus, to propagate the application of IT in the industrial sector, it is necessary to strengthen management education in the country.

Agriculture

In the agriculture sector too, IT can play an important role to provide timely and relevant information to farmers, researchers and policy makers. Digitisation of relevant data and information would assist the rapid development of the agricultural sector. Examples for such data and information includes extent of cultivation, yields by produce and by geographical area, usage of fertiliser and chemicals, seed requirements and stocks, weather patterns by geographical area, commodity prices at production areas and major markets, imports of agricultural produce on order, commodity stocks with wholesalers and food department, agricultural information services, best practices

in agriculture, subsidies and other government benefits available to farmers, loan schemes available for farmers, farmer insurance schemes etc.

It is also possible to monitor food stocks and take timely action to prevent scarcities, as well as oversupply, which would be detrimental to consumers and farmers respectively. A sound food stocks control system to ensure sufficient food stocks without over supply or scarcities that would ensure a reasonable price for both consumers and producers could be developed. Factors such as demand, local supply, stocks held by traders and farmers, acreage of cultivation and imports could be included in the model.

Home and leisure applications

IT has enabled people to perform many activities such as learning, access to information, entertainment, banking, shopping, insurance, travel reservations, office work etc. at anytime from home.

Another fast developing area of IT is the entertainment sector, which is one of the most influential areas of lives of people. Most formats on entertainment technology have now adapted into digital formats from their original analogue roots. Advancements in digital versatile disk (DVD), digital TV, minidisk technology and Motion Picture expert group-1 layer 3 technology (MP3) coupled with Internet access have enabled people to enjoy a vast range of entertainment from the comfort of their armchair at home. These will, however, be possible only if they have access to Internet and other networks from home. Therefore, all avenues such as TV decoder boxes and cable TV have to be explored to provide people cheap and wide spread access to networks from home.

OPPORTUNITIES FOR SRI LANKA

Software industry growth

Software is the fastest growing industry worldwide (Metha, 2000). The global software market stood at US\$ 375 billion in 1997 and was expected to grow to US\$ 560 billion by the year 2000 (Infoline, 2000). The world market for packaged software was expected to reach US\$ 153 billion by year 2000 (ITDS, 2000). The global software market is estimated to rise to 2 trillion by 2008 (Nasscom, 2000). When considered on a global scale 75 - 80 % of the total IT work force is made up of those employed in the software industry. Over the last decade there was a continued trend for the software industry to shift towards the low wage countries having trained manpower particularly in Asia. Analysts predict this trend to continue during the coming decade. Due to its far sighted policies, India was able to take the best use of the opportunities that were available in the IT sector and achieved annual growth rates of over 50 % during the last decade and is aiming to become an IT super power by the end of the coming decade.

Potential for Sri Lanka

Sri Lanka too has the potential to develop the software industry to make it the largest foreign exchange earner surpassing the garment sector. The key factors for Sri Lanka's potential and suitability are as follows.

- a. Availability of a large pool of unemployed educated youth with good mathematical and logical skills and a reasonably good knowledge of English who would be ideal to undergo training in software development. Out of those who qualify to apply for the university, every year over 50,000 fail to get placements (CDN, 2000).
- b. Software industry could be located anywhere in the country due to the advancements of telecommunication and networking, which reduce the time and distance and made transportation of software extremely cheap, efficient & reliable (Jaber, 1999).
- c. Relatively low capital investments since the software industry is manpower and skill intensive (Metha, 1998).
- d. Enormous potential to earn foreign exchange due to the high share of labour cost (in the total software development cost) which gives and the opportunity for very high local value addition (MSPL, 1998).
- e. Very attractive gross margin rates, often 80 to 90% (ITDS, 2000; Jaber, 1999).
- f. Software industry does not pose undesirable environmental problems.

