

Annex III

Country Study on Sri Lanka using Global Value Chain Analysis:

THE INDUSTRIAL RUBBER AND ELECTRONIC PRODUCTS SECTORS³⁵

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Contents

	Page
List of figures	156
List of tables	156
List of boxes	156
Preface	157
The Industrial Rubber Products Sector in Sri Lanka	157
1. An Overview of the Natural Rubber Sector in Sri Lanka	157
2. The Global Rubber Market and Sri Lanka's Share	158
3. Structure of the Rubber Sector Value Chains	163
3.1. Raw materials and suppliers	163
3.2. Natural rubber production process	165
3.3. Marketing environment	167
3.4. Infrastructure and logistics system	168
4. Factors Affecting Comparative Advantage in Rubber Manufacturing	169
4.1. Rubber cultivation, production and costs	169
4.2. Human resources	172
4.3. Policies and regulatory framework	172
5. SWOT Analysis	173
6. Action Plan for the Development of the Rubber Industry in Sri Lanka	178
The Electronic Products Sector in Sri Lanka	183
7. Overview of the Global Electronics Industry	183
8. Advancement of Asia-Pacific Developing Countries in the Electronics Sector	185
9. Potential for the Development of the Electronics Industry in Sri Lanka	186
10. Access to Major Markets	189
11. Value Chains in the Electronics Industry in Sri Lanka	192
12. SWOT Analysis of the Electronics Industry in Sri Lanka	196
13. Action Plan for the Development of the Electronics Sector Value Chains in Sri Lanka	198

Contents (continued)*Page***List of figures**

1. Global natural rubber production in 2008	158
2. Rubber production in Sri Lanka from 1990 to 2008	159
3. Global rubber consumption in 2008	160
4. Competitive factor grid (based on industry expert opinion)	160
5. Natural rubber production, consumption and exports in Sri Lanka	161
6. Rubber products export from Sri Lanka, 1999-2008	162
7. Export income from value added rubber products	162
8. Global value chain of rubber products	164
9. Natural rubber production cycle	166
10. Growth of global consumption in natural rubber, 2005-2010 (in per cent)	168
11. Value of input components in the rubber sector	169
12. Rubber cultivation in 2008	170
13. Rubber cultivation, yield and cost of production in Sri Lanka	170
14. Global rubber cultivation, production and yield in 2008	171
15. Annual average remuneration by rubber product segments	172
16. Comparative percentage price variations	175
17. Natural rubber/synthetic rubber relative price ratio	176
18. Performance of the semiconductor sector, 2001-2010 (actual); 2011 and 2012 (forecast)	185
19. Total value of inputs and outputs in the electronics sector in Sri Lanka ...	188
20. Value chains for electronic components	194
21. Value chains for electronic products	195

List of tables

1. Global rubber production and consumption, 2004-2008 (in thousands of MT)	159
2. Competitive factor matrix (based on industry expert opinion)	160
3. Types of rubbers	165
4. Action plan matrix for the rubber sector in Sri Lanka	179
5. Apple iPhone 3G's major components and cost drivers	184
6. Productivity levels across the three sectors in Sri Lanka	188
7. Trade between India and Sri Lanka, 2000-2007 (in millions of dollars)	190
8. Action plan matrix for the electronics sector in Sri Lanka	200
9. Sub-activities for the action plan	202

List of boxes

1. Experience of Malaysia and Taiwan Province of China in the development of the electronics industry	187
2. An example of the electronics sector FDI in Sri Lanka	199

Preface

Rubber and electronic products are two important export-oriented products of Sri Lanka. Rubber, mainly natural rubber industry in Sri Lanka, is based on the geographical advantage of the country, with its extensive experience in growing rubber trees, and on foreign investment in advanced technologies in processing and manufacturing of rubber products. Sri Lanka is now exporting different types of manufactured finished rubber products. In view of the increasing global demand for natural rubber and rubber products and the emerging competitiveness in the rubber industry, Sri Lanka is enacting various measures to increase and improve rubber cultivation and collection and to enhance the quality of manufactured products.

Electronic products manufacturing relies on the availability of a skilled labour force and the country's central transit location particularly for maritime logistics, which could facilitate efficient transportation of electronic components for different end products, manufactured in other countries. Furthermore, with considerable experience in producing and exporting electronic components for the local joint ventures and fully foreign-owned branded electronic products companies, Sri Lanka is now exploring the prospects of developing its own branded products.

The study was conducted with the purpose of enhancing the value added in both the rubber and electronic products sectors' SMEs so that the benefits from such value added could be widely distributed. Action plans, detailing national strategies, as well as some critical regional programmes have been prepared to facilitate cooperation among countries and enterprises for the products under consideration. The findings of the initial studies were presented at a national workshop, held in Colombo, and the proposed strategies and recommendations for strengthening the value added in the rubber and electronic products sectors were deliberated. Action plans were presented and further discussed at the subregional workshop also held in Colombo with representatives from participating countries, bilateral and multilateral agencies, involved in promoting subregional cooperation, and other stakeholders.

