

I. INTRODUCTION

1.1 Background

The Master Plan Study for Industrialization and Investment Promotion in Sri Lanka (Phases I and II), conducted by JICA in 1999-2000, has worked out the overall strategies for industrial sector development of the country, as well as strategic development plans for the target industries (seven sub-sectors), with a target year set for 2010. Among the industrial development programs proposed at the sector and sub-sector levels, the IT industry is considered to be a driving force of the Sri Lankan economy and an important part of the national industrialization strategies.

As a strategic plan for development of the IT industry, the Master Plan has proposed the establishment of a “Technopark”. The Technopark will be a cluster of IT service industries and electronic/electric industries, having close linkages with academic and research institutions. The Technopark also aims at promoting human resource development of IT experts as a prerequisite for development of the IT industry. The Master Plan has presented a conceptual plan of the Technopark.

With the increasing importance of the IT industry in Sri Lanka, the Ministry of Enterprise Development, Industrial Policy and Investment Promotion (hereinafter referred to as MEII) asked JICA to carry out a follow-up study of the Master Plan in order to formulate an implementation plan for the Technopark.

1.2 Objectives and Scope of the Study

1) Objectives

The objectives of this follow-up study were defined by MEII and JICA, as listed below.

- (i) To review the conceptual plan of the Technopark proposed in the Master Plan, with updated information on the requirements, prospects and alternative locations of the Technopark,

- (ii) To formulate a development plan for the Technopark, and
- (iii) To propose investment promotion strategies for the Technopark.

The study area is the area surrounding the city of Colombo. The inland urban center of Kandy was one of the alternative study areas, but it was excluded from further consideration because of the existing industrial park capable of accommodating further investment in IT related industries. An investment demand survey for the Technopark was conducted in neighboring countries (southern India, Malaysia and Singapore) as well as in Sri Lanka.

2) Scope of the Study

In order to achieve the aforementioned objectives, the Study covered the following major works, as agreed to in the Inception Report:

(a) Review of the Technopark functions

The functions of the Technopark should be reviewed and defined to meet the requirement for the IT related industries, including the following:

- (i) Clustering of IT-industries (software and hardware industries),
- (ii) Smart Center for network operation and other functions,
- (iii) Virtual University and electronic library,
- (iv) Training and retraining of IT-professionals,
- (v) Incubation of software industries, and
- (vi) Locating electronic/electric industries.

(b) Survey of investment-demand for the IT-industry

The potential for investment in the Technopark by domestic IT enterprises and those of neighbouring countries were identified through a questionnaire survey. Potential investment by foreign enterprises was surveyed in southern India, Malaysia and Singapore.

(c) Selection of Technopark location

Candidate locations for development of the Technopark were studied, including the three sites identified by the Master Plan (i.e., Dampe, Regidale and Malambe), as well as new sites suggested by the authorities concerned.

(d) Planning of the Technopark facilities

The facilities required for respective functions were planned and designed for feasibility level study and evaluation purposes.

(e) Institutional framework for implementation

Institutional frameworks for implementation were identified, including financial arrangements, implementation and management organization.

(f) Evaluation of the Technopark plan

The technical soundness and financial viability of the Technopark plan was evaluated, together with the initial environmental examination (IEE).

1.3 Execution of the Study

This Study was carried out by the JICA Study Team, organized by experts of KRI International Corp. (an affiliate of Nippon Koei Co., Ltd. specialized in economic and social studies). The fieldwork was conducted from mid of February to the end of March 2002. Subcontract-works were conducted for an investment-demand analysis and a natural condition survey and Initial Environmental Examination (IEE). The former was subcontracted to Jurong Consultants Pte Ltd. of Singapore, and the latter was carried out by Ground Engineering Consultants Pvt Ltd. of Sri Lanka.

A Working Group (WG) for this Technopark study was formed by MEII with representatives from the public institutions concerned, universities and associations of private enterprises in the IT-related industries. The WG convened twice to discuss major issues of IT promotion and the Technopark project. The comments and opinions raised by the WG have been considered in the preparation of this final report. Likewise, a workshop was held to discuss the basic plan to incorporate the opinions of the stakeholders at the conclusion of the fieldwork. The WG members, as well as the members of the Study Team, are listed on the following page.

Table 1.1 Participants in the Study

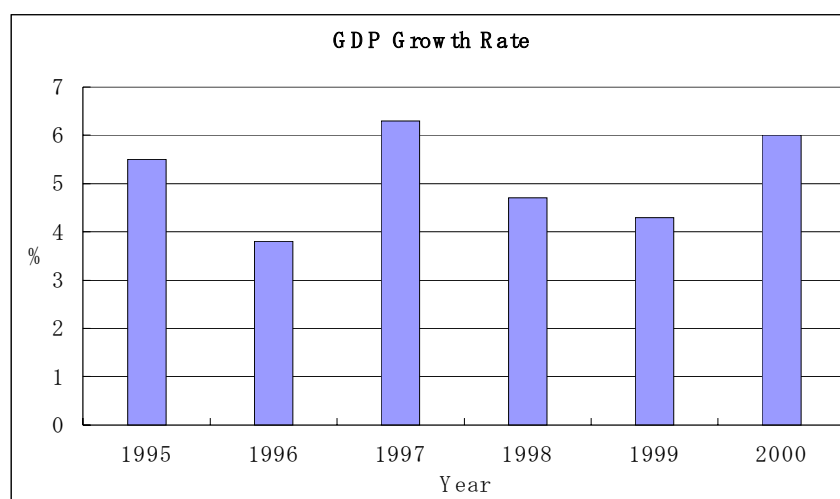
Position	Name	Title
Management by the Ministry	Ranjit Fernando	Secretary, MEDII
	R. V. Don Piyatilake	Director, Specific Project, MEDII
	W. Ruchira Withana	Deputy Director, Specific Project, MEDII
Working Group		
	S.V. Jayasooriya	Executive Director, Board of Investment
	Dr. S Dharmavasan	Vice President, Association for Software Industries
	Lionel Perera	President, Association of Computer Training Organization
	Tisil Cooray	Chairman, I.E. Technics
	Meric Gunarathne	Executive Director, Toslanka Co. Ltd.
	J.A.J.T. De Seram	Deputy General Manager, National Engineering Research Development Centre
	Gamunu Silva	General manager, State Engineering Corporation
	T.I. Jamaldeen	Coordinator, Software Exporters Association
	Sahen Sonnadara	Manager, Singer Industries Ceylon Ltd.
	Siri Samarakkody	Chairman, SJ Electronics
	K.M. Liyanage	Director, University of Peradeniya
	Deleeka Dias	Head of Electronics and Telecommunication, University of Moratuwa
	Nalin Wickramarachchi	Head of Computer Science, University of Moratuwa
	Prof. V.K. Samaranayake	Computer Department, University of Colombo
	Dr. Ajith Madurapperuma	Dept. of Computer Science and College House
	Sehana De Silva	Deputy Director, Board of Investment
	Hemantha K. Jayasundara	Director, Urban Development Authority
JICA Study Team		
	Hajime Koizumi	Team Leader
	Seiichi Aoki	IT industry development (policy)
	Sanath B. Jayamanna	IT industry development
	Yosuke Fukushima	Investment-demand survey
	Isamu Asakura	Technopark Planning
	Jun Kuwabara	Facility Planning
	Shinichi Isoda	Financial Analysis

II. SECTORAL BACKGROUND

2.1 Sri Lankan Economy

Since Sri Lanka shifted to a market-oriented economy in 1977, the national economy has attained steady growth, with GDP increasing from US\$4.1 billion in 1977 to US\$17.2 billion in 2000. Nevertheless, Sri Lanka still remains a low-middle-income country (World Bank classification) with a per capita GDP estimated at around US\$840.

Despite the fact that the Asian financial crisis in 1997 affected the Sri Lankan economy to a certain extent, it still grew at 4.7% in 1998 and 4.3% in 1999. The economic growth rate in 2000 was significantly higher at 6.0%, and its inflation remained moderate. The recent growth was observed in every sector of the economy, and particularly in the manufacturing and service sectors. The relatively high economic growth and expanding investment have resulted in increased employment opportunities and the unemployment rate declined to about 8% in 2000.

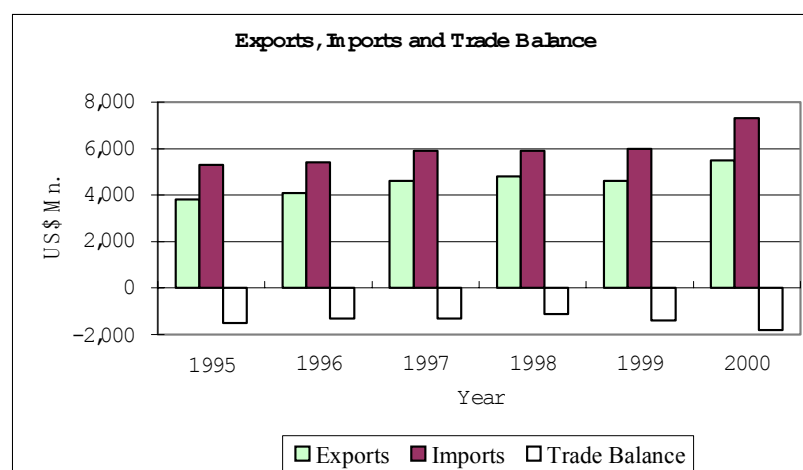


(Source) Central Bank

Figure 2.1 GDP Growth Rate

An open market policy has been adopted, including trade liberalization, and Sri Lanka is now reputed to be the most open economy in South Asia. Strong growth can be seen in

international trade, with export earnings of US\$5.5 billion recorded in 2000, an increase of 20% on 1999.



(Source) Central Bank

Figure 2.2 Exports, Imports and Trade Balance

The industrial sector grew by 11% in 2000, reflecting a robust growth in export-oriented industries. Among the industrial sub-sectors, the textile and apparel industry has been a leading industry since the early 1990s. This sub-sector accounted for over 40% of the gross value added (GVA) in the manufacturing sector and 54% of the total export value in 2000. Major industries in other sub-sectors are labor-intensive industries and local resource-based industries, e.g., tea products, rubber, and gems/jewelry.

Table 2.1 Structure of Manufacturing Gross Value Added

		(%)				
		1990	1995	1998	1999	2000
31	Food, beverage and tobacco	38.9	36.1	31.2	31.0	29.3
32	Textile, wearing apparel and leather	23.1	30.4	36.7	38.5	41.5
33	Wood	1.6	1.4	1.0	1.0	0.9
34	Paper	3.3	3.0	2.0	1.9	1.7
35	Chemical, petroleum, rubber and plastic	7.8	8.4	11.0	9.6	10.6
36	Non-metallic minerals	15.3	11.9	9.6	9.6	8.5
37	Basic metals	0.6	0.4	0.5	0.5	0.5
38	Fabricated metal, machinery and transport eqpmt.	8.9	5.6	5.2	5.1	4.6
39	Other manufacture	0.4	2.8	2.6	2.6	2.4
Total Manufacturing		100.0	100.0	100.0	100.0	100.0

(Source) Central Bank

Excessive dependence on the textile/apparel sub-sector is considered to be a constraint, because the export quota system is to be abolished in 2005 when the Multi-Fiber Agreement (MFA) comes to an end. Though the impact of the dismantling of the MFA on the textile/apparel industry is as yet uncertain, it is obvious that the Sri Lankan industrial base should be more diversified. As proposed in the Master Plan for Industrialization and Investment Promotion, a paradigm shift should be pursued from labor-intensive and resource-based industries to technology-intensive and knowledge-based industries.

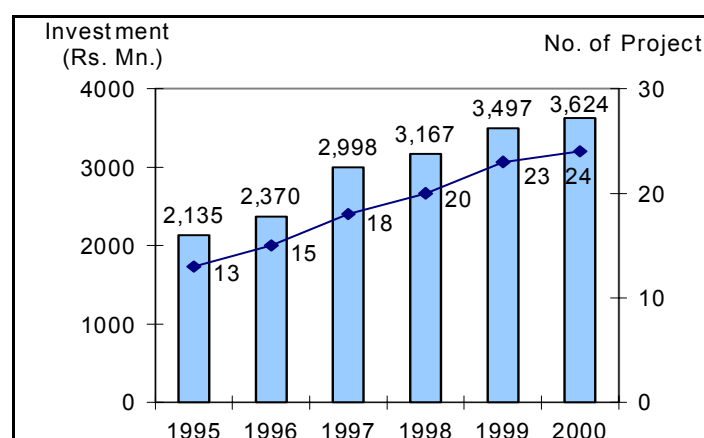
The Sri Lankan economy has been substantially affected by the prolonged ethnic conflicts. However, a permanent ceasefire agreement was realized in February 2002, and there is an expectation in the private and public sectors that economic and social development could be accelerated after a peace agreement is concluded.

2.2 IT-related Industry

The IT-related industry in Sri Lanka covers the following sub-sectors:

- (i) Electronic/Electric industry, including IT hardware industry,
- (ii) IT software (service) industry, and
- (iii) IT training industry.

The questionnaire survey in 1999 revealed that there were more than 50 electronic/electric manufacturers having more than 25 employees. Their total employment was about 9,340, and nearly 60% were employed by foreign firms or their joint ventures. The electronic industry projects approved under Section 17 of BOI law have been increasing both in terms of number and the total scale of investment as shown in the figure below.



