

INFORMATION TECHNOLOGY: THE FUTURE SCENARIOS

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Information Technology or I.T. as it is popularly known, is the term used to define the combination of Computers, Software and Telecommunications. This combination permits access to information in all forms. Traditionally, information was available to those who required it in the written form, namely in books or periodicals. The technology of the day was the printing press and a person had to either purchase the required source of information or use a library to obtain this information. However, access to knowledge was restricted because not all of it was readily available.

In trying to look at the future one must look at how this merger of the three components evolved. The first computers were developed to assist the war effort of the Allied Forces during the Second World War. Following the end of the war research and development were focussed on commercializing these computers. Therefore, during the 50's, 60's and 70's computers were naturally very expensive and were affordable only to large wealthy corporations and governments. During the 80's the paradigm shifted with the development of the Personal Computer. This can be considered the beginning of the information revolution because the developers of the early PC's were challenged by the market to develop faster, low cost machines. This change in the equation brought pressure on established companies, which specialized in main frame and mini computers, to develop cheaper machines. While these pressures were mounting on the mainframe vendors, PC manufacturers were introducing faster and

faster machines. The result of these two developments was the improved affordability of computers. As a result today it is no longer possible to truly differentiate between a mainframe, mini computer or personal computer.

The developments in the Personal Computer arena were the catalyst for the creation of networks. During the era that is considered to have been dominated by Mainframes and Mini-computers, computer networks developed although at a comparatively slow pace. Pure economic factors contributed to the slow development of networks. However, in the USA, a network linking many Research Centers and universities was developed with the assistance of the US government. This network was primarily for the sharing of information relating to the defence establishment of the USA. Over the time as computers began to proliferate due to lower prices, more and more of their machines were connected to this network. Similar networks began to appear in Europe and other countries, although usage was confined to academia and government organizations. As the demand for networking grew it fueled research and development in network technology. Due to economic reasons, capacities had to be increased rapidly. This gave birth to new technologies and improved manufacturing methodologies. Today the end result is seen in networks that are capable of providing access to other computers at very high speeds, which would have been unimaginable a few years ago. As these international networks grew and the implementation costs of telecommunications were being reduced the demand for more connectivity to these networks grew rapidly.

As the cost of networks, computers and software declined, more people were able to afford these technologies. This gave rise to the ability to share knowledge and we saw in the last three years the explosive growth of the number of computers connected to the Internet. Essentially there were seekers of information and providers of information. This is what we have today.

Sri Lanka is fortunate that it has embraced this revolution at this stage of technological development. As a result we are now able to afford these technologies that only a few years ago were far beyond our economic reach. Coinciding with the increased affordability of computers was the determination of the government to significantly improve the overall telecommunications environment in the country. The advent of companies such as Suntel and Lanka Bell ensured that Sri Lanka obtained the latest telecommunication technologies where the same technology could be used for voice, data and image communications. The subsequent divestiture of a part of Sri Lanka Telecom to NTT added to the changes shaping the future of telecommunication services in Sri Lanka. Mobile operators such as Celltel, Mobitel, CallLink and Dialog increased the availability of telecommunications services. These mobile operators and in particular Dialog, which uses digital systems, laid the foundations for the move towards an information economy.

With the rapid development of telecommunications, foundations are now laid for the construction of a new industry – the information based

service industry. We are now in a position to challenge the regional centers such as Singapore for Financial Services and Transshipment of Goods, and India for software development and call centers.

The acceptance of I.T. in Sri Lanka has been and continues to be driven by the financial sector. The infrastructure built for institutions such as the Colombo Stock Exchange, the availability of Banking around the country through the use of Automated Teller Machines (ATM) and other type of Cash machines has brought about significant improvements in the delivery of services. The financial sector, particularly banks continue to propel the usage of technology by utilizing I.T. to offer services such as telebanking or banking via the Web. While these initiatives provide improved service for customers they also bring down costs of maintaining branches.