The Industrial Rubber Products Sector in Sri Lanka

1. AN OVERVIEW OF THE NATURAL RUBBER SECTOR IN SRI LANKA

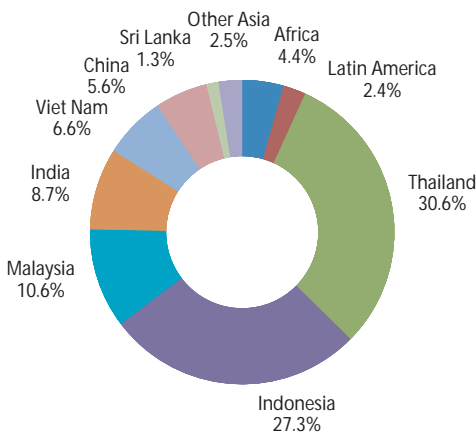
The rubber industry in Sri Lanka dates back to 1876 with the first planting of rubber trees in Henerathgoda Gardens in Gampaha. Rubber cultivation focuses on growing rubber trees and producing raw rubber from field latex, while rubber manufacturing converts the raw rubber into value added products. In 2008 the natural rubber sector contributed \$664 million to the economy (EDB 2009) and created employment for approximately 200,000 people, mainly in the rural areas (ASI 2009). Rubber plantations in 2008 extended over 122,000 hectares, accounting for seven per cent of the total cultivated land area of Sri Lanka (Central Bank 2008).

The manufacturing of rubber products began in the 1950s primarily with rubber re-treading and expanded rapidly after the introduction of open trade policies and development of industry zones in the late 1970s. A tremendous growth of the rubber sector has allowed Sri Lankan rubber manufacturers to compete in regional and global markets at both industrial and consumer levels, offering value added natural rubber products such as solid tires, surgical gloves, automotive parts, mats and hoses. Currently, the Government of Sri Lanka and private entrepreneurs are considering the possibilities of product diversification and the improvement of domestic and international competition.

2. THE GLOBAL RUBBER MARKET AND SRI LANKA'S SHARE

The global demand for rubber is satisfied by the supply of both natural and synthetic rubber each catering to different consumer needs. Global natural rubber production in 2008 amounted to 9.88 million MT, of which 93.2 per cent came from Asia and the Pacific (figure 1). The remaining 4.4 per cent and 2.4 per cent were produced by Africa and Latin America, respectively. The global supply of synthetic rubber mainly comes from Asia and the Pacific, the United States of America and the European Union. A contribution of Asia and the Pacific in the global synthetic rubber production in 2008 was 48.8 per cent, of which 17.3 per cent and 12.3 per cent were from China and Japan, respectively. On a macrolevel, the global natural rubber production has gradually increased from 2004 to 2008 while synthetic rubber production experienced a dip in 2008 (table 1) due to economic recession in North America and Europe. Increased petroleum prices also led to the decrease in production of synthetic rubber during this time. While there was a further overall decline in production and consumption in 2009, estimates for 2010 indicated an upward trend.

Figure 1: Global natural rubber production in 2008



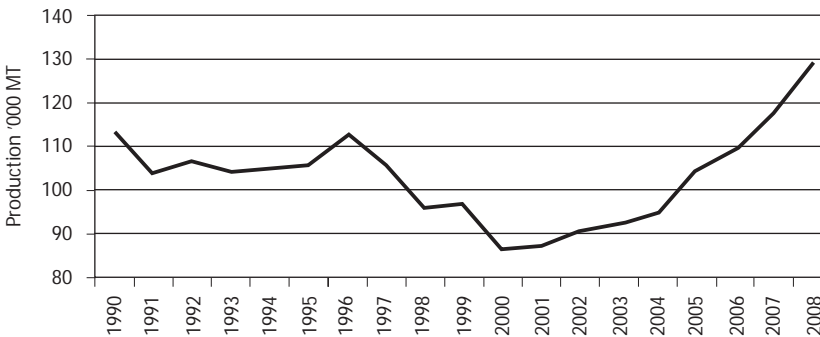
Source: IRSG (2009).

Table 1: Global rubber production and consumption, 2004-2010* (in thousands of MT)

	2004	2005	2006	2007	2008	2009	2010*
Natural rubber production	8 758	8 906	9 698	9 687	9 877	9 662	10 291
Natural rubber consumption	8 701	9 184	9 709	10 230	10 088	9 390	10 671
Synthetic rubber production	11 999	12 136	12 690	13 434	12 813	12 087	14 002
Synthetic rubber consumption	11 880	11 921	12 692	13 284	12 586	11 754	13 858
Per cent of natural rubber in total rubber consumption	42.3	43.5	43.3	43.5	44.5	44.4	43.9

Source: IRSG (2009 and 2011).