(Source) BOI

Figure 2.3 Investment in Electronic Industry

The IT hardware industry consists of a small number of companies, but its export contribution is significant. An example is a manufacturer of electronic disk readers for export (FDK Lanka, invested by a Japanese enterprise), which has expanded to employ more than 3,400 workers. The export value of the electronic/electric industry amounted to about US\$240 million in 1999, according to the EDB statistics.

Recently, foreign direct investments (FDIs) in the IT hardware industry have been rather stagnant. The number of IT hardware enterprises approved by the Board of Investment (BOI) is shown in the following table:

Table 2.2 BOI Approved IT Hardware Enterprises

Project Status	No. of Project	Estimated Investment (Rs. Mn.)			Employment at Capacity (Nos.)
		Foreign	Local	Total	
Hardware					
Awaiting Agreement	0	0.00	0.00	0.00	0
Awaiting Construction	4	33.50	81.20	114.70	482
Under Construction	0	0.00	0.00	0.00	0
Commercial Operation	20	1,717.90	870.50	2,588.40	11,214
Total	24	1,751.40	951.70	2,703.10	11,696

(Source) BOI

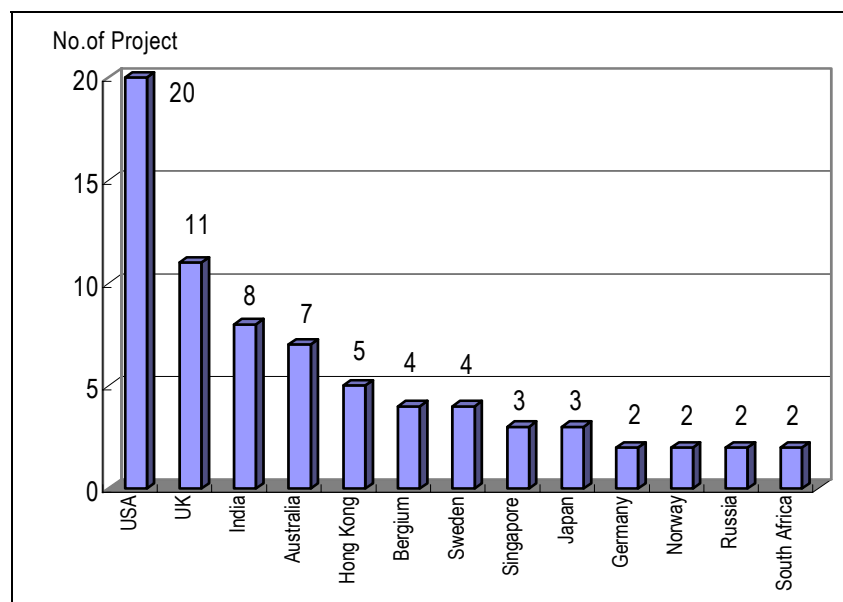
The IT software (service) industry is a new industry developed in the 1990s, particularly after 1996 when the IT industry promotion package was adopted. Around 50 enterprises are in operation, employing about 5,400 at the end of 2001, providing such services as consulting, system integration, software system design, programming, software maintenance/support services, conversion, data-input services and software documentation. According to BOI, an increased number of enterprises are applying for BOI incentives to set up IT software industries in Sri Lanka. The total number of employees will exceed 40,000 if and when the enterprises that have applied for approval become operational, as shown in the table below.

Table 2.3 BOI Approved IT Software Enterprises

Project Status	No. of Project	Estimated Investment (Rs. Mn.)			Employment at Capacity (Nos.)
		Foreign	Local	Total	
Software					
Awaiting Agreement	34	1,818.40	504.00	2,322.40	40,884
Awaiting Construction	21	903.00	133.50	1,036.50	866
Under Construction	14	43.70	667.40	711.10	2,362
Commercial Operation	49	1,382.20	871.10	2,253.30	5,429
Total	118	4,147.30	2,176.00	6,323.30	49,541

(Source) BOI

BOI approved IT software enterprises are local enterprises, joint ventures (JV) of local and foreign enterprises, and foreign enterprises. FDIs are from 27 countries around the world. Major countries of origin of foreign enterprises investing in the IT software industry are shown in the table below.



(Source) BOI

Figure 2.4 Major Countries Investing in the IT Software Industry

US software-related enterprises are the leading investors, followed by the UK. India is also proactively investing in Sri Lanka. More than half of the investors in the IT software industry are from the USA and Europe.

The IT training industry has also attracted both foreign and domestic investment in recent years. The number of BOI approved IT training institutions includes 24 in operation and 35 under preparation, as shown in the following table.

Table 2.4 BOI Approved IT Training Institutions

Project Status	No. of Project	Estimated Investment (Rs. Mn.)			Employment at Capacity (Nos.)
		Foreign	Local	Total	
It related Training Center					
Awaiting Agreement	20	76.9	189.9	266.8	619
Awaiting Construction	13	54.5	384.0	438.5	475
Under Construction	2	0.0	558.1	558.1	101
Commercial Operation	24	385.6	620.2	1,005.8	1,302
Total	59	517.0	1,752.2	2,269.2	2,497

(Source) BOI

As briefly reviewed above, IT-related industries are attracting foreign and domestic investment, though investment in the hardware industry has been rather stagnant in recent years, due mainly to the prolonged ethnic conflicts.

2.3 IT policy and Initiatives

Sri Lanka recognises the importance of IT development for the economic and social development of the country.

The general objectives set for IT-related industry are:

- (i) Efficient administration and management.
- (ii) Establish and maintain competitive advantage.
- (iii) Capture a significant proportion of the global IT market.
- (iv) Provide information on Sri Lanka to the world and act as a tool to acquire information.
- (v) Support the national development effort.

In order to achieve the above objectives, Sri Lanka has already taken a series of initiatives. In 1984, the Computer and Information Technology Council of Sri Lanka (CINTEC) was established by an Act of Parliament. A round table held by CINTEC in 1996 was followed by the formation of the National Working Group for IT exploitation. CINTEC has made some policy recommendations such as the removal of import duty and turnover tax on computers. It declared 1998 as the 'Year of IT'. The Ministry of Higher Education and Information Technology Development was formed in October 2000, and CINTEC is now under this ministry.

The 2001 Budget Speech expressed a government commitment to IT development policy for the first time, acknowledging that export earnings of the IT software industry increased to US\$55 million in 2000. In the speech, some initiatives were proposed, i.e. establishment of an information technology development fund, establishment of national information technology centers and IT parks, formulation of a national IT policy and tax concessions to IT industries. Subsequently, in the 2002 Budget Speech, the IT policy initiatives were expanded to include development of a national IT road map, encouragement of private sector establishment of rural tele-centers and cyber-kiosks, and liberalization of control over international voice telephony and fixed wire line services.

The Information Technology Policy, drafted by CINTEC in June 2001, spelled out the framework for development in the IT field. This framework identified some key strategies of human resource development, community empowerment, infrastructure development, law and legal frameworks, government services, and industry and business development. More specifically, proposals were set out for the provision of incubator facilities, the promotion of venture capital for the IT industry, the identification of fiscal incentives, and concessions, review of the regulatory regime to catalyze sustainable growth and new investment in the IT industry by the private sector.

The IT-related industries in Sri Lanka are relatively young, but public institutions and private enterprise are making joint efforts to promote the IT-related industry as a leading industry in the country. They have formed associations to enhance their competitiveness in the global market. Major private associations and public institutions formed by the IT-related entities are as follows:

<Private associations>

Sri Lanka Computer Vendors Association (SLCVA)

Established in 1988, SLCVA has a membership of 32 computer hardware vendors. It promotes imports, exports, assembly and supply of digital computer systems, peripherals and associated products. It also organizes seminars for the public.

Sri Lanka Association for Software Industry (SLASI)

SLASI was set up in 1992 under the auspices of the Export Development Board (EDB). Currently, it has 41 members and offers seminars and workshops for training IT management staff. It also presents policy recommendations to the government.

Association of Computer Training Organizations (ACTOS)

Established in 1991, ACTOS has 29 members involved in education and training in the IT service industry. It provides a certificate of competency in computer skills, called the Sri Lanka Computer Driving License (SLCDL).

Federation of Information Technology Industry, Sri Lanka (FITIS)

FITIS was set up in 1996 as a federation of SLCVA, SLASI and ACTOS, and an apex organization of the IT industry in Sri Lanka, in order to promote hardware, software, computer training and Internet services across the country.

<Public institutions>

The Government of Sri Lanka has taken initiatives to support the IT industry in training and human resource development. The Sri Lanka Institute of Information Technology (SLIIT) was established in 1999 under the joint initiative of the Ministry of Higher Education, the Ministry of Internal and International Commerce, and the Ministry of Planning and Finance. SLIIT has recently opened a training center in Malambe for a 2-year full time IT diploma course for 320 students and a week-end IT course for 60 students. The center has a plan to offer courses for nearly 2,000 students in the near future.

The Institute of Computer Technology (ICT), established in 1987, promotes postgraduate diploma courses and certificate level courses for IT programmers and system analysts. In addition to the regular courses, ICT provides various short-term training courses and seminars (e.g., auto-CAD, LAN, C/C++, multimedia technology and Internet). Further, several universities have expanded their IT courses and/or faculties, including Colombo university, Moratuwa university, and Peradeniya university.

Ministry of Higher Education and Information Technology Development

The Ministry was established in October 2000 to function as the apex body for all matters relating to IT development. Some important IT relevant institutions are under this Ministry (e.g., CINTEC, SLIIT and University Grant Comissions).

The Board of Investment (BOI) is an autonomous statutory body vested with wide ranging powers to facilitate foreign direct investments (FDIs). BOI promotes export-oriented industries and seeks to attract foreign technology transfer and/or employment generating

industries. BOI states as its vision the development of a world-class IT industry in Sri Lanka and the achievement of US\$1 billion worth of exports in IT software services by 2008.

2.4 Free Trade and IT-related Industry

The Indo-Lanka Free Trade Agreement (FTA), signed in December 1998 and implemented from 1st March 2000, will provide Sri Lanka with a great opportunity to exploit the emerging huge market in India. The underlying premise of FTA is to create a free trade area through the complete or phased elimination of tariffs, which will occur over defined phases. The objectives of the agreement are to promote bilateral trade through the development of economic relations, fair and open competition and the removal of trade and investment barriers between the two countries. Salient features of the Indo-Lanka FTA are as follows:

- (i) The establishment of a free trade area through the phased elimination of tariffs;
- (ii) Immediate zero duty access for selected imports of both countries;
- (iii) The introduction of negative lists to protect industries which are of national interest;
- (iv) A three-year time frame for India to give duty free access to Sri Lankan exports, excluding items included in the Indian negative list;
- (v) An eight-year time frame for Sri Lanka to move towards free trade, excluding items included in the Sri Lankan negative list;
- (vi) Low rules of origin criteria; and
- (vii) Review and consultation mechanisms.

Sri Lanka offers preferential access and duty concessions to the Indian market. Potential business models benefiting under FTA will include the following:

- (i) Preferential market access to India resulting from tariff concessions, which make qualifying Sri Lankan exports much more competitive (over 4,100 items will become duty free within three years);
- (ii) Indian manufacturers can now source their intermediate goods from Sri Lanka, rather than importing them from other countries and paying higher tariffs;

- (iii) Indian investors and firms from other countries can set up operations in Sri Lanka in order to re-export to India and international markets.

Industrial sectors that will attract FDIs have been identified by BOI, i.e., electronic/electric industries, rubber, ceramics, machinery/mechanical appliances and automobiles and spare parts industries. In 1998, India's import bills on electronic and electrical products were US\$ 1 billion and US\$ 740 million respectively. The prevailing Indian duty rates on 293 electronic and electric products range from 0 to 35 %. However, the duty rates on nearly 250 of these items exceed 25%. The 50% duty reduction (which will become zero duty in three years) on all electronic/electric products has created tremendous scope for investment in the sector.

Table 2.5 Duty Rates on Electronic and Electric Products under Indo-Lanka FTA

No. of items	Indian duty rates	
	General	FTA
148	35%	17.5%
105	25%	12.5%
11	20%	10.0%
15	15%	7.5%
14	0%	0%

(Source) BOI

BOI identified potential electronic products for investment, namely, computer and automatic data processing units, electronic integrated circuits, uninterrupted power supply (UPS) units, magnetic tapes, magneticheads and printed circuits. Potential electric products for investment are antennas, parts of electric telephone apparatus, parts of electric ignition equipment, wound starters for fan motors and plugs and sockets. An electronic company interviewed by the Study Team has expressed high expectations that they will be able to export their products to Indian market under FTA. The proximity of the Indian market is an additional benefit. It is said that it takes approximately four days for a truck to transport goods from New Delhi to Chennai, whereas shipment from the Colombo Port to Chennai takes half that time.

Negotiations are underway for a similar FTA with Pakistan that will open Sri Lanka as a staging post for companies that wish to operate in India and Pakistan simultaneously. Sri Lanka is also a signatory to the South Asia Preferential Tariff Arrangements (SAPTA) which came into force since December 1995. Under the agreement, tariff concessions for 226 items are available, with an envisaged increase of up to 2,000 items in the near future. The South

Asian Association for Regional Cooperation (SAARC) member states have also resolved that SAPTA should eventually progress towards the South Asia Free Trade Agreement (SAFTA).