As regards access to information which I referred to at the beginning, we are seeing a rapid increase in the number of Internet web sites in Sri Lanka. Knowledge is being transferred from paper form into electronic form and is being made accessible to the entire world. I.T. therefore has a role to play in all spheres of human activity in this country. Sri Lanka has much to offer to the world. Our tourism industry can significantly benefit if we can attract not only those who want to enjoy our sunshine and our beaches but also our ancient wonders and culture – a more discerning clientele. Having information (textual and pictorial) such as our heritage sites online and accessible by anyone with a computer anywhere in the world, provides the ability to disseminate this information to a much wider audience than would be possible through any promotional campaign that is based on conventional forms of communications. Today it is possible to visit, from the comfort of one's office or home, vacation destinations around the world. One can see pictures of these exotic destinations, find out prices of hotels, climate, appropriate attire, costs and other information before one makes a decision. Today it is possible

to even make available video clips of these destinations so that not only can one read about or see still pictures of these destinations but also hear a narrative about them. One has to only imagine the effect on someone in Europe of seeing the beauty of our ancient wonders such as the Sigiriya Frescos or the ruins of our ancient civilizations in Anuradhapura or Polonnaruwa.

Let us leave aside our ancient culture and look at other areas such as tropical medical research. There is a vast amount of material out in society that is not accessible. If we were to compile all this knowledge and publish these on the Internet we would be contributing to social and economic development. Our knowledge of ancient medical practices as well as knowledge gained through practical applications of western medicine is invaluable not only to our own people but also to those all over the world. One could argue that it costs a significant amount of money to convert these ideas into reality. This is true but the money can be found through the sale of this knowledge to others. The world is thirsty for knowledge. If we require the knowledge of the developed countries we have to pay for it. Similarly if they want our knowledge they should have to pay for it and they will willingly pay for it. Information has become a commodity.

The use and application of I.T. is now only limited by the limits of our creativity. Today stock market information is available to you on your digital cellular phone or your computer screen. The day when you can trade your shares without physically going to your broker's office is not far away. This may not sound very exciting but if we were to take it a step further where anyone in the world can look at what is happening in our exchange online the possibilities are limitless. The developments in the telecommunications networks make it even possible to rent entertainment such as movies online and to view these on a large TV screen which is connected to your PC. In the near future you will see the merging of TV, Video, Music and Computers into one system.

Looking at possible new industries one readily sees the ability to capitalize our telecommunications links and our comparatively lower manpower costs to establish call centers or off shore processing of raw data into valuable marketable information. We already have seen a few pioneers in this area, who may not have had the ideal environment when they started but are now able to forge ahead providing information related services. Just one year ago if one wanted to convert a paper based document to an electronic document one had to either type it on a keyboard or scan it in as an image. Today there is voice recognition technology readily available that allows one to read/talk into a computer. Therefore, transcription of knowledge has become cheaper and easier.

The future economic and social development of this country is in the I.T. services industry. It is the next trust industry for Sri Lanka. However, while we have ready access to computers, software and telecommunications technologies, there are certain constraints that we are now facing. The most important is the non-availability of Human Resources that are essential for the continued development of our industry. The types of Human Resources that we lack range from a sufficient number of people who are familiar with computers and their usage (users) to personnel who would develop the software, support the networks and hardware that are needed in the private and public sectors.

Over the last few years, successive governments, senior policy makers and implementers have recognized the need to create an industry that addresses the need to find employment for the educated youth of this country. The last major sector focus was in the garment industry, which essentially addressed the employment question of the relatively uneducated youth. This program was focused at the female workers. Programs such as the 200 garment factory's etc. were geared to creating industries around the country and thereby, through a "ripple" effect bring about

development in the respective areas because the factory would become the economic focal point for this development. However, this program did not address the pressing issue of employment for the educated unemployed namely the graduates of our universities nor those who have passed the GCE 'A' Level but were unable to secure seats at the universities.

Even industrialized countries such as the United States of America and those in the European Community have realized that traditional industries cannot provide the social stability that these countries have enjoyed in the past. As a result, they are looking towards the developing world to provide them with their durable goods at cheaper prices than it is possible to provide when manufactured within their own national boundaries. Manufacturing companies in the developed world have accepted the reality that the consumer is seeking quality products at cheap prices. In an effort to protect their companies and their shareholders many companies have retooled and modernized their factories through the use of Robotics and automated processes. The result of this has been more efficient production and greater productivity. However, the cost of this productivity and efficiency has resulted in the loss of blue collar jobs. In fact today a majority of workers in the workforce in the developed countries are considered white collar workers. Furthermore, these white collar workers are involved in some form of information processing.