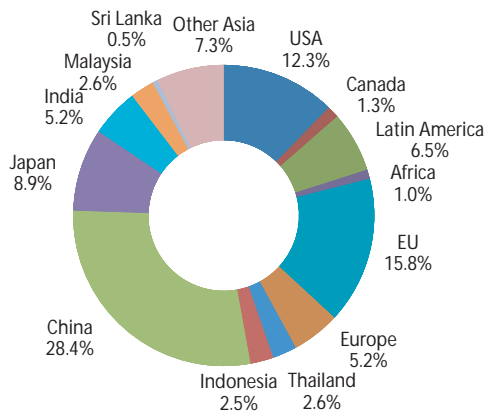
Sri Lanka ranks as the eighth largest natural rubber producing country in the world with a production of 129,243 MT in 2008, which represents just a tiny share of around 1.3 per cent of the global natural rubber production and 0.6 per cent of the global total rubber production (see figure 1). The natural rubber production in Sri Lanka declined significantly and rapidly during the Asian financial crisis in 1997-1998 due to low prices for natural rubber in the world market, but rebounded strongly during the next decade, as shown in figure 2.

Figure 2: Rubber production in Sri Lanka from 1990 to 2008

The production of natural rubber in Sri Lanka increased by 36 per cent between 2004 and 2008 (figure 2) and is expected to increase even further as rubber plantation projects have been implemented both by the private or small holding and the larger state estate (20 acres or more of agricultural land) sectors. Of the total natural rubber production in Sri Lanka in 2008, 62 per cent was used for domestic product manufacturing and the remaining was exported as raw rubber.

Of the global rubber consumption in 2008, China consumed 28.4 per cent while the United States of America, the European Union, Japan and India consumed 12.3, 15.8, 8.9 and 5.2 per cent, respectively (figure 3). Sri Lanka consumed 0.5 per cent of global rubber products, of which 0.8 per cent was natural rubber consumption and 0.2 per cent synthetic rubber consumption (IRSG 2009).

Figure 3: Global rubber consumption in 2008



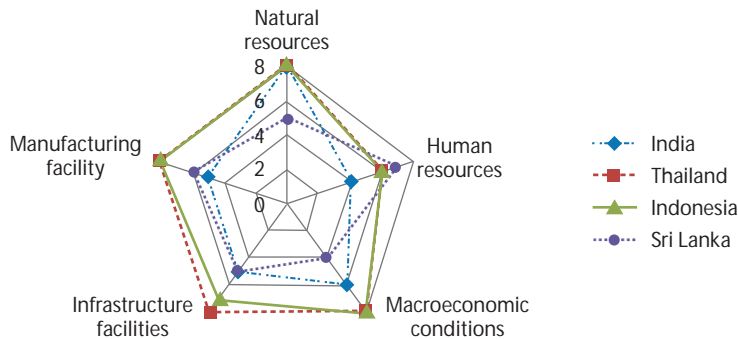
Source: IRSG (2009).

With respect to natural rubber production, Sri Lanka has to compete with its regional neighbours India, Thailand and Indonesia. Except for the human resources factor, these other countries have better competitive advantages as seen in the competitive factor analysis presented in table 2 and figure 4 and based on the industry expert opinion.

Table 2: Competitive factor matrix (based on industry expert opinion)

	India	Thailand	Indonesia	Sri Lanka
Natural resources	Strong	Strong	Strong	Average
Human resources	Average	Strong	Strong	Strong
Macroeconomic conditions	Strong	Strong	Strong	Average
Infrastructure facilities	Average	Strong	Strong	Average
Manufacturing facility	Average	Strong	Strong	Average

Figure 4: Competitive factor grid (based on industry expert opinion)

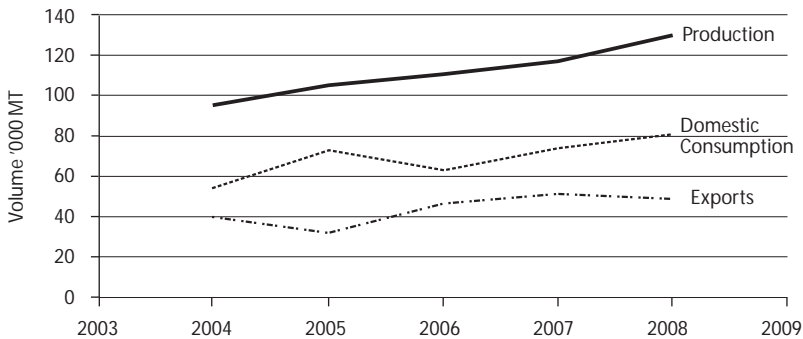


Market analysis

Sri Lanka produces different natural rubber products such as ribbed smoked sheet (RSS), latex crepe, sole crepe, scrap crepe, technically specified rubber and concentrated latex. Sheet rubber, which is mainly produced by small enterprises, accounted for 43 per cent, while concentrated latex accounted for 28 per cent of the total production in 2008, becoming the second largest type of natural rubber products in the country (RDD 2009). The production of latex crepe, which is mainly produced for the export market by the estate sector, accounted for 16 per cent.