2.5 Strengths and Weaknesses of IT-related Industry

1) Strengths

The IT-related industry in Sri Lanka has comparative advantages in the following aspects:

(i) Educated and Low-waged Work Force

Sri Lanka has achieved a high standard of education with a literacy rate of about 92%. Further, most of the educated people speak English as a second language, which is attractive to investors in the IT-related industry. The lower wage rate of IT skilled workers is another factor that makes the IT-related industry competitive in the global market. For instance, the average wage rate of programmers ranges from US\$250 to US\$500 per month, which is far less than US programmers' earnings of US\$50 to US\$100 per hour. Indicative wage rates of IT-related workers in Sri Lanka are tabulated below for reference.

Table 2.6 Indicative Wage Rates in IT Industry in Sri Lanka

Category	Monthly Wage Rates (US\$)
Systems Manager	1,200 - 1,500
Systems Analyst/Engineer	700 - 1,200
Systems Operator/Hardware Engineer	700 - 1,000
Programmers	250 - 500
Computers Operators	100 - 250
Data Entry Operators	70 - 200
Trainee	50 - 150

(Source) BOI

The above wage rates appear competitive compared to those of IT workers in India, where the IT industry has been booming in recent years. It should be noted, however, that the wage rates of IT workers in China and Vietnam are much lower. For instance, the monthly wage rate of a system analyst/engineer in Vietnam is as low as US\$ 350-400. Further, the absolute number of IT skilled workers in Sri Lanka is still limited, and human resource development in the IT industry is essential.

(ii) Attractive Incentives

BOI grants tax incentives to approved IT enterprises under Section 17 of the BOI Law. The incentive package applied since 1996 has played a significant role in attracting foreign and domestic investors. An outline of the BOI incentives is shown in the following table:

Table 2.7 Incentives Offered to IT Industry under BOI Law

Description of activity	Qualifying Criteria			Incentives				
	Minimum investment in Rs Million	Minimum direct/ Indirect export requirement	Minimum Employment	Full Tax Holiday	Concessionary Tax at 15%	Import Duty exemption		Exemption from exchange control
						On capital goods	On raw materials	
Domestic Market Oriented	None	0 – 69%	25	5 years	As per Inland Revenue Law after tax holiday	Yes	N/A	No
Export Oriented (New and existing companies)	None	Above 70%	25	8 years	12 years after tax holiday	Yes	N/A	Yes

(Source) BOI

The increased number of applications for approval of investments has endorsed the attractiveness of these incentives offered by BOI.

(iii) Attractive Cultural Environment

It is often pointed out that the cultural environment in Sri Lanka is one of the attractive factors for investors in deciding investment. Sri Lankan workers are generally quite adaptable to the corporate culture, particularly that of the Oriental nations. Managers of Japanese investors, interviewed by the Study Team, feel that their business success in Sri Lanka is attributable to the cultural environment, in which they can work with local people harmoniously. They feel comfortable working with Sri Lankan people because they share the same cultural background. This kind of advantage is often neglected in the analysis of a company's decision-making process, but it has a significant effect on business success and it is an advantage when compared with other newly emerging IT targeted countries. Sri Lanka, therefore, has a potential to attract FDIs from those countries who feel comfortable with Sri Lankan culture.

(iv) Open Market Regime

Sri Lanka is reputed to be the most open market economy in South Asia. According to the 2002 Index of Economic Freedom produced by The Heritage Foundation, Sri Lanka is ranked 55th out of 161 developed and developing countries.

Table 2.8 Index of Economic Freedom

Country	2002 Ranking
Thailand	32
South Korea	38
Sri Lanka	55
Philippines	70
Malaysia	79
Indonesia	105
China	121
India	121
Vietnam	137

(Source) The Heritage Foundation, Wall Street Journal

Sri Lanka also complies with the standards and regulations of the World Trade Organisation (WTO) vis-à-vis non-discriminatory trade policies (including reciprocal and preferential trade agreements), Rules of Origin, the settlement of disputes according to prevailing international laws, the drafting of suitable legislation relating to intellectual property, trademarks, patents and the adoption of best labor practices.

2) Weaknesses/Constraints

Despite the strength of locating IT-related industry in Sri Lanka, there still remain some weaknesses or constraints for promotion of the IT industry. Major constraints are outlined below.

(i) Telecommunications Infrastructure

The telecommunications sector has been privatized, and Sri Lanka has multiple telecommunications services, including three Basic, four Cellular and six Pay telephone services. Two wireless local loop operators led by foreign investors have also been put into operation recently. The number of fixed telephone lines was increased by 84% between 1997 and 1999. Despite the recent improvement in telecommunications infrastructure, the current service speed and capacity are unable to meet the fast-growing requirements. Particularly, the current international link capacity of 8-12 Mbps is insufficient for promotion of the IT software industry, and it is expected that a broad band link with a capacity of 640 Mbps will be put into operation. It should also be noted that the prices of telecommunications services are relatively high and costs of international services should be further lowered to make the IT software industry more attractive for foreign and domestic investors.

(ii) Electric Power Supply and Other Infrastructure

Stable supply of electric power is indispensable for promotion of IT-related industries. Unfortunately, Sri Lanka has suffered from power supply shortages in recent years and factories and offices are obliged to install in-house generators to cope with the planned blackouts. Increased capacity in power generation is required in the long term, but some measures should be taken in the short and medium terms to collectively locate IT-related industries and ensure stable power supply at a reasonable cost. Other infrastructure for the manufacturing sector (e.g. transportation, water supply and sewerage, waste disposal) should also be improved, particularly for promotion of the IT hardware industry in Sri Lanka. The existing industrial estates equipped with infrastructure of an international standard (e.g., Katnayake, Biyagama and Seethawaka) are almost fully occupied, and measures should be taken to collectively locate industries and provide adequate infrastructure and services.

(iii) Shortage in Integration

Industrial clusters have not been developed well in Sri Lanka, both for local industries and modern advanced technology industries. It may be partly attributable to the facts that the division of labor or sub-contract systems have not been historically promoted in state enterprises, and partly to inadequate planning and infrastructure. Without clusters, collective efficiency cannot be attained through vertical and horizontal integration among industries. Linkages between industries and academia have not been developed yet. It is desirable that the IT-related industry be collectively located in a cluster, as experienced in the development of Silicon Valley in the USA and Bangalore in India, where the IT hardware and software industries are collectively located and enjoy synergistic effects through integration.

(iv) Shortage in Human Resources

Although the high literacy rate and educational standard are strengths for industrial development, and measures have been taken for training in the IT-related industry, as noted before, there still remains a shortage of talented engineers and IT specialists in Sri Lanka. The absolute shortage of trainers at various training institutions is an issue that must be resolved quickly. Since electronic and IT technology is rapidly advancing, the shortage of facilities for the retraining of engineers and specialists is another weakness in the drive to catch up with advanced technology.

The Technopark is proposed to break through these weaknesses/constraints and ensure that the IT-related industry leads the economic development of Sri Lanka in the first decade of the 21st century.

III. DEVELOPMENT FRAMEWORK

3.1 General

From past experience it can be seen that what has promoted industry on a sustainable basis, and made it dynamic, is the facilitation of the overall industry by the public and the strong motivation of the private sector. These facilitation measures include economic liberalisation, research and development and human resource development that elevate the competitiveness of the country's industrial products. Private enterprises adopt global strategies, investing where market opportunities are attractive and where favourable inputs such as skilled labour, good infrastructure and attractive investment incentives are available. Therefore, the focus is placed on policies that enhance the business environment and remove obstacles to trade and investment. Industrial support is to be oriented towards research and development (R&D), infrastructure development, environmental protection and growth of new businesses (start-ups). It has become important to improve the size and competitiveness of the private sector, which would require continued improvements in the macroeconomic, legal, and policy framework, and in the country's physical infrastructure.

Under global and regional competition, private enterprises focus on their "central capabilities", shedding activities in which they are less competent while collaborating with other companies for these services and purchasing a range of services from outside suppliers, both domestic and overseas. Enterprises have shown an increasing tendency to rely on knowledge based information networks in order to ensure the smooth flow of important information within the company, as well as with other partners and subcontractors. Manufacturing related business services, high technology and high value added industries and services that capitalise on information technology are expanding and becoming more important than the traditional resource based industries. The key to being globally competitive is therefore the diffusion of knowledge based technologies to be used throughout the economy, especially in the manufacturing sector.

Vision 2010, prepared by the National Planning Department in 2001, has recognised the IT service industry as a leading industry (thrust industry). The JICA Master Plan for Industrialization and Investment Promotion, proposed prior to Vision 2010, envisages the enhancement of the IT services industry in two stages, the first stage to consolidate the

industry bases during the period from 2000 to 2004 (Stage 1, short term) and the later stage to expand businesses in both domestic and foreign markets during the period from 2005 to 2010 (Stage 2, medium term/long term). To achieve the vision and targets, it is necessary to break through various bottlenecks identified in the Master Plan as follows;

(i) Manpower Development

- Shortage in supply capacity of technical personnel
- Obsolete equipment and education materials in training organisations

(ii) Infrastructure

- Capacity and speed of telecommunications line

(iii) Market

- Small domestic markets
- Limited market channel to foreign markets

(iv) Organization

- Lack of capability of apex organization for IT
- Lack of cooperation among ministries and institutes related to IT

The Master Plan for development of the IT service industry in Sri Lanka has been formulated to break through these bottlenecks by adopting several strategies; i.e., (i) domestic market expansion, (ii) foreign market development, (iii) promotion of flagship projects, (iv) supply of IT professionals and (v) new business creation.

Experience in the Electronics City of Bangalore and the MSC in Malaysia shows that flagship projects enhance the IT industry and function as catalysts to diffuse information based technologies throughout the economy. In view of the current infrastructure and future plan in Sri Lanka, the strategy to establish a technopark as a flagship project should be adopted to concentrate resources with proper infrastructure at international standards and to serve as a catalyst to expand information based technologies throughout the country and thereby enable its economy-wide exploitation.

The proposed Technopark should therefore be developed as an internationally recognized IT center in Sri Lanka, as a provider of efficient services for the IT related industry, as a core of IT related information, as a promoter of linkages between academia and industry, and as a pool of IT professionals.

3.2 Objectives of Technopark Development

In view of the current situation of the IT-related industry and its prospects, it is proposed that the Technopark be developed with the following objectives:

- (i) The Technopark is to be developed as a flagship project to make the IT hardware/software industry “a driving force for the economic growth” of the country.
- (ii) The Technopark is to be developed to make the IT hardware/software industry “a generator of employment”.
- (iii) The Technopark is to be developed to make the IT-related industry “a vehicle for poverty reduction” through increased job opportunities and enhancement of income generation.

1) A Driving Force for Economic Growth

Since independence, the focus of the Sri Lankan industrial policy has varied according to the socio-political and economic policy of successive governments and changes in the international economic environment. In 1957 the government enacted the State Industrial Corporations Act resulting in a major shift in industrial policy. The Act empowered the government to set up and carry out any industrial undertaking under state ownership. In order to cope with declining foreign reserves, the government during the period from 1960 to 1965 emphasised on import substitution industrialization. Between 1965 to 1970, greater emphasis was placed on export promoting industries within the framework of the general import substitution industrialisation. The industrial policy of the government that came to power in 1970 relied heavily on state sector led development through promotion of import substitution industries. Under the economic reforms policy initiated in 1977, there was a complete turnaround in economic policy, focusing mainly on the export market and relying more on the private sector. The local industries were exposed to international competition by gradually removing the degree of tariff protection offered to them. The simplification of the tariff system, unification of the exchange rate, abolition of many foreign exchange restrictions and opening of sectors which were until then allocated to the public sector to the private sector, had a significant impact on industrial sector activities. Industrialists were encouraged to face global competition, as the state could not guarantee protection in the long run.

The availability of natural resources is no longer the major source of economic growth. The basis for international competitiveness is knowledge and human capital. The industrial sector therefore has to move away from resource-based industries to knowledge based and technology intensive industries. During the last decade, high technology and high value added industries and services that capitalise on information technology have expanded fast. The mastering of skills in information based technologies and the introduction of knowledge intensive means of production have become the key to competitiveness and even survival. Development of the IT software, services and hardware industries will promote the diffusion of such technology throughout the economy. Now, the Technopark is to be developed as a flagship project to make the IT software, services and hardware industries “a driving force for economic growth”.

2) A Generator of Employment

In order to promote the IT software, services and hardware industries, government policy will encourage more investment in assets such as technology, knowledge and skills, business organization and software. Such assets will drive the performance of firms, as against investment in traditional physical assets such as machinery and equipments. The concentration of resources to establish the Technopark as a flagship project with international standard infrastructure will have a catalytic effect on development of IT software, services and hardware industries throughout the country. The diffusion of IT throughout the economy will improve the competitiveness of the industries through the introduction of information-based technologies and knowledge intensive means of production. The improved competitiveness in the industries will result in economic growth, which will in turn generate employment. The Technopark itself will provide job opportunities for both semi skilled and skilled personnel. The opportunities provided to skilled personnel will help in reversing the brain drain.