Possible impediments to overcome

Though software industry has the potential to be developed as an industry that could solve some of the most pressing problems such as the balance of payment and unemployment among the educated youth leading to better living standards, there are certain impediments for its development that must first be overcome. A recent industry needs assessment carried out in Sri Lanka indicated the lack of trained manpower and the poor telecommunication facilities as the main impediment stifling the growth of the software industry in Sri Lanka (Table 2) (Munasinghe *et al.*, 2001a). The other enabling factors that would create a vibrant software industry are the commitment of the government, low cost funding, incentives and simplified investment approvals, promotion of investors and exports, local demand and legal protection for intellectual property rights (Munasinghe *et al.*, 2001b). Therefore, the government should formulate a sound policy that will strengthen these factors.

Table 2 : Ranking of impediments for IT growth in Sri Lanka

Impediment	Rank
Lack of trained IT personnel	1
Inadequate infrastructure facilities (i.e. telecommunications)	2
Bureaucratic delays at government agencies	3
Inadequate incentives	4
Lack of finances	5

Source: (ADB, 2000)

IT industry trends

Potential development of IT must closely follow the rapidly changing IT industry trends. Application of software that could be located on a centralised data centre, enabling access via Internet or Intranets on a recurring fee basis using thin wireless devices or desktops is tipped to be the major driver of the software industry in the coming decade (SIIA, 2000b). Other major growth areas are e-business and other web based interactive software (Nasscom, 2000). Most web-based software is expected to use Java computer language, enabling software to be run on any platform (ITDS, 2000). There is also a trend to develop software around the freely available network operating system Linux.

Many analysts predict IT enabled services or 'Remote Processing' to be a major driver in the IT led services industry (Nasscom, 2000). IT enabled services cover data processing, call centres, medical transcription, data digitisation, back office operations, web content development, animation and many other services. Manpower required for these services can be trained within a relatively short time and with little effort, making it an ideal avenue for Sri Lankan entrepreneurs to launch in to the software industry.

Software technology parks (STP)

Countries such as India have used the STP model as a mean of propagating new IT ventures. Though Sri Lanka may not yet have come to the stage of setting up STPs apart from the initial showpiece centre located at the heart of the commercial capital, time is now opportune to identify a few areas for the purpose. Out of the two main resource requirements, i.e., manpower and telecommunication facilities, the latter can be provided to any area. Therefore, the availability of potential manpower becomes the vital factor for identifying potential STPs. Ideally, both issues have to be addressed simultaneously. It is also desirable to promote the establishment of IT educational and training centres and to initiate action to provide most up to date telecommunication infrastructure for these areas.

IT education and training sector

While IT is the fastest growing sector in the world, the relevant technology too is advancing very rapidly. Therefore, in addition to training an increasing number of new manpower, the existing manpower too has to be retrained continuously to cope with the fast changing skill requirements resulting from the rapidly changing technologies.

This has enabled education and training in IT too to emerge as a very significant and growing business area. India has targeted to earn US\$ 5 billions in foreign exchange by 2005 by providing IT related education and training to other countries (Anon., 1999). This emerging IT education business potential has encouraged a number of private sector led IT training ventures. As a result, in addition to government initiative to enhance the competitiveness/productivity of all sectors of the economy using IT, a number of foreign investors have shown considerable interest to locate software industries in Sri Lanka. Table 3 shows the status of investments approved by the BOI in the recent past.

Table 3 : Investor interest for locating software industries with BOI approval

Status	Number
Under Construction	12
Commercial Operation	32
Awaiting Construction	5
Closed	2
Awaiting Agreement	23

Source: BOI, 2000

Based on the results of the General Certificate Examination (advanced level) examination held in 2000, 91,589 have qualified to apply for admission to universities (CDN, 2000). Though similar numbers qualify every year, only around 20,000 get university placements. Thus due to the availability of a large pool of well educated trainable youth in Sri Lanka, there is a tremendous potential for investment opportunities in the education and training sector. Therefore, the government has to carry out an aggressive campaign to attract reputed foreign establishments engaged in training to start operations in Sri Lanka. Foreign collaboration is important because the curricula related to IT have to be updated at very short intervals to reflect the rapid advancements. It is therefore desirable for the training providers to have alliances, affiliations, links, franchises and accreditation with reputed local and foreign institutes and industries.