Sri Lankan raw natural rubbers and latex are exported mainly to Pakistan; the European Union; India; Japan; the United States of America; Hong Kong, China; and some other industrially developed countries (EDB 2009). Of those raw rubber exports in 2008, 35 per cent was high-quality sheet rubber and 32 per cent latex crepe. Currently, 83 per cent of the sole crepe and 73 per cent of the latex crepe are mainly exported to manufacturers to produce footwear, food and pharmaceutical products. Sri Lanka rubber clones produce pure white latex containing no significant dirt content and suitable for clear transparent products. Therefore, there is a high demand for Sri Lankan natural rubber that has resulted in a gradual increase in the export of raw rubber over time with a slight decline in 2008. Over the years, domestic consumption of natural rubber has kept on rising, indicating that the fall in the 2008 export was compensated by the increase in domestic consumption (see figure 5).

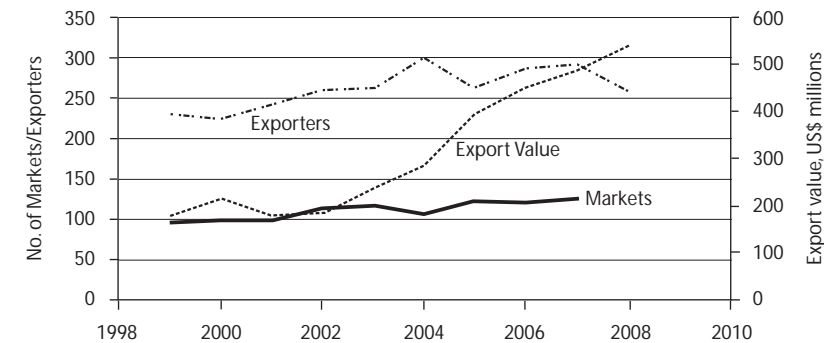
Figure 5: Natural rubber production, consumption and exports in Sri Lanka



Sources: RDD (2009); MPI (2008).

Rubber products have been a solid part of country's economy since the 1980s. All leading solid tire manufacturers — major consumers of natural rubber — have operations in Sri Lanka. In the past two decades, Sri Lankan rubber product manufacturers have entered into regional and global markets for the value added products in both industrial and consumer segments. Although export of rubber products from Sri Lanka dropped during the Asian financial crisis of 1997-1998, it has recovered significantly during 2002-2003 due to the introduction of a new investment incentive, growing steadily from \$286 million in 2004 to \$543 million in 2008 (figure 6). According to statistics, rubber product exports accounted for seven per cent of the total

Figure 6: Rubber products export from Sri Lanka, 1999-2008

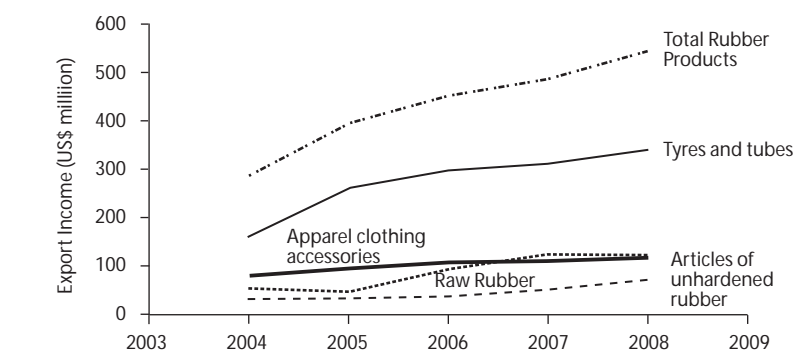


Source: EDB (2009).

export earnings of Sri Lanka, representing 1.4 per cent of its gross domestic production in 2007 (Central Bank 2008). A total number of 259 players are engaged in the export of rubber products (EDB 2009).

The number of countries, where Sri Lankan rubber products are exported, has grown up to 130 in 2008 and include the major markets such as the United States of America, the European Union, India, Canada and Australia. The rubber products, exported to those countries, include tires, tubes, articles of unhardened rubber like gloves, apparel clothing accessories, industrial components, biomedical devices and food packaging materials. It is clear that the export earnings of Sri Lanka from value added rubber products are rapidly growing compared to that of raw natural rubber (figure 7). Of the total earnings from the value added rubber products, more than 50 per cent is from tires and tubes. The rest is largely distributed among apparel clothing accessories and unhardened rubber products.

Figure 7: Export income from value added rubber products



Sources: EDB 2009; RDD 2009.

3. STRUCTURE OF THE RUBBER SECTOR VALUE CHAINS

A global value chain for rubber products (both natural and synthetic) is illustrated in figure 8. The main input to the industry is the different types of raw materials: natural rubber, synthetic rubbers, natural and synthetic lattices, chemicals and other additives. Different natural rubber products are available locally while synthetic rubbers, lattices and additives are all imported. Natural rubber originates from rubber trees and field latex and coagulum are collected by planters. Field latex and coagulum are converted into raw rubbers and concentrated latex by raw rubber manufacturers and then used by compound manufacturers and/or by rubber product manufacturers buying product from rubber traders. Some rubber product manufacturers collect raw rubber from their own plantations and from other smaller subsidiaries. Rubber product manufacturers sell their products to local customers through agents/dealers. Most domestically manufactured high value added rubber products are exported to international markets through wholesalers and retailers. Several ministries, trade associations, research institutions and business associations provide their assistance and services to planters, traders and manufacturers in the rubber industry to improve quality and quantity of the final rubber products.