3) A Vehicle for Poverty Reduction

Promotion of the IT software, services and hardware industries will result in improvement of the telecommunications and Internet facilities throughout the country. These improvements in telecommunications infrastructure, particularly in the rural areas, will facilitate access to information and communications. The provision of access to information and communication, human resource development, and development of an entrepreneurial culture among poor groups will make a valuable contribution to poverty reduction.

One of the targets of the IT service industry outlined in the Master Plan on Industrialisation and Investment Promotion is the establishment of business incubators. The proposed Technopark will have software business incubators for the IT service industry and electro incubators for the IT hardware industry. This strategy helps early stage enterprises to establish themselves and grow. Business incubators will support entrepreneurs and small and medium enterprises (SMEs) to develop into commercially viable business ventures. Incubators can help entrepreneurs to overcome barriers and constraints to business development. These would be lack of funding, expensive premises, regulatory obstacles, inadequate investment in technology or equipment, inadequate marketing, lack of skilled personnel and inadequate training.

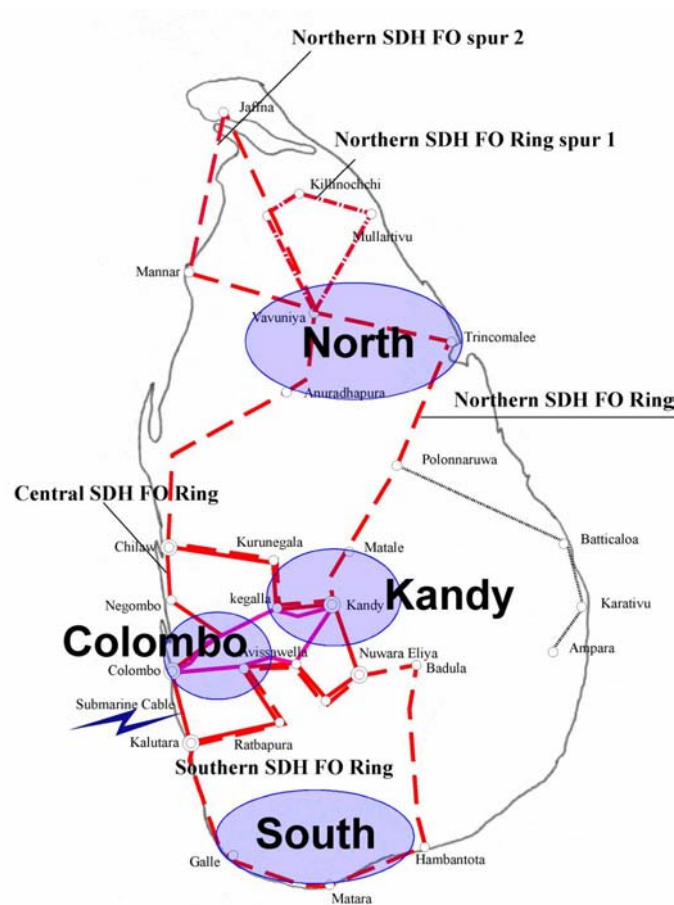
SMEs are an important source of employment for low-income rural and urban households. In Sri Lanka, SMEs account for nearly 90% of industrial establishments and 70% of employment in the manufacturing sector. It is expected that a vibrant SME sector will take the lead in generating employment opportunities and avenues for productivity and income growth for a large segment of the low-income population. The establishment of business incubators at the Technopark will therefore be a valuable direct contribution to poverty reduction.

3.3 Strategies for Technopark Development

To attain the objectives noted above and to promote “a flagship project”, it is proposed that some strategies be applied specifically for development of the Technopark in Sri Lanka. These strategies will include the following:

1) Cores for Nationwide IT Development

In order to enhance the IT related industry nationwide and ensure economy-wide IT diffusion, it is proposed to adopt a strategy of developing IT regions on cores in the north, center and the south of the country as shown in the following figure.



(Source) JICA Study Team

Figure 3.1 Distribution of IT Development Cores

The above IT development cores are conceptual, primarily based on the current and planned telecommunications network. It is expected that the Colombo Area will lead the nationwide IT development and its development should have regard to the future development of the regional cores. The proposed Technopark is to be planned and implemented under this broad strategy.

2) Core IT Development in the Colombo Area

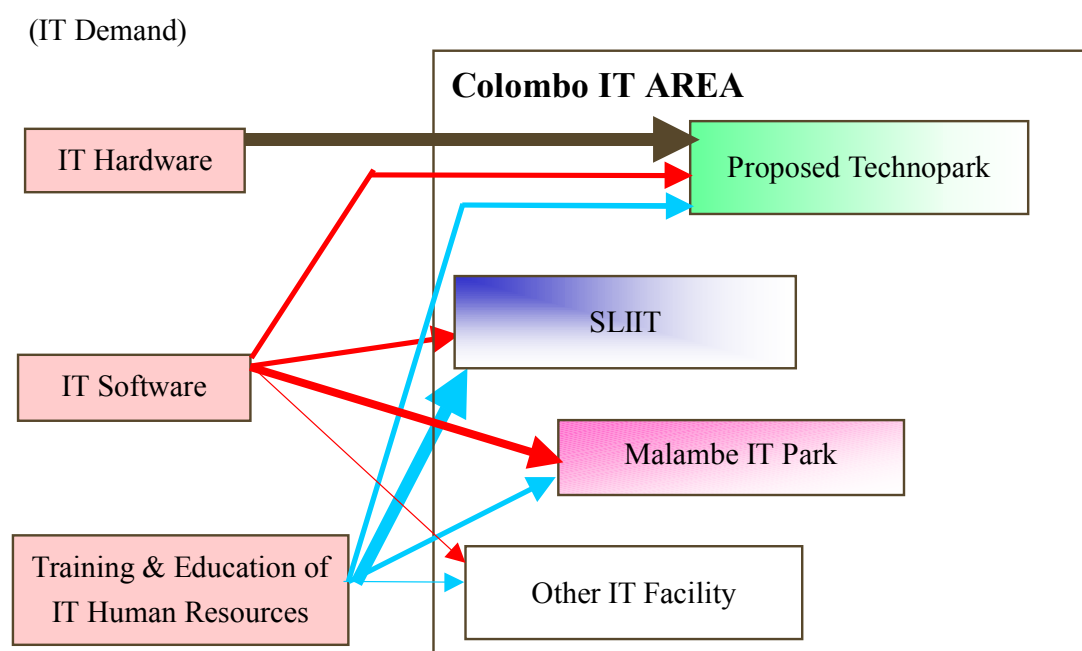
Presently there are several initiatives by public and private institutions and academia for the development of information and communications technology in the Colombo Area.

In the IT software industry, a small IT park has been set up in the World Trade Center Building under the initiative of a public-private partnership between BOI and Overseas Realty. The Urban Development Authority (UDA) has taken steps to set up another IT park in

Malambe. The Arthur C Clarke Institute also intends to establish a micro-electronic park at Malambe (called the Arthur C Clarke Technology Town).

Both public and private institutions have also developed initiatives aimed at increasing the number of IT personnel in Sri Lanka. SLIIT has initiated a training center on a 25-acre site at Malambe for 1,200 students. SLIIT also plans to establish research and development laboratories, residential and recreational facilities, a satellite communication centre, a shopping complex and other infrastructure requirements for students, staff and researchers. The "50 IT Centres Project" of BOI is also being implemented. Under this project, 18 primary training centers will be established islandwide on a commercial basis. BOI also plans to set up an IT campus at Dompe. Private training institutes, such as Informatics (Pvt) Ltd, Asia Pacific Institute of Information Technology, Mackwoods Infortech (Pvt) Ltd, the National Institute of Information Technology, and Singapore Informatics (Pvt) Ltd, have plans to develop training and education facilities for IT.

The roles of the proposed Technopark and other ongoing programs are conceived as illustrated below. The functions of the Technopark are to be strategically defined under this framework.



(Source) JICA Study Team

Figure 3.2 Role of IT Park in IT Industry Promotion

3) Development as a Cluster

Increasing competitiveness is forcing enterprises to adopt new business models, keeping their "core competencies" in one part of the chain and outsourcing other functions. The changing nature of competition has prompted the growth of networking. For their success in the innovation process, enterprises are becoming more dependent on complementary knowledge and know-how in enterprises other than their own. Successful and innovative firms are seldom alone spatially. Innovation and economic growth is often situated within a unique combination of firms tied together by knowledge and production flows. There is now a clear trend indicating the growth of industrial networks. Industry cluster is therefore the key to competitiveness in the new economy. They comprise groups of competing and collaborating industries in one location, linked into horizontal and vertical relationships. Vertical linkages with clients and sub-contractors and horizontal linkages among enterprises improve competitiveness through collective efficiency. The collective competitiveness is not only due to the concentration of related industries, suppliers and services in the same place, but also through access to economic inputs that are not usually provided solely by the business sector. These resources include institutions that provide adaptable skills, accessible technology, adequate financing, available infrastructure, advanced communications, acceptable regulatory and business climate and an achievable quality of life.

In line with these concepts, the IT software, services and hardware industries are to be developed as a cluster within the Technopark. Clustering of both software and hardware industries together has a synergistic effect with each industry supporting and complementing the others. The integration of the software and hardware industries will also facilitate consultation, and collaboration among the different ventures. It will also support the employment of a larger spectrum of workers in one location, from semi-skilled to skilled in the hardware industry to the high-end knowledge workers in the software industry

4) Provision of Facilities at Global Standards

Competition in the IT software and hardware industry is global and products and services will be supplied to a global market. For Sri Lanka, the characteristics and/or circumstances of the industry are the same as for other countries, including advanced countries. Facilities, therefore, have to be up to international standards. Since technology changes rapidly, the Technopark should be linked with overseas technology parks and institutes for the transfer of technology through collaborative ventures.

5) Promotion of Private-Academia-Public Partnership

As a strategy for development of the Technopark, private-academia-public partnerships should be established. Linkages between industry and academia will be strengthened through on-the-job training programs, collaborative R&D activities and personnel exchange programs between universities and industry. Such private-academia-public partnerships will produce clusters of strongly interdependent firms (including specialized suppliers), knowledge producing agents (universities, research institutes and engineering companies), bridging institutions (brokers, consultants) and customers, linked to each other in a value adding production chain.

IV. FUNCTION OF TECHNOPARK

The proposed Technopark is to be implemented as “a flagship project” to develop the IT-related industry in Sri Lanka. As noted in the Master Plan for Industrialization and Investment Promotion in Sri Lanka, it is proposed that the Technopark will integrate the following functions/components:

- (i) SMART Center as a central unit of the Technopark,
- (ii) Location of the IT software industries, and
- (iii) Location of the electric/electronic (IT hardware) industries.

An electronic technology center proposed in the Master Plan may be located in the Technopark when the administration of calibration and testing of the electric/electronic industry is further defined in an integral manner in the future. Likewise, the residential lots will be additionally developed in the Technopark as they are required to develop the Technopark as a flagship project.

4.1 Functions of SMART Center

The SMART Center is proposed to function as a central unit of the Technopark, as well as a core of the nationwide IT development in the short and long term. The Center will have the following functions;

1) Technopark Management Unit

The Technopark Management Unit will function as a promoter of the private-academia-public partnership and a facilitator of the Technopark operation and management. The unit will develop a common administrative platform, and the central database and web site will allow workflow integration and data sharing among three divisions of the Management Unit. These divisions are:

- Planning and Development Division,
- Management Division, and

- Business Promotion Division.

2) Network Operation Unit

The Network Operation Unit will function as a public-private partnership between BOI and a private company specializing in network operations. The operations will be managed by the private sector company. The Network Operation Unit will operate and maintain the network infrastructure within the Technopark, as well as with the universities, research centers and other IT parks. The overall computer network system will be administered by this Unit as illustrated below. The function of the unit is illustrated below. The Network Operation Unit will also offer several system operation services to tenants such as web rental services, web hosting services, and housing services. The Unit will also offer web site development services and consulting services for tenants in the Technopark, as well as for the public institutions outside the Technopark. Coordination with other IT parks will also be a function of this Unit.