Types of IT related training

Education and training programmes relating to the IT industry fall in to two main types. These are as follows.

a. Courses targeted at producing manpower requirements for the IT industry.

These courses can be at a number of different levels and categories:

- i.) Diploma or degree courses giving a comprehensive training in all aspects of IT;
- ii.) Training programmes on proprietary software packages such as SAP and Oracle to professionals;
- iii.) Courses targeted at technology or skills upgrading such as computer-aided software engineering (CASE) and adoption of graphical user interfaces (GUIs);
- iv.) Training on programming languages such as Java, Visual Basic, C++ and Power Builder;
- v.) Courses leading to a career in a niche area such as web page designing and multi-media designing.

b. IT literacy courses and courses targeted at users of specific application packages.

- i.) Courses at literacy level include those on fundamentals of computers and most widely used application packages such as word processing and spread sheets.
- ii.) Training on using a specific software package are targeted at professionals who intend using a specific software package to carryout their functional activities such as accounting, designing, marketing and stock keeping.

In Sri Lanka, both these types of courses are offered at a limited number of universities and private and public institutes, while large number of private institutes and a very limited number of schools offer only literacy level courses.

Impediments

Shortage of the trainers, inadequate facilities at the training institutes, non-availability of training institutes, lack of links with industry and lack of information infrastructure are the key impediments for development of education and training sector. In the short term, the most cost effective measure to overcome the shortage of trainers may be to get the services of personnel from India where there is a large base of well-qualified trainers.

CONCLUSIONS

There is a high potential to Sri Lanka to benefit from the ongoing IT revolution. India has quite successfully utilised the opportunities available both in terms of software development and finding an alternate source of employment previously not available. Such gains are attributed to long term planning by the government and the provision of an enabling support environment.

In the case of Sri Lanka, the available potential can be effectively utilised to address two major economic problems. One of these problems is the need to diversify the economy to a new gainful sector. The industry sector now contributes about 21% of the GDP, but heavily reliant on garment exports. The elimination of the Multi-fibre agreement (MFA) in 2005 exposes the economy to global competition. IT industry offers an opportunity to develop a new gainful sector for the economy. The other main problem faced by successive governments is the high degree of graduate unemployment and the issue of over 50,000 G.C.E (Advanced level) qualified students seeking alternate career prospects. The IT industry offers a rewarding career opportunity to such graduates and G.C.E (Advanced level) qualified job aspirants.

Apart from the linkage of training professionals for the global IT market and sub-contracted local software houses, a concerted IT industry development programmes provide much needed support to a number of other related areas of the Sri Lankan economy. The IT revolution offers a unique training and knowledge enhancing opportunity to the masses through web based training and this opportunity has to be explored to the full.

Though Sri Lanka can be proud of being a top league developing country with the highest literacy rate, in future what would be important is computer literacy and urgent plans have to be made to ensure a significant part of the population to be computer literate.

Development relies on efficient governance and public administration. The government machinery in developing countries such as Sri Lanka is overly bureaucratic, inaccessible, slow and poor in providing user-friendly information. IT offers an opportunity to revolutionise the information flow and the governance capabilities. The biggest impact of the IT revolution would be on industry and commerce. In the emerged era of the globalised market place, e-commerce plays a vital key and IT applications are essential for industry to become globally competitive.

From the foregoing, it is imperative that IT industry offers a number of development opportunities for Sri Lanka. These include the prospects for developing a vibrant new sector in the economy, addressing the growing unemployment problem, improving governance & public administration and enhancing the global competitiveness of industry and commerce.

The exploitation of this potential naturally relies on developing appropriate policies and programs. A critical factor that should govern the policy and incentives is the IT industry trends. The speed at which the industry itself has developed over the recent years shows that the correct analysis of industry trends is critical.

Within the above overall analytical framework, the following urgent steps are recommended.

- Infrastructure development specially for communication
- Appropriate incentives under BOI
- Concerted training programs

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