3.1. Raw materials and suppliers

Different natural rubber products are produced in Sri Lanka of which 60 per cent is produced by smallholders. Natural rubber is also imported to meet occasional shortage on the domestic market. For example, 3,636 MT of natural rubber was imported in 2008 (DOC 2009); however, this amount is insignificant compared to the domestic natural rubber consumption of 80,600 MT.

Synthetic rubber is a distinct but integral part of rubber products sector, though it is not a complete substitute of natural rubber. Different types of synthetic rubbers, such as SBR, BR, NBR, EPDM, IR, IIR, HIIR and CR (see table 3), and synthetic lattices are imported for specific use in certain industries. 23,500 MT of synthetic rubbers and lattices (IRSG 2009) were imported in 2008, mainly from the United States of America, the Republic of Korea, Malaysia, the European Union, South Africa and some other countries. Rubber chemicals, such as carbon black, silica, activators, accelerators and processing oil, are mostly imported from India. Small volumes of rubber chemicals are also imported from Thailand, Malaysia and China. A total of 10,660 MT of chemicals (DOC 2009) was imported in 2008. On top of that, steel and nylon fabrics are also imported and used especially in the tire manufacturing industry.

Figure 8: Global value chain of rubber products

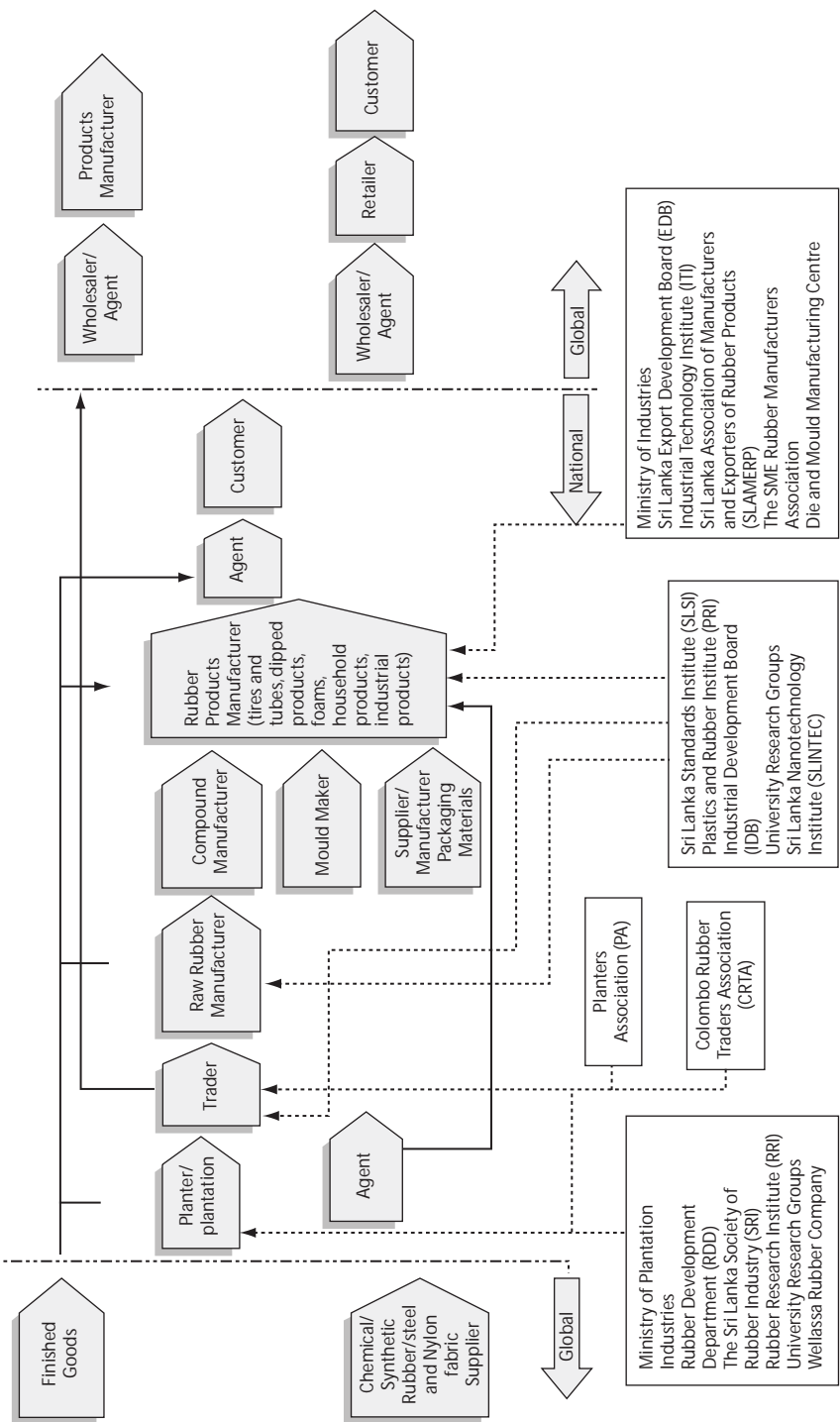
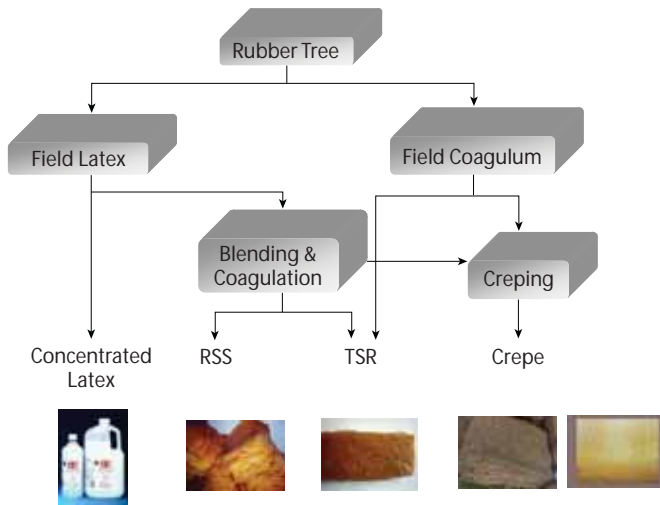