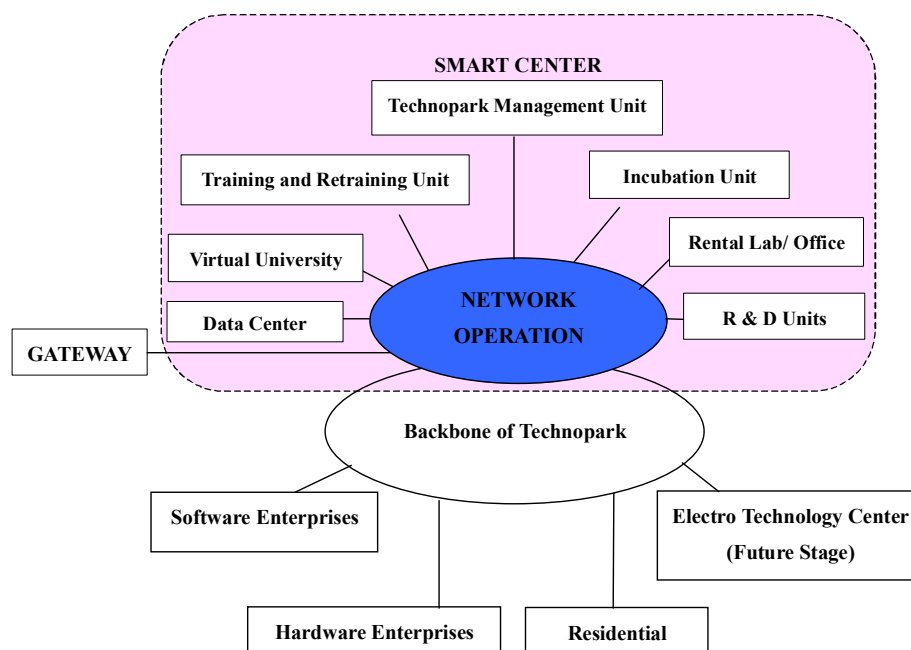


Figure 4.1 Function of Network Operation Unit

3) Data Center

The Network Operation Unit will also be responsible for the operation and maintenance of the Data Center. The Data Center will be developed as an Internet Data Center. The main objective of the Center will be to provide a data storage service for software companies, tenanted factories, the virtual university and the tenants of the SMART Center. These services

will include the storing of the web-based content of the virtual university and hosting services, data management and application services for the software companies, tenanted factories and the tenants of the SMART Center. The local area network system of the Data Center will be administered by the Network Operation Unit. The Center may also offer its services to the public and private institutions outside the Technopark. The function of the Data Center is illustrated below.

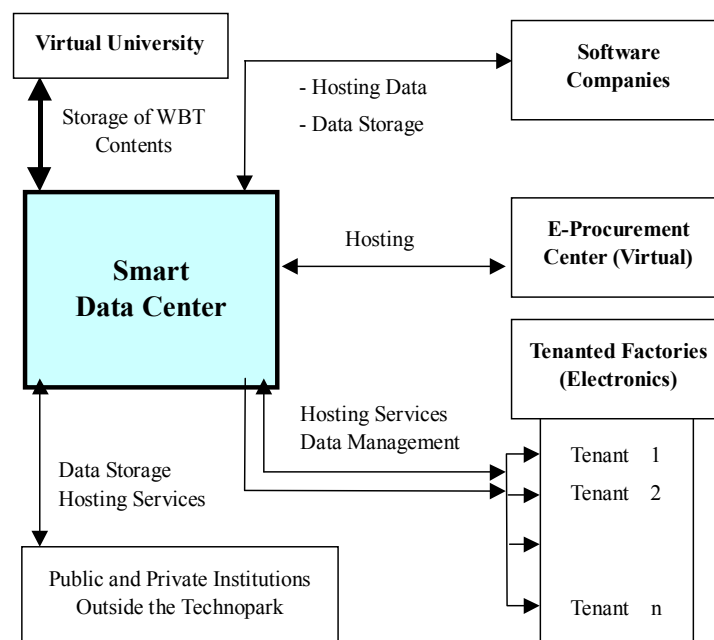


Figure 4.2 Function of Data Center

4) Virtual University

The objective of the virtual university is to provide web-based training at under-graduate level and postgraduate level for both IT related and non IT related courses. It will also provide for instructor training and continuing professional development to a vast number of students, instructors and professionals in order to overcome the present shortage of academic staff and limited facilities in the universities. In the short term, the target of the virtual university would be to make IT training available on-line, and in the long term to cover other areas of specialisation as well. A short to medium term target is to include IT subjects in the curricula of first degrees of other specializations in the 12 national universities, in line with the national strategy for development of information technology, and to make course materials available on-line with a credit transfer scheme among the universities for the award of degrees. Such a scheme could be facilitated through the activities proposed under the SIDA-SAREC Project, which envisages the following program during the 3-year period commencing in 2003:

- Connect all the universities and affiliated institutions in the country through the Internet, and upgrade the existing connections to meet expected demands;
- Obtain a sufficient amount of international Internet bandwidth to support the academic activities (both teaching and research) of the staff and students of the universities and affiliated institutes;
- Install campus-wide networks in universities that do not already have such networks, and to expand the existing networks to cover the areas that have not been networked in the first phase;
- Deploy applications (e.g., e-learning and video conferencing) based on the networks constructed; and
- Build and maintain network management units to operate and maintain the campus-wide, inter-university and international networks, and to support users in using the networking facilities effectively.

The virtual university in the SMART Center will further develop such a project under the private-public-academia partnership. The model adopted and proposed for the SMART Center is that of a virtual university consortium, where Peradeniya University, Colombo University and the Moratuwa University will come together in a more or less tight organisational framework to put “a skin of virtuality” around all of them. Examples can be found in several such partnerships that have been fostered by the European Commission and by national funding agencies in the UK. In order to overcome in-built difficulties that seem to exist in such university consortia, the consortium has to be led or strongly influenced by a major application service provider, software supplier or telecom giant. Microsoft, for instance, has an interest in this sector and has now established an alliance with MIT, while SUN, Oracle and Hewlett Packard have also shown interest in it from time to time. The leading companies will be responsible for development of the web-based systems, operation and maintenance. The course contents will be developed by the proposed centers of excellence of the three universities in consultation with representatives of the industry and teaching institutes who will be represented by the other stakeholders of the virtual university consortium, namely, CINTEC, representing the national statutory apex body on information technology in Sri Lanka, the Sri Lanka Electrical and Electronics Manufacturers Association (SLEEMA), representing the hardware industry, the Sri Lanka Association for the Software Industry (SLASI), representing the software industry, and the Association of Computer Training

Organisations (ACTOS) representing the private training institutes. The concept of the virtual university consortium is shown below.

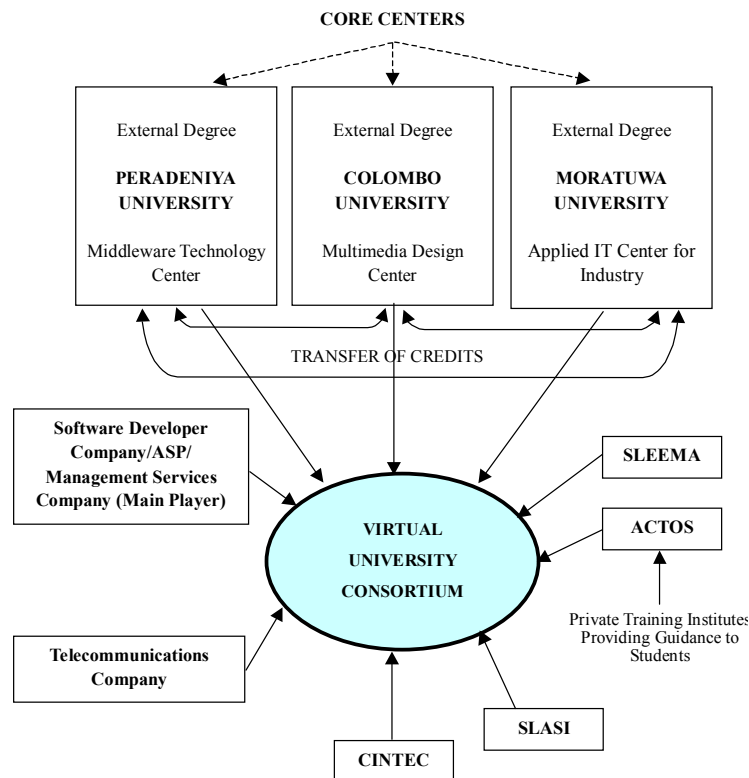


Figure 4.3 Conceptual Plan of Virtual University

It is proposed that unique centers of excellence for selected technologies be established in the Peradeniya, Colombo and Moratuwa universities. The Peradeniya university is to be promoted as a center of excellence for middleware technology, while the Colombo university is to be promoted as a center of excellence for multi-media technology and the Moratuwa university will be the center of excellence for applied IT technology. These centers will be linked to similar centers of excellence in overseas universities and institutes for staff and student exchange programs. Within the virtual university system, there will be a credit transfer scheme by which students from one university could take a course unit from another university to satisfy course requirements of his/her university or the other university. Under this scheme, each university will recognize each other's course units for the award of a degree in a particular specialization, the curriculum and required course units for the course being specified by the respective university. The university may also specify a written examination, a research project, an interview or practical training as further requirements for the award of its degree. Degrees will be awarded as external degrees by each university. Private training

institutes will provide additional guidance to students following these courses. The courses offered by the consortium will be open to both on-campus and off-campus students, as well as to overseas students, instructors and professionals who can meet the basic qualifications required for the course by each university. The figure below shows the conceptual configuration of the virtual university:

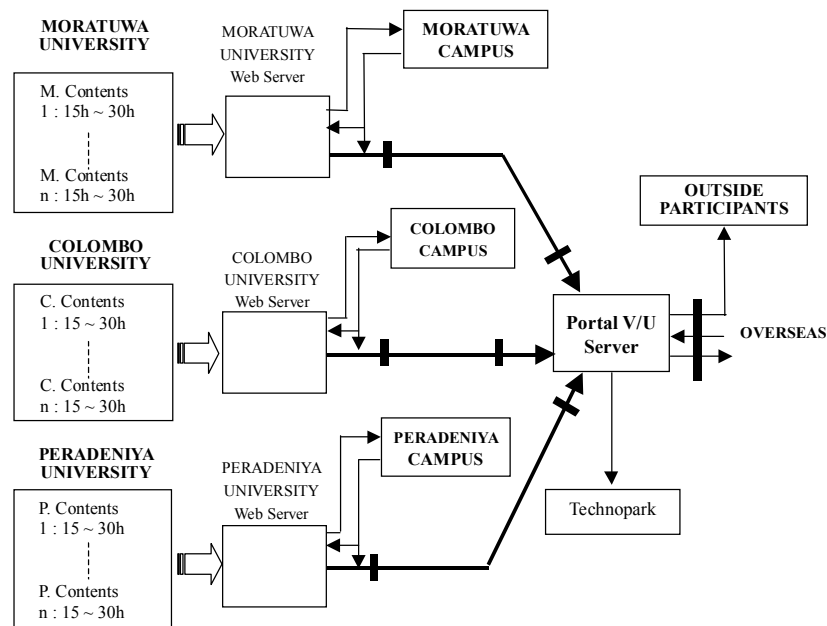


Figure 4.4 Virtual University Conceptual Configuration

It is proposed that the interim target of the virtual university would be to make IT training available on-line and at a subsequent stage to cover other areas of specialisation as well. The course curricula will take into consideration the present as well as the expected future needs of the IT software and hardware industries. The virtual university consortium will identify the needs of instructor training and continuing professional development. At the interim stage, this training will be held through training courses, seminars and workshops conducted predominantly through established overseas links with the Colombo, Peradeniya and Moratuwa universities and other private training institutes. These short term courses, seminars and workshops will be conducted at the Training and Retraining Unit of the SMART Center. The seminar rooms of the Training and Retraining Unit will be rented out for this purpose. Some of these courses could be developed into web-based training courses at a later stage. The consortium will also conduct a forum on research and development. The figure below shows the type of training to be conducted.

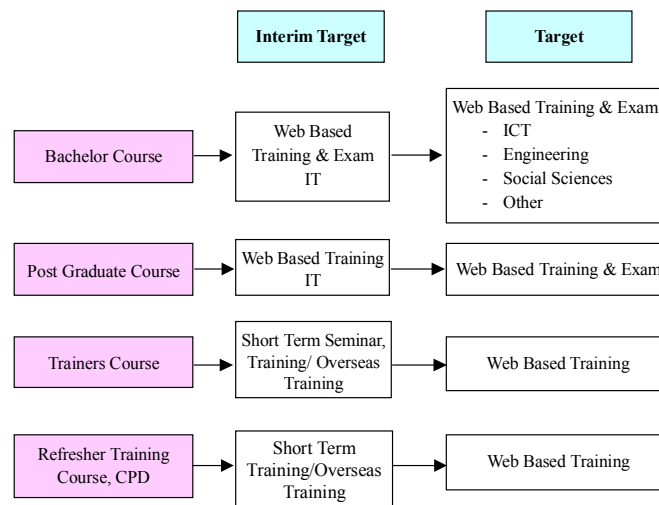


Figure 4.5 Virtual University Facilitating Training and Retraining

A software developer, application services provider or management services company will be the main player and strategic private partner for promoting the private-public partnership. It will be responsible for development of the web based system, and overall management and promotion. The supportive stakeholders of the virtual university consortium will include the following:

- Colombo university. The center of excellence for multi-media technology will be responsible for the development of content related to its specialization. It will also be responsible for conducting assessments, evaluating students and recommending the award of degrees or diplomas related to the Colombo University.
- Moratuwa university. The center of excellence for applied IT technology will be responsible for the development of content related to its specialization. It will also be responsible for conducting assessments, evaluating students and recommending the award of degrees or diplomas related to the Moratuwa University.
- Peradeniya university. The center of excellence for middleware technology will be responsible for the development of content related to its specialization. It will also be responsible for conducting assessments, evaluating students and recommending the award of degrees or diplomas related to the Peradeniya University.
- The Council of Information Technology (CINTEC). It is the national statutory apex body on information technology in Sri Lanka. It will advise the consortium on matters related to policy and national strategy for IT development.