However, in the developed world, the human cost is growing larger which means that even service industries, particularly those relating to I.T., are beginning to find themselves unable to meet the "quality product at a competitive price" requirement of the consumers. Essentially, the developed world has moved into dependence on electronics in every aspect of life. This growing dependence and demand for newer technologies, have resulted in the unavailability of sufficient software personnel in the developed countries who would be the inputs into the "quality but competitive" equation.

The result has been the turn towards the developing world to provide the human resources needed to create the instructions/programs that would manipulate and control the rapid increase in technological use of electronics. The developed world will continue to excel in the development of new technologies and will devote significant funds towards research and development of these technologies. In the "product costing" equation, the ability to recover large amounts of research and development expenses, is based on the number of units of a product that can be sold. Due to the large populations in the developed world, it is possible to recover an investment in research and development through the sale of sufficient units of any product. This is plainly seen in the sector of I.T., where we continue to see the technological breakthroughs and new technology development taking place in the developed countries, particularly the United States of America.

When analyzing the basic requirement for the development of systems and programs needed to meet the growing dependence of the west on new technologies, the single most important input is the human intellect. It is human intellect that makes possible the innovative systems and programs that are required to drive the technology that is being developed in the west. This fact is amply demonstrated by the recent initiative by Microsoft Corp. to recruit 3000 programmers from the developing world. Microsoft realized that if it was to be competitive it needed more human intellect at lower prices than were available from among their own citizens.

A further example is an effort currently underway by major US and European Human Resource Recruitment Companies, to recruit large numbers of software developers a month for clients in countries such as the USA, Canada, and UK from countries such as Sri Lanka, India and Vietnam. Today, in Sri Lanka, we have many BOI Software Development companies which have a target of employing on average over 200 personnel per year. Some have plans to establish software development centers employing over

1,000 developers using state-of-the-art software technologies. The current requirements for programmers for Software Development companies that came into existence during the last 12 months is over 1,200.

Economic development in a country such as Sri Lanka has to be viewed from a national perspective and not from a locality angle. The economic hub of Sri Lanka is without doubt the Western Province, particularly the Colombo metropolitan area. The reason that this area has achieved this status is due to infrastructure factors such as the availability of electricity, telecommunications, pipe borne water, transportation, and social factors. The latter include the availability of high quality education facilities (from pre-school to university), communications to the rest of the world and other historic reasons.

If nationwide economic development is to become a reality, economic activities must take place throughout the country. We have seen the first step in meeting this goal through, as indicated earlier, such initiatives as the 200 Garment Factory Programme. However, with the impending abolition of the quota system, there will be tremendous competitive pressure for these factories to improve efficiency and productivity, while keeping costs down. Based on the current level of efficiency of these factories one can safely assume that as much as 50% could go out of business. The result will be loss of existing jobs in factories that close down and the corresponding economic down turn in the ancillary industries that directly support these factories through the provision of raw materials. Furthermore, support industries such as small shops and eating houses will reduce in numbers because these areas would not have as much disposable income.

Compounding the national problem, is the fact that industrialization of Sri Lanka and the flow of foreign investment, has slowed down considerably, due to the prevailing security situation in the country as well as other regional factors such as the "Asian Meltdown". Foreign investors

who were evaluating ventures that would bring in large foreign investments that are needed to provide employment to the semi-educated populace, are now looking at other emerging countries such as Vietnam as being more suitable for making their investments. Essentially, political and security stability has become a major requirement.

Ventures such as these require very large investments, and foreign investors are reluctant to make such investments. It should be clearly understood that this investor reluctance does not apply to infrastructure projects such as telecommunications since the benefits of such investments far outweigh the risks.

Since the traditional manufacturing industries are capital intensive, and due to global competition, have to remain competitive, it is not possible to look to indigenous industrialists to meet the unemployment challenges we are facing.