Table 3: Types of rubbers

Rubber	Abbreviation	Used mainly to manufacture
Stirene Butadiene	SBR	Tire
Butadiene rubber	BR	Tire
Nitrile Rubber	NBR	Gaskets
Ethylene propylene	EPDM	
Isoprene rubber	IR	Tire
Butyl rubber	IIR	Tubes
Halobutyl rubber	HIIR	
Chloroprene rubber	CR	

3.2. Natural rubber production process

Natural raw rubber production starts with the tapping of the field latex from the trunk of a rubber tree. The latex is first collected in small containers fitted on the bark of the rubber tree and then transferred into buckets and mixed with anticoagulants. The field latex and field coagulum (cup lump, tree lace and earth scrap) are delivered to raw rubber manufacturers. Anticoagulated field latex is placed into a centrifuge to produce concentrated latex that contributes to the rubber value chain at process specific level and is used in the manufacturing of foam rubber, dipped products, rubber threads and caste rubber products. In the ribbed smoked sheet (RSS) and technically specified rubber (TSR) manufacturing units, the field latex is blended and coagulated first to form the soft coagulum. The soft rubber mass is then milled in a two-roller mill with ribbed rollers and the resultant sheets are then dried in a smoke house. These dried sheets are then packed into bales for transport. The soft rubber mass is also mashed and then dry heated to produce block rubber, which is also called TSR. Some grades of TSR are produced from field coagulum. Crepe rubber is manufactured from fresh coagulum, field coagulum or cuttings of RSS. In the latex crepe manufacturing units latex is transferred into bulking tanks to separate white and yellow fractions. The two fractions are taken out from the tanks separately and coagulated separately. The white coagulum is cut and then fed through mills to become mats and then laces. The laces are dried in drying chambers and are either sold as pale crepe or folded and compressed into blankets called blanket crepe. The yellow coagulum is processed in the same way to produce laces. In this case, the laces are then made into blankets, which in turn are passed through a lamination process to form sole crepe. Field coagulum also undergoes the same processes to produce low-grade rubbers. The production cycles of main raw rubbers are given in Figure 9.

Figure 9: Natural rubber production cycle

Source: The authors.

Rubber product manufacturers and related entities

Manufacturers of rubber products can be classified into two categories according to the raw materials they use – rubber or latex-based manufacturers. Rubber-based manufacturers produce tires, tubes, belts, hoses, mats, floor coverings, slippers, gaskets, caster wheels, hot water bottles, jar rings, exercise components, automotive components, etc., using natural rubber (RSS, crepe and TSR), synthetic rubbers and chemicals. Latex-based manufacturers produce dipped products including different types of gloves (examination, surgical, household, cotton supported industrial and agricultural gloves), balloons, foam rubber mattresses and other articles of foams, rubber bands and threads, toys and masks, cot sheets, etc., using both natural and synthetic lattices. A total number of 529 rubber enterprises are currently engaged in manufacturing rubber products; each of these manufacturing units employ from 10 to 500 labourers (ASI 2009).

The Government of Sri Lanka has given a priority to improving global competitiveness of the country's rubber sector initiating the appropriate policy reforms and other support initiatives. In recent years, the development of this sector has been given a high priority, particularly in the areas of infrastructure development and improving access to finance. A large number of agencies, including Ministry of Enterprise Development and Investment Promotion (MEDIP), Ministry of Industrial Development (MID), Ministry of Trade and Commerce (MTC) and Ministry of Plantation Industries (MPI) have launched activities aimed at developing and improving the rubber manufacturing industry. However, they do not have product-centred strategies or specific long-term development strategies targeted to the rubber industry.