- The Sri Lanka Electrical and Electronics Manufacturers Association (SLEEMA) will represent the hardware manufacturers in Sri Lanka. It will advise the consortium on the requirements of the electrical and electronics industry and help develop courses that are industry oriented.
- The Sri Lanka Association for the Software Industry (SLASI), established in 1992 with the support of the Export Development Board (EDB) and CINTEC, is the national organisation representing the software industry. It presently has 43 members. It will advise the consortium on the requirements of the software industry and help develop courses that are industry oriented.
- The Association of Computer Training Organisations (ACTOS) provides education and training in the information service industry. Its membership presently stands at 29. The training institutes will provide guidance to students regarding follow-up courses offered by the virtual university.

5) Training and Retraining Unit

The objective of the Training and Retraining Unit will be to facilitate instructor training, retraining and continuing professional development. Facilities at the unit will be used by both the virtual university consortium and the Incubation Unit on a fee-paying basis. The Management Division of the Technopark Management Unit will undertake coordination of the unit. The facility may also be made available to tenant companies for training purposes. The function of the Training and Retraining Unit is shown below.

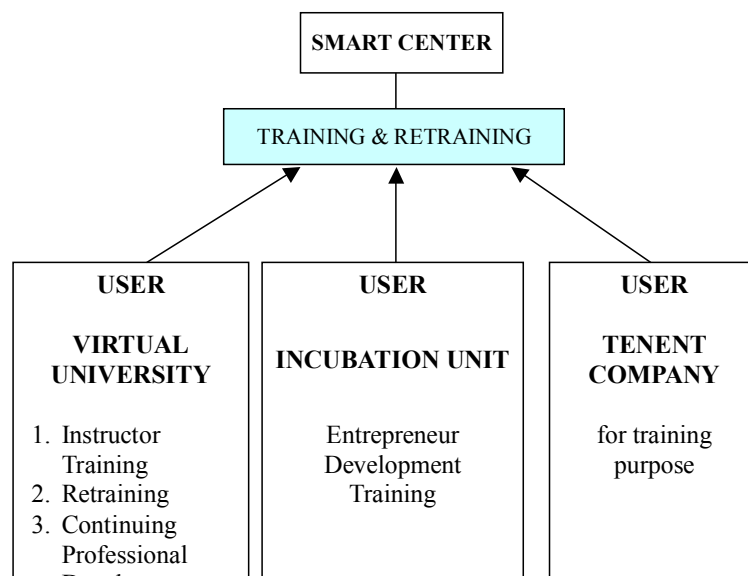


Figure 4.6 Training and Retraining Unit

6) Research and Development Unit

The objective of the Research and Development Unit is to bring academia, research institutes and private enterprise together to carry out research and development (R&D). The proposed concept is illustrated below.

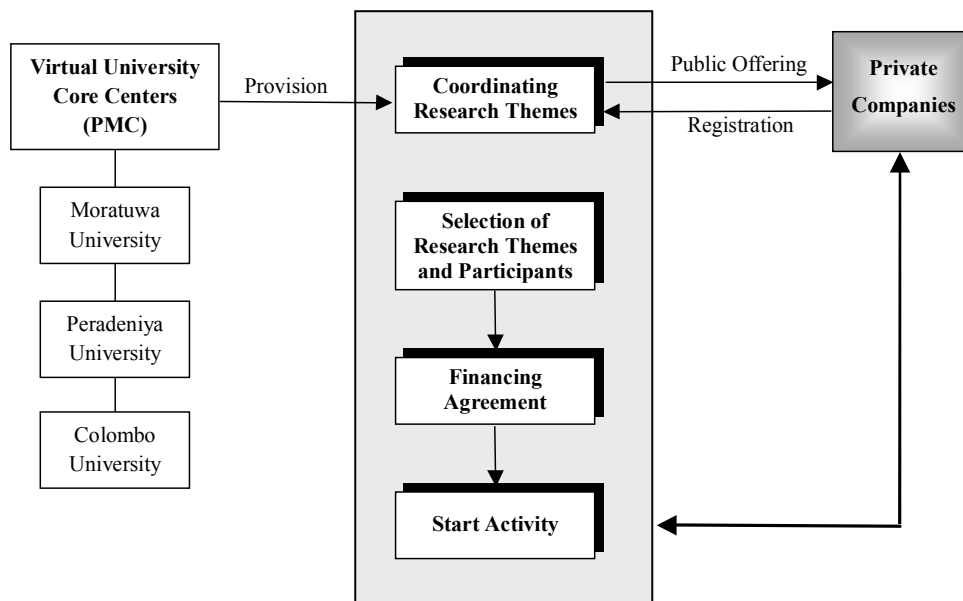


Figure 4.7 Research & Development

The three core centers of excellence, (Peradeniya, Colombo and Moratuwa university) and other research institutes could offer research themes (seed) to private companies or companies already registered for collaborative work. On-line services, such as the electronic forum and the business matchmaking search engine, could be used for this purpose. The Management Division of the Technopark Management Unit would be responsible for coordination. Once the research themes and the participants are selected, the financial arrangements could be worked out and the activity could begin. Companies could also carry out their research and development programs independently.

The Research and Development Unit will have research units that will be leased without equipment so that companies can fit equipment required by them. A customized configuration also can be provided at an additional cost.

7) Incubation Unit

The Incubation Unit will function as a software business incubator. It will be a coherent system for providing focused assistance to its members to ensure the survival and success of their enterprises. Rents and fees will be affordable but structured, in order to provide sources of revenue for the incubator and move it towards sustainability.

The process of incubation is illustrated in the following. The incubator will provide the tenants with an experienced partner. The incubatee will start with a small amount of seed money, technology and individual ideas. There are several steps from these modest beginnings to business realities, which include development, management and marketing. Throughout these stages the incubatees will be supported by funding, rental space, network facilities, technical support, marketing support, management support, exchange promotion, legal services and training in entrepreneurial development.

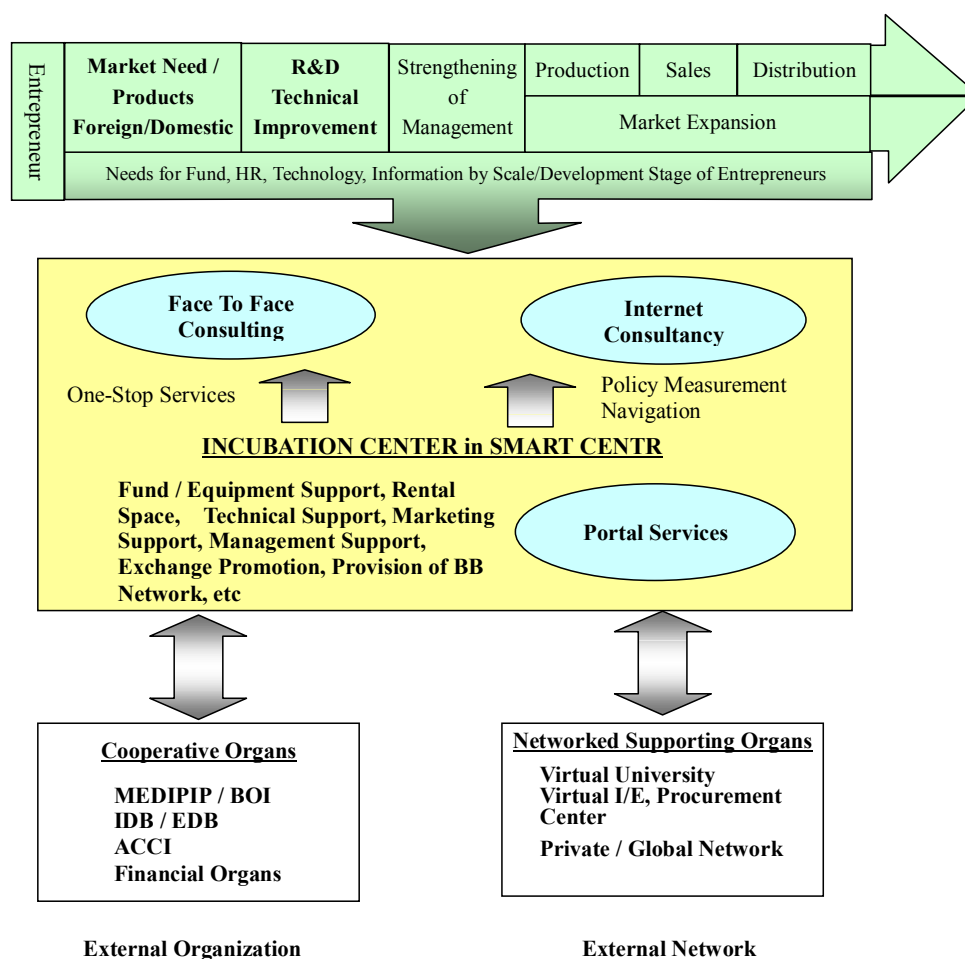


Figure 4.8 Incubation and SME Support Function

The Incubation Unit will be managed by a public-private partnership with supportive stakeholders. The large private software development company will lead the partnership. The incubator company will also advise the incubatees on supportive systems for new business. These supportive systems will advise on available concessional loan schemes for incubatees, technical assistance schemes and education/training schemes. The incubator will also provide common office services such as reception, secretarial support and meeting rooms. The performance of the incubatees will be continuously monitored and remedial measures will be proposed when necessary. The functions of the Incubator Unit are illustrated below.

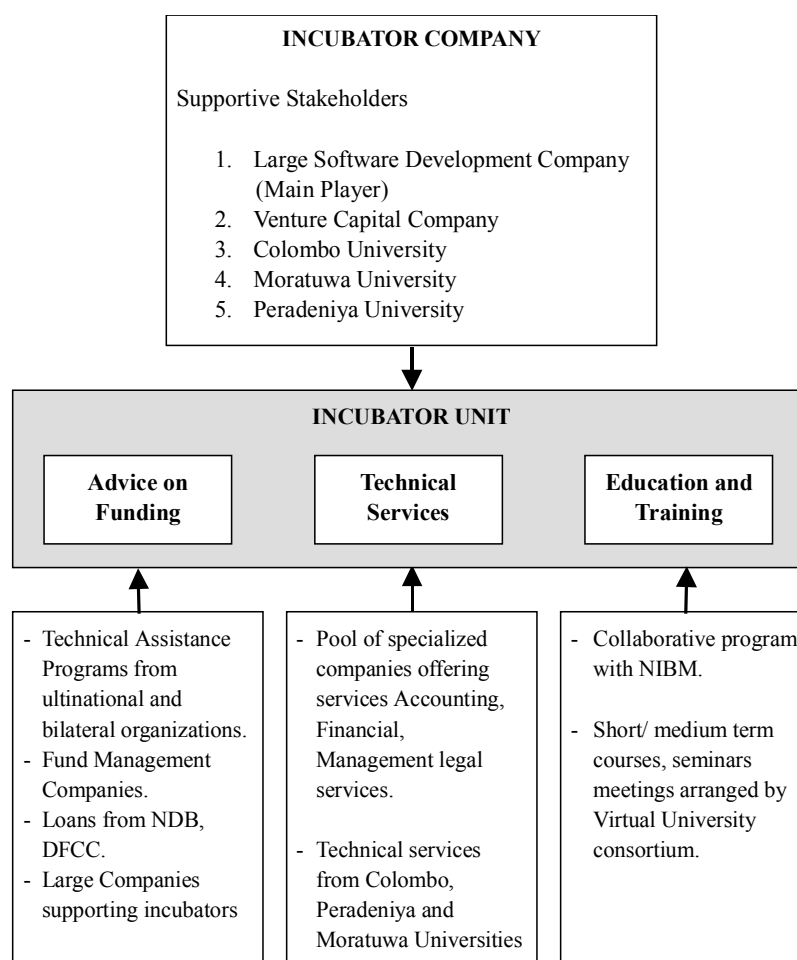


Figure 4.9 Functions of Incubator Unit

Under the supportive system for concessional loans, the incubator company will provide information to the incubatees on the sources of such assistance, such as the NDB/DFCC managed on-lending loans, fund management companies providing venture capital, and other concessional loans. There are also large companies supporting incubators in the IT sector. An example is Oracle Corporation, which has launched a US\$55 million incubation initiative to

support internet start-ups in South Asia. Presently, eight incubation centers in Singapore are working with Oracle to deliver this program.

The supportive system on technical assistance will advise incubatees on acquiring appropriate consultancy and cost efficient support services from a pool of specialized companies in IT services, venture capital, accounting and financial management services, legal services from law firms specializing in intellectual property law and management consultancy services assisting companies to develop ideas into business realities. After the required service is identified the incubatees will contact those companies directly to develop contracts for their services. The incubator company can also arrange technical services which will be provided by the Colombo, Moratuwa and Peradeniya universities as part of on-the-job training under the supervision of university staff.

The supportive system on education and training will advise on the training requirements of the incubatees. The curricula will be designed to focus on the development of entrepreneurial-focused human resources and training with an emphasis on practical implementation and formulation of tailored business plans. Courses to meet these requirements will be conducted in collaboration with the National Institute of Business Management (NIBM). The virtual university consortium in the Training and Retraining Unit will conduct the training, in the form of short and medium term courses, seminars and meetings.

As an exit strategy for the incubatees, the Incubator Unit will identify large companies that have an interest in building and improving a network of suppliers to link up with incubatee companies. Prospective incubatees will be encouraged to develop a similar business model.