The type of industry that is required is one that meets the following requirements:

- Requires a relatively low capital investment (less than Rs. 15 million)
- Must have the ability to be setup anywhere in the country or at least in the major towns and cities in the Provinces without being dependent on the facilities in the Colombo District.
- Must be able to provide employment to large numbers of educated youth.
- Must be able to generate entry level individual income levels above the US\$ 250 – US\$ 350 per month.
- Complies with the requirement of being environmentally friendly or at least generating minimum pollution of the environment.
- Does not require or prompt major social dislocation.
- Ensures technology transfer to Sri Lanka

- Provides very high level of value addition in the process – at least 75% of the raw material.

- Ability to provide a product that is superior in quality when compared to our competitors – particularly India, Singapore, Malaysia, Thailand, Taiwan, China, Indo-China.

The industry that meets the criteria outlined above is the I.T. industry and the means by which it meets the criteria are as follows:

- The costs for establishing an export oriented I.T. industry such as a software development company is confined to the acquisition of the technology and related equipment and infrastructure for people to develop software. These investments can be incremental based on the income generated and future work in the pipe line. As work increases, the additional requirements of staff can be met either through further capital infusion or through financing mechanisms such as leasing or working capital loans. The financing institutions would see a low risk on repayment because of the contracts in hand.

- I.T. industries such as software development can be established anywhere in the country where there is electricity and telecommunications. With current developments in telecommunications it is possible for these industries to be "connected" to the world.

- Uninterrupted electricity is a major issue since it is not confined only to this industry but to the country as a whole. Assuming that current efforts to avert an energy crisis such as that faced by us recently, are successful, then the availability of electricity in large provincial centers would not generally be an issue. However, even if electricity is not available 100% of the time, the use of generators could partially and temporarily solve this problem.

- The I.T. is the one industry that can provide employment to large numbers of educated youth. This could be in the area of Software Development, Information Processing, etc. because these industries are dependent

almost 100% on the human intellect. Therefore, as we have a large pool of educated youth this industry is ideally suited to meet this national requirement. The software industry not only makes use of the human intellect but also stimulates it because no software project is identical to another.

- If the clients are being provided with I.T. services e.g. software development, that are on the cutting edge of technology, it is possible to set rates as high as US\$300 per day. As the marketplace in the west is so large, many companies are now looking to move to the next level of technology and therefore are looking for companies that have the newer skills. In a country such as the USA, even if only 500 companies are moving to the new technology, the work that such a move generates is in the region of US\$100's of millions. This phenomenon is not confined to the USA but is also very evident in Europe. Therefore, our software resources, if they are providing the newer technologies can use the supply/demand factor to charge even a higher rate than our competitors, provided a quality product is assured.

- The I.T. industry is environmentally friendly since it does not have pollution as an output of the production processes.

- If I.T. companies are distributed outside the Colombo District, people from rural areas who have the skills in this industry can work for companies that have been established in their home areas. They will not have to move to the Colombo District and find lodgings etc. They can remain in their towns and commute short distances to their work place. As a result, the family unit will remain intact and the expenses of these individuals will be reduced, resulting in the availability of more disposable income for use in the immediate economic area.

- Since the type of software that needs to be developed is based on the newer technology, the mere fact that this type of software is being

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developed ensures that technology transfer takes place. In addition, the electronic technology that is required as the platform on which software is developed will penetrate throughout the country. With technology being introduced, new ways of using this will be identified by the people.

● The raw material for the I.T. industry is largely human intellect. Therefore, the value addition is extremely high. Initially, during the learning period of the new technologies, some of the raw materials (knowledge) will have to come from other sources which means that not all of the inputs will be local human intellect. However, in time in most instances this value addition can be as high as 90%.

● Currently the software industry is suffering from a dearth of expertise because many of the experienced, dynamic developers have migrated. As a result, the human costs are rising rapidly due to the low supply as compared to the high demand. However, if there is a large pool of trained personnel (trained in the newer technologies), salary costs can be stabilized and as a result it is possible to be price competitive.

While the I.T. industry can be export oriented, developments due to the application of human intellect can be used for developing our own organizations so that through the use of I.T. they can become even more competitive in the global market. The application of human intellect into the development of electronic means of conducting our work can help bring all types of services, especially government services closer to the citizens. It may even be possible to bring about national integration and harmony and cut through the various barriers that prevent this integration and resolution of our current national problems.