Rubber industry related government agencies and private sector organizations have also played key roles in promoting the rubber industry by short-term measures. Rubber Development Department (RDD), Rubber Research Institute (RRI), Planters Association of Ceylon (PA), Wellassa Rubber Company, Sri Lanka Society of Rubber Industry (SRI) and Colombo Rubber Traders' Association (CRTA) have provided support to the rubber plantation industry. Sri Lanka Association of Manufacturers and Exporters of Rubber Products (SLAMERP), SME Rubber Manufacturers Association, etc., are responsible for the rubber products manufacturing industry. All these organizations are engaged in certain activities individually but their lack of inter-relationship and coordination has limited the overall growth of the rubber industry. The Sri Lanka Export Development Board offers a platform for product manufacturers to market their products at international markets; however, such government sponsored export promotion activities are quite inadequate.

3.3. Marketing environment

The production and marketing of natural rubber is generally subjected to high level intrinsic barriers, which are normal for most commodity systems in developing countries (Jaffee and Gordon 1992). The geographical distribution and involvement of a large number of small-scale growers has resulted in the escalation of costs related to collection of raw materials, transportation, agglomerating, sorting, grading, etc. that occur at different locations in the processing of rubber products. Despite a relatively good system of transportation and relatively short distances, geographical dispersion of rubber plantations has adversely affected the farmers' ability to receive better prices for their products.

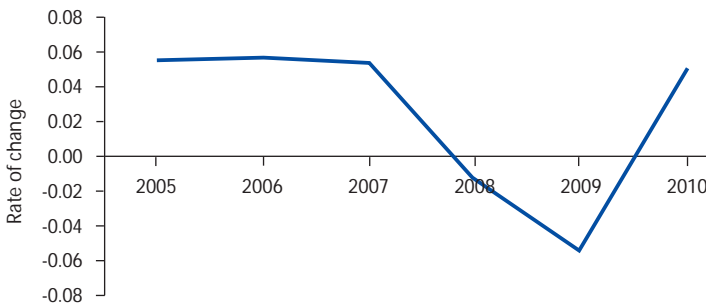
Marketing of natural rubber is left in the hands of middle-level dealers, operating in the rubber growing areas of the country, and mostly takes place at Colombo rubber auction. Traditionally, these marketing channels have been used for the low-grade rubber. Sri Lanka has yet to fully utilize Thailand's model of Group Marketing Centres, where a group of smallholders form a joint venture, which collectively assists in weighing, grading and selling their product (Ali et al. 1997). These centres collect unprocessed rubber from smallholders and decide on the best processing mechanisms that provide better pricing and quality output. Apart from creating the necessary infrastructure for such centres, it is important to educate the stakeholders about the advantages of such system for achieving long-term sustainability. Additionally, it is necessary to establish quality standards for the unprocessed rubber that will be purchased through the system. It must also be noted that Sri Lanka could receive better prices for its rubber if direct links, requiring the Government's intervention, could also be established in global niche markets.

Most of Sri Lanka's large rubber product manufacturing entities are either owned by international brands or established under joint venture partnerships between foreign and local investors. This has resulted in product marketing controlled by foreign investors. Many small players struggle, trying to find access to international markets for their products, because of the existing deficiencies in the overall marketing efforts. Sri Lanka's rubber products marketing system lacks cohesion due to a variety of reasons,

such as the inability of stakeholders (especially small players) to absorb market and production risks, asymmetric information flow, low or no integrity and coordination among stakeholders and high cost structures.

The majority of Sri Lankan rubber products reach international markets, being part of a few established international brands that operate their manufacturing entities in the country, and via other direct and indirect links of the Government and private non-governmental organizations. During the 1990s, Sri Lankan major markets for manufactured rubber products were the Islamic Republic of Iran, Pakistan and Germany. Thus, Sri Lankan export of rubber products was positively correlated with the economic growth and development of these countries. But in the past decade, Sri Lankan rubber products became diversified and reached North America and Europe, thus reducing its dependence on the markets of the Islamic Republic of Iran and Pakistan. Though the rubber sector witnessed a slump in 2008 and 2009, higher growth was predicted for 2010 and beyond (figure 10).

Figure 10: Growth of global consumption in natural rubber, 2005-2010 (in per cent)



Source: IRSG (2009).

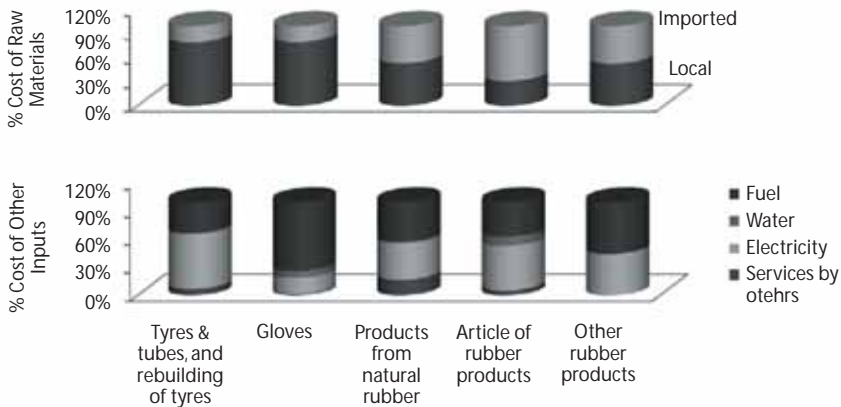
Note: Estimates for 2010.