4.2 Industrial Land and Facilities

As discussed in Chapter 3.3, paragraphs 3 and 4, industrial clustering is a key to attain competitiveness in the global economy, collaborating in one location and linked into horizontal and vertical integration, thus achieving collective efficiency. The facilities to be provided to investors in such a location should be at international standards. The functions of the proposed Technopark, therefore, is to offer the land and facilities at international standards to the IT software industry and IT hardware industry in order to attain collective efficiency.

1) IT Software Industry Lot

The Technopark offers the land area allocated for the companies in IT software and services industry who will set-up their own buildings. The IT software and services industry, which manages the design of IT systems, program design, multi-media content development, CAD, etc., will be categorised by two types; i.e., small scale software industries who rent floor area, and large scale software industries who develop their own buildings. The small-scale software industries will be established in SMART Center, while the large-scale software industries will use the allocated lot. A range of plot sizes will be prepared for software industry building development, ranging from 1 to 2 acres. Land will be leased with the basic infrastructure in place; e.g., roads, drains, electricity, water supply and telecommunications services. A long-term lease agreement will be offered.

2) IT Hardware (Electric/Electronic) Industry Lot

The Technopark offers the land area allocated to companies in the IT related hardware industries, which manufacture electric and electronic industrial products. The electronic component fabricators of FDI, are most prospective in Sri Lanka, therefore the clean and labour intensive industries will be developed in the IT hardware industrial lot of the Technopark.

The IT related hardware industries will develop their own buildings on leased plots within the Technopark. Plots, ranging from 2 to 5 acres, will be prepared for development. Land will be leased with the basic infrastructure, such as roads, drains, electricity, water supply and telecommunications services, in place. A long-term lease agreement will be offered.

V. INVESTMENT DEMAND AND PROMOTION

5.1 Investment Demand Analysis

1) Rationale

A survey has been conducted on the investment demand of the IT-related industry for the proposed Technopark in the Colombo area. This survey has been carried out to assess potential investment from IT-related enterprises in Sri Lanka and in neighbouring countries (i.e., India, Malaysia and Singapore).

The objectives of the survey are:

- (i) To get information on IT-related enterprises in the software and hardware;
- (ii) To introduce the Technopark to these enterprises; and
- (iii) To assess and evaluate their level of interest in the proposed Technopark.

It should be noted that the survey was carried out under the limitation related to the ethnic conflict in Sri Lanka. As of the time when the survey was carried out, potential investors' prevailing perception of Sri Lanka was still influenced by the prolonged conflicts, although the peace process was underway. Under such circumstances, it was assumed to be rather difficult to obtain positive responses from potential investors. Nevertheless, the survey was valuable in that it provided an insight into the temporal investment environment and an understanding of the issues to be addressed in order to attract investment into the Technopark.

2) Methodology of Analysis

The survey was designed to get responses from software and hardware enterprises in four countries, i.e., India, Malaysia, Singapore and Sri Lanka. The sample size is shown in the following table. The survey was conducted from the end of January to the end of February 2002.

Table 5.1 Sample size of Investment Demand Analysis

	Sample number		
	IT software/ service Industries	IT hardware Industries	Total
Sri Lanka	221	172	393
Singapore	345	412	757
Malaysia	334	106	440
South India	182	160	342
Total	1,082	850	1,932

(Source) JICA Study Team

The survey process was as follows:

- (i) Compilation of software and hardware enterprise directories in each country,
- (ii) Sending questionnaire forms to the sample enterprises by fax or e-mail,
- (iii) Calling companies as a first reminder to respond to the questionnaire survey,
- (iv) Calling companies as a second reminder, and
- (v) Collection and evaluation of responses.

5.2 Investment Demand of IT Software Industries

1) Survey results

A summary of the results of the questionnaire survey for the IT software industries is shown in the table below.

Table 5.2 Survey Results for IT Software Industries

Country	Samples	Responded	Interested			
			Highly	Mode.	Slight.	Total
Sri Lanka	221	13	0	3	5	8
Malaysia	334	109	0	11	0	11
Singapore	345	143	0	0	0	0
India	182	102	0	0	0	0
Total	1,082	367	0	14	5	19

(Source) JICA Study Team

(i) Sri Lanka

A total of 221 companies in the software sector were surveyed, and 13 companies responded directly. Of the responding enterprises, three companies expressed a moderate interest and five companies showed slight interest in venturing into the Technopark. The low response rate

in Sri Lanka is explained by the limitation related to the early project stage at which the survey was carried out. Lack of detail relating to the Technopark (e.g., function, location and charges) may have made it rather difficult for the sample companies to evaluate their position on future investment.

(ii) Malaysia

A total of 334 software enterprises were surveyed, and 109 companies responded. Of the respondents, 11 companies expressed moderate interest in venturing into the Technopark.

(iii) Singapore

A total of 345 software enterprises were surveyed, and 143 companies responded. The survey did not obtain a positive response from any of the software companies in Singapore.

(iv) India

A total of 182 software enterprises in Southern India were surveyed, and 102 companies responded. None of these companies expressed a positive interest in the Technopark.

2) Evaluation of Interest by IT Software Industries

(i) Analysis of positive response

The attractiveness of the Technopark to IT software companies was evaluated using multiple answers from the questionnaire forms. Out of eight positive responses from IT software companies in Sri Lanka, six companies provided reasons for their interest in locating in the Technopark, as shown below.

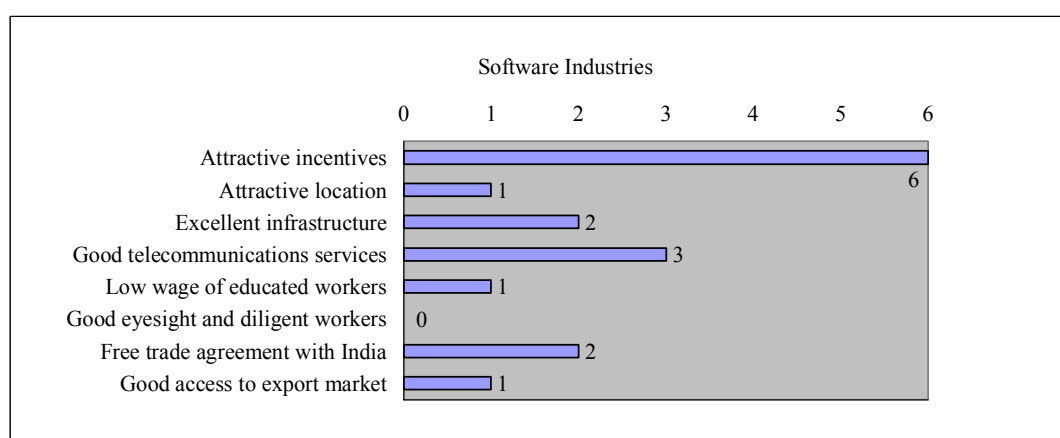


Figure 5.1 Reasons for Interest in the Technopark

All enterprises interested in the Technopark stated that the incentives offered in Sri Lanka are attractive for their investment. The response also shows that many enterprises recognize that good telecommunications services are indispensable to IT software businesses.

(ii) Facilities expected for the Technopark

Facilities expected by potential investors in the Technopark have been revealed by the survey. Of the eight positive answers from IT software companies in Sri Lanka, six companies stated their expected facilities, as shown below.

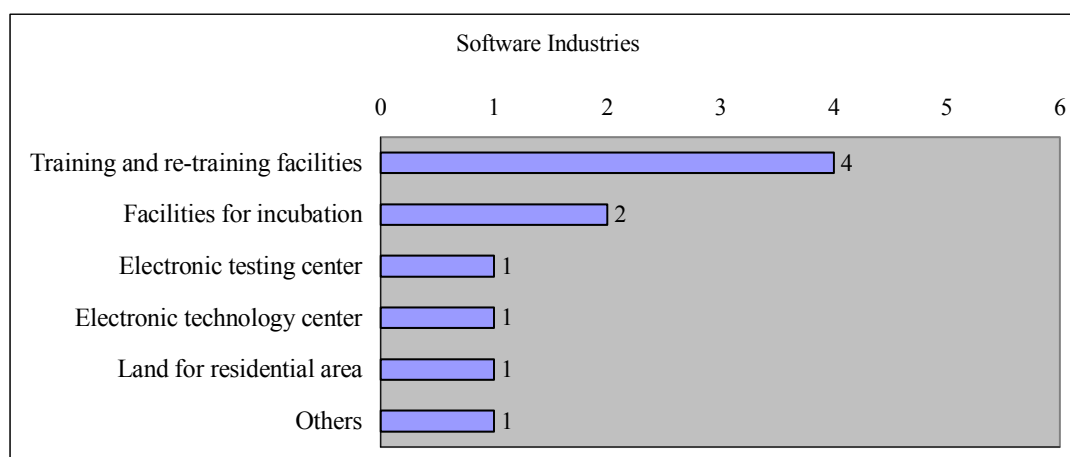


Figure 5.2 Facilities Expected by Potential Investors

Training and re-training facilities for IT professionals are expected by most respondents. This implies that the supply of IT professionals does not meet the industry's requirements, and that there is a role for a virtual university and training/re-training facilities at the SMART Center. Respondents also expect that an incubation company should be located in the Technopark.

(iii) Linkages with other institutions

All respondents expressed an interest in setting up linkages with academia and research institutes, as well as with some other industries, as shown below.

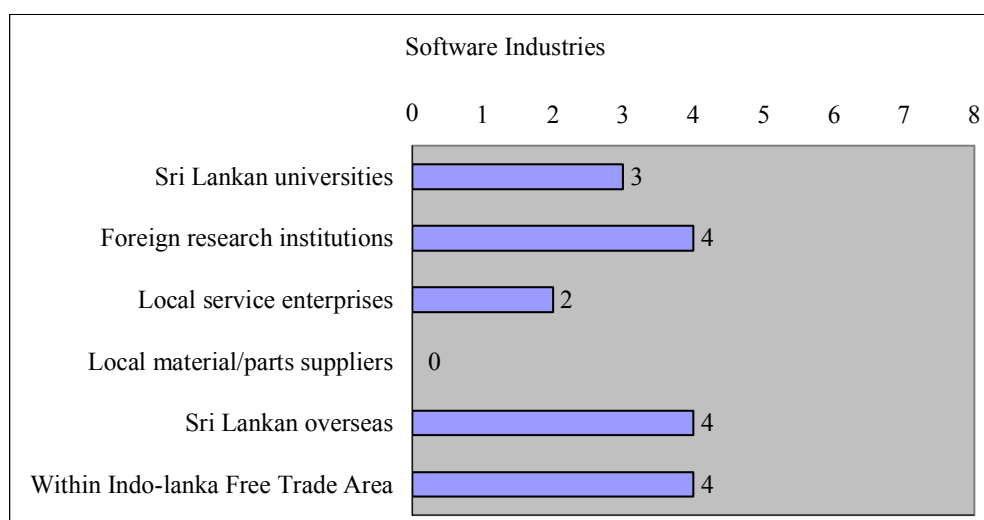


Figure 5.3 Linkages Expected to be Established

Linkages with universities and research institutions are expected to be beneficial in that industries can use innovation to keep pace with global competition in the fast IT changing market. Sri Lankan overseas people who made business success are expected to play a catalytic role to bridge local enterprises to the world market and advanced technologies.

5.3 Investment Demand of IT Hardware Industries

1) Survey Results

A summary of the results of the questionnaire survey for IT hardware industries is shown below.

Table 5.3 Survey Results for IT Hardware Industries

Country	Samples	Responded	Interested			
			Highly	Mode.	Slight.	Total
Sri Lanka	172	5	2	1	1	4
Malaysia	106	82	0	5	0	5
Singapore	412	139	0	1	0	1
India	160	100	0	1	0	1
Total	850	326	2	8	1	11

(Source) JICA Study Team

(i) Sri Lanka

A total of 172 enterprises in the hardware sector were surveyed, and five companies responded directly. Of the respondents, two companies expressed a high level of interest and

one company was moderately interested in locating in the Technopark. Slight interest from one company was also obtained. Although there were few respondents, the result is encouraging in the sense that two manufacturing companies are highly interested in investing in the Technopark.

(ii) Malaysia

A total of 106 enterprises were surveyed, and 82 companies replied. Of these respondents, five companies expressed moderate interest in the Technopark.

(iii) Singapore

Of 412 hardware enterprises contacted, 139 companies responded to the survey. One company expressed moderate interest in the Technopark.

(iv) India

A total of 160 enterprises were surveyed, and 87 companies replied. Of these, one company showed a moderate interest in the Technopark.

2) Evaluation of Interest by IT Hardware Industries

(i) Analysis of positive responses

Attractiveness of the Technopark to the IT hardware companies was evaluated using multiple answers from the questionnaires. Of the five positive answers from IT hardware companies in Sri Lanka, four companies gave reasons for their interest in the Technopark, as shown below.

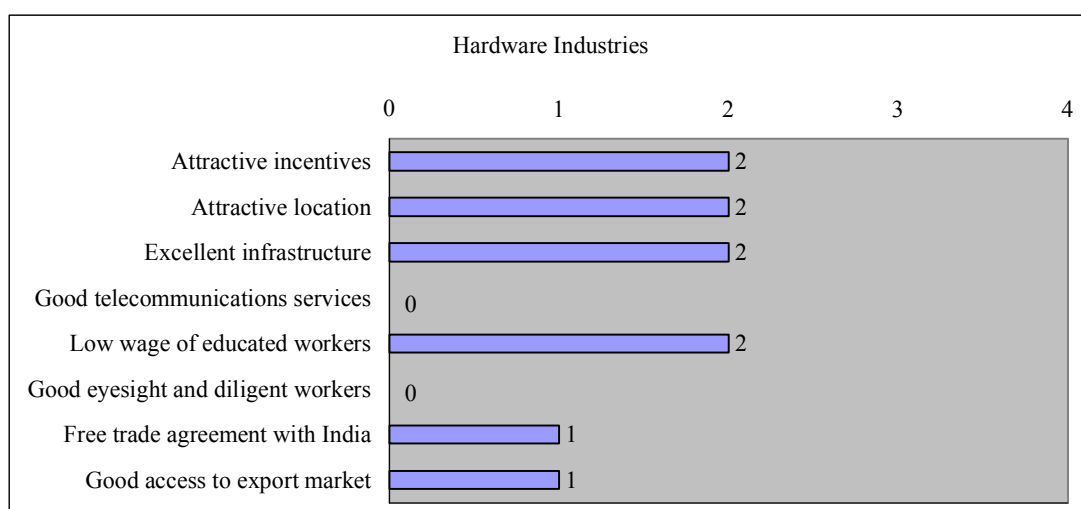


Figure 5.4 Reasons for Interest in the Technopark

The survey result indicates that hardware enterprises expect to get attractive incentives and good infrastructure services in the Technopark. Since the manufacturing sector in general needs a large amount of skilled human resources for their operation, availability of educated workers at low wages is an incentive to invest in Sri Lanka. The Indo Lankan Free Trade Agreement (FTA) will also be attractive for the electronic/electric sector. Some manufacturing companies interviewed by the Study Team expressed their intention to take advantage of this opportunity. The trade linkages with southern India will create more business opportunities for companies locating in Sri Lanka.

(ii) Reasons for showing no interest in the Technopark.

Reasons for showing no interest in the Technopark have been evaluated in order to make the project more viable and attractive. Based on the findings from direct interviews, the following factors are considered to be major reasons why companies are not ready to explore the possibility of investing in the Technopark;

- Concern about the security situation in Sri Lanka due to the prolonged ethnic conflicts;
- Misconceptions regarding socio-economic conditions in Sri Lanka, possibly due to biased reports on security conditions and living and working conditions;
- Lack of publicity for the Technopark, and Sri Lanka in general;
- Sri Lanka is covered by company offices located in India because Sri Lanka is geographically close to South India;
- Uncertainty over the world IT market;
- Companies have a focus on other markets, such as those within South East Asia, India and China;
- Companies already have a presence in Sri Lanka through distributors, resellers and corporate offices;
- Companies intend to consolidate operations in their country of origin first.

5.4 Phased Development of the Technopark

On the basis of the questionnaire survey and the study of the current state of IT-related industries in Sri Lanka, it is proposed that development of the Technopark should be phased.

The number of plots reserved for the software and hardware industries in the short term (Phase 1) have been derived from the survey results and following assumptions:

- Those companies who have expressed high or moderate interest in the questionnaire survey will invest in the Technopark;
- Those BOI approved IT-related companies who are awaiting agreement or construction with substantial amounts of investment will invest in the Technopark and build their facilities on the industrial plots;
- Those BOI approved IT related companies who are in operation with substantial investment will also invest in the Technopark for expansion purposes;
- The number of these assumed investors should be discounted by half to take account of uncertainty.

Table 5.4 Number of Industrial Plots for Phase I Development

	Software companies			Hardware companies			Total
	A*	B*	Sub total	A*	B*	Sub total	
Sri Lanka	3	1	4	3	3	6	10
Foreign	11	4	15	7	1	8	16
Total	14	5	19	10	4	14	26
↓							
50%	10			7			17

A*: Number of companies expressing high or moderate interest in the survey.

B*: Number of BOI approved IT related companies who are awaiting agreement or construction with substantial amount of estimated investment.

(Source) JICA Study Team

(i) Software industries

Three Sri Lankan enterprises and eleven software companies in other countries expressed moderate interest in the questionnaire survey. According to the BOI database, there is one local company and four foreign companies awaiting agreement or construction with substantial amount of investment. Accordingly, 10 industrial plots are recommended for the short-term development (Phase 1).

(ii) Hardware industries

Three Sri Lankan enterprises and seven foreign IT hardware companies expressed high or moderate interest in the survey. According to the BOI database, there are three local

companies and one foreign company with substantial amount of investment. Accordingly, 7 industrial plots are recommended for the short-term development (Phase1).

It should be noted that the number for short-term plot development is provisional, and will be adjusted depending on changing demand in the future. It is because the questionnaire survey was conducted prior to the permanent cease-fire agreement and because the interest of the potential investors must have been inevitably lower than that of investors when the peace agreement is reached. The scale of development, therefore, should be adjusted depending on the future demands of investors under the peace agreement.

5.5 Investment Promotion

One implication that was derived from the survey results was the need to promote investment into the IT industries and the Technopark. An awareness program or publicity campaign should be set up in order to introduce IT industries and the Technopark, not only to a particular country, but also regionally and globally. The following schemes could be adopted:

- (a) The Government of Sri Lanka should issue a statement to demonstrate a high level of commitment to the Technopark project. This should be aimed at winning investors' confidence and drawing attention to the peaceful and secure conditions in Sri Lanka.
- (b) Local research institutes and universities should participate more actively in IT promotion program by organizing seminars and exhibitions so that investors realize the potential of IT talent in Sri Lanka.
- (c) The Sri Lankan authority should organize an exhibition inviting all local companies involved in the IT industries. This will create awareness of the local companies.
- (d) Non-resident Sri Lankan IT scientists and experts should be linked to help incubate the IT sector in Sri Lanka.

More specifically, the following activities are recommended to promote investment in the proposed Technopark:

- (i) Promotion targeted at global IT companies

As discussed in Chapter IV, the SMART Center and each unit under the center, such as the virtual university, would be operated by public-private partnerships. The virtual university, for

instance, would be operated under the strategic partnership with a major application service provider or software supplier (e.g., Microsoft, Sun Microsystems, Oracle and Hewlett Packard). Other SMART Center units might also be operated in close collaboration with the leading IT companies. Therefore, investment promotion should be targeted at leading companies who have expertise in the management of IT business.

(ii) FDI promotion in focused countries:

Figure 2.4 in Chapter II shows the major countries of origin of investors in the Sri Lankan IT-related industry. Marketing should be targeted at those countries, such as USA, UK, Australia, EU and Japan in order to efficiently allocate the limited resources for investment promotion.

(iii) Promotion through Overseas Sri Lankans:

Many Sri Lankans who are working in the IT area overseas maintain relations with domestic enterprises and often come back to Sri Lanka. These IT talented people should be encouraged to establish or expand their businesses in Sri Lanka by means of affiliation with or subcontracting to domestic enterprises and ventures. Close linkages with overseas Sri Lankan IT personnel should be maintained and promoted. Establishing business linkages with those people will also create opportunities to access the world market and obtain advanced technologies.

(iv) Promotion program targeted at IT-related SMEs:

IT software industries outside Sri Lanka often operate as a large number of small and medium scale enterprises (SMEs). For instance, Japanese software industries are dominated by SMEs, and due to high production costs, part or allof production is often out-sourced from, or the production base is moved to, other Asian countries, such as China and Vietnam where cheap work forces are available. Some companies, however, are not necessarily satisfied with their operations in such countries, because the investment environment is not always business friendly. Sri Lanka can target SMEs that are not happy with business conditions in other countries.

(v) Promotion through IT-related associations:

In the IT advanced countries, software enterprises often form business associations networked among them. Investment promotion channeled through these networks is likely to be effective. In Japan, for instance, there are IT software industry associations, such as the All Nippon

Information Industry Association Federation (ANIA). ANIA is a nationwide federation of local software industry associations. Currently, it has about 2,000 member companies and offers seminars and workshops for the promotion of local IT enterprises. ANIA recognizes that cooperation with developing countries is important in helping the Japanese software industry to face global competition. Outsourcing of middle-ware products from developing countries is one of the possible ways for Japanese IT companies to maintain competitiveness, and developing close business partnerships with Japanese enterprises will benefit Sri Lankan IT enterprises. However, it is noted that “competency” is necessary for the IT companies in developing countries to make high quality products. ANIA is starting a program whereby Vietnamese IT engineers are invited to Japan to work for Japanese IT companies, where they can learn Japanese and advanced IT skills. Sri Lanka should be proactive in publicizing itself as a potential destination for investment by Japanese IT enterprises. The IT-related associations such as ANIA are aware of the needs of domestic enterprises and try to play a catalytic role in finding appropriate partnerships in developing countries. Clearly, promotion of investment through networks of IT-related associations has a lot of potential.

(vi) Promotion of satellite factories:

Electronic/electric industries outsource non-economical parts of their production process to other countries where production costs are much cheaper. These enterprises produce a range of products, from high profit to low profit generating products, and they may have loss-making production models. The loss-incurring components may be turned into profitable ones by outsourcing production or by establishing factories in lower waged countries. This basic concept is known as “satellite factory operation”, illustrated in the figure below. If the labor cost for loss-incurring products is reduced to the point where the product could be turned to profitable one, it might be better for the company to move their product line to Sri Lanka where the standard of wage rate is lower. Hence, the marketing effort of the Technopark could be targeted at those enterprises that are looking for the place to produce non-economical components at a lower cost. A specific effort should be taken to promote satellite factories for electronic industries in India, Singapore, Malaysia, Thailand, Hong Kong, Taiwan and Japan.

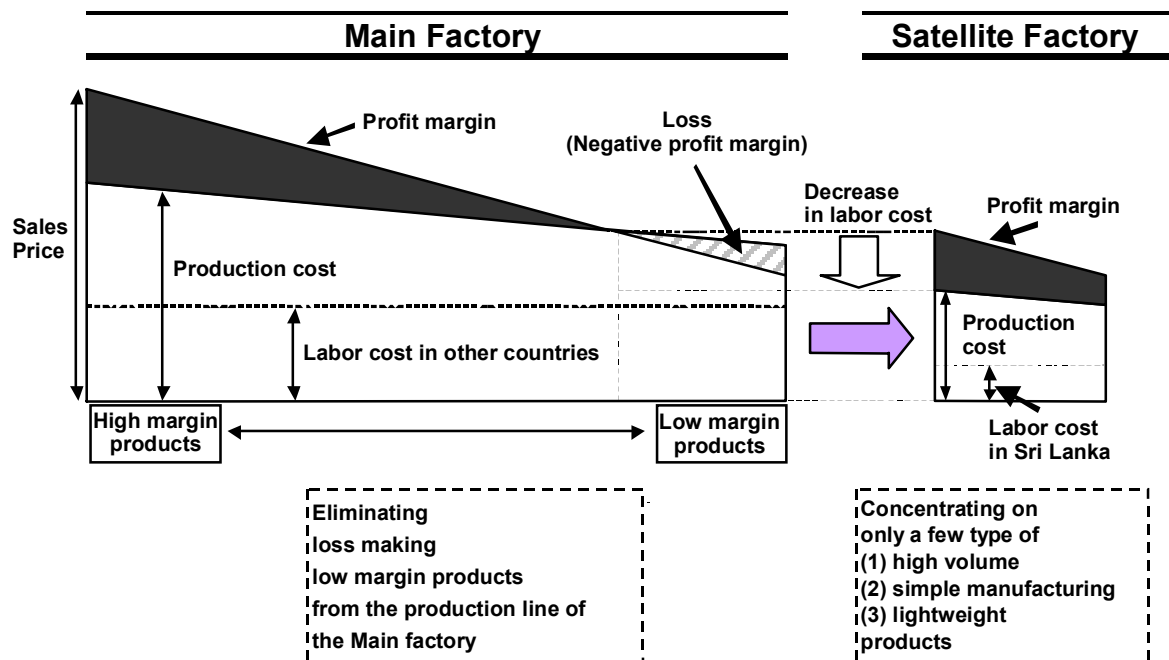


Figure 5.5 Promotion of Satellite Factories

(vii) Collaboration with investment promotion bodies in developed countries:

Some match-making programs or business-partnering programs have been implemented by institutions in developed countries in order to develop mutually profitable relationships with companies in developing countries. For instance, the Norwegian Agency for Development (NORAD) initiated the Matchmaking Program with Sri Lanka in 1995. Norwegian companies looking for a partner in a developing country can submit a profile to the coordinating center, and, when a match is found, NORAD can back the Norwegian company up to US\$2,290 as a grant for the first trip. If the parties agree to develop their relationship further, they can apply to NORAD for various types of industrial and commercial support. Reportedly, the program has received 120 profiles from Norwegian companies since 1995. 104 matches have been found. In all, 16 companies have signed cooperative agreements and 12 joint ventures have been formed. Close collaboration with the Japanese investment promotion body, called JETRO, could also promote investments by Japanese IT enterprises in Sri Lanka.