3.4. Infrastructure and logistics system

Rubber production in Sri Lanka is blessed with year-round favourable weather conditions. Rubber product manufacturing centres are located in the districts with abundant rubber plantations within a 150 km distance from each other. Rubber-based products, raw rubber export and the raw material import are currently channelled through Bandaranayake International Airport and Colombo Freeport. The ongoing development and upgrading of Galle Port on the south coast, Trincomalee Port on the northeast coast and Oluvil Port on the east coast will help to improve maritime transportation facilities for the export market.

The rubber industry requires significant fuel and electricity consumption (figure 11) and is negatively affected by scarce energy resources in Sri Lanka. Three power generation projects (coal power plants at Norochcholai and Sampur and Upper Kotmale hydroelectric power station) were expanded to meet the country's annual growth of electricity demand by eight per cent (Mahinda Chintana 2005).

Figure 11: Value of input components in the rubber sector



Source: ASI (2009).

4. FACTORS AFFECTING COMPARATIVE ADVANTAGE IN RUBBER MANUFACTURING

As stated earlier, Sri Lanka has a significant comparative advantage in the rubber industry compared to other countries. However, to sustain its market share and improve competitiveness in international markets, Sri Lanka needs to analyze several critical factors, affecting such advantage, some of which are presented in the following sections.

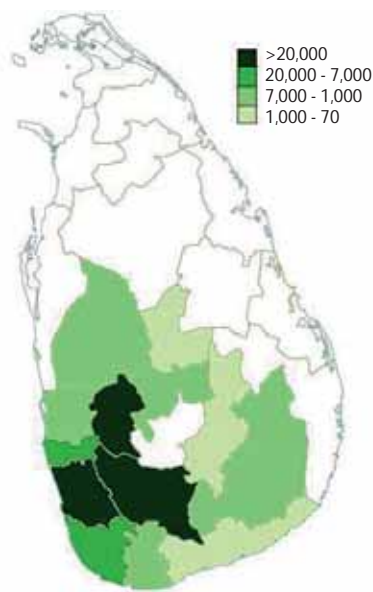
4.1. Rubber cultivation, production and costs

Rubber plantations stretch over 13 districts in Sri Lanka the largest of those, with over 20,000 hectares, are in Kegalle, Kalutara and Rathnapura districts, followed by plantations of 7,000-20,000 hectares in Colombo and Galle districts and plantations of 1,000-7,000 hectares in Gampaha, Matara, Kurunegala, Kandy and Monaragala districts (figure 12). Matale, Badulla and Hambantota districts have smaller plantation areas of 70-1,000 hectares. Of the total plantation areas, nearly 42 per cent is owned by the public/estate sector while the remaining 58 per cent is owned by the private/smallholder sector. The major cultivating districts offer the best conditions, in terms of soil and weather, for successful rubber cultivation. Since the early 2000s, a positive trend in yield increase has emerged after the stakeholders started to put serious effort in increasing the rubber production and productivity.

Rubber replanting and new-planting has gradually increased with the implementation of the Monaragala Rubber Development Programme (MRDP) in 2005 by Sri Lanka Society of Rubber Industry (SRI). MRDP aims at replanting of around 40,000 hectares by 2016, resulting in an additional annual production of 60,000 MT of rubber (SLRC and USAID 2002).

Rubber plantation areas, yield and cost of production are shown in figure 13. Unlike in Indonesia and Thailand, where considerable areas of land were reserved for

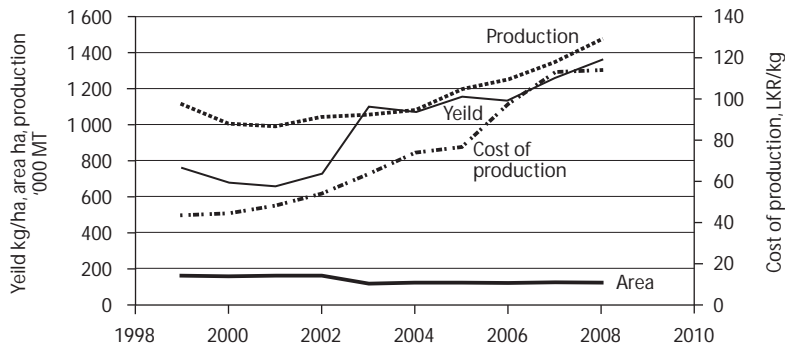
Figure 12: Rubber cultivation in 2008



Source: RDD (2009).

expansion of rubber plantations in future years, Sri Lanka, over the past decade, experienced a decrease in the areas under rubber cultivation, as these land areas were diverted to other uses, partially due to urbanization of the country. The rubber cultivation in Sri Lanka is mainly centred in the western part of the country, whereas sabaragamuwa and the southern provinces have undergone urbanization during the past two decades. The land values during the past two decades have demonstrated a growing trend, being used for residential and commercial rather than rubber cultivation purposes, and provided the owners with higher financial benefits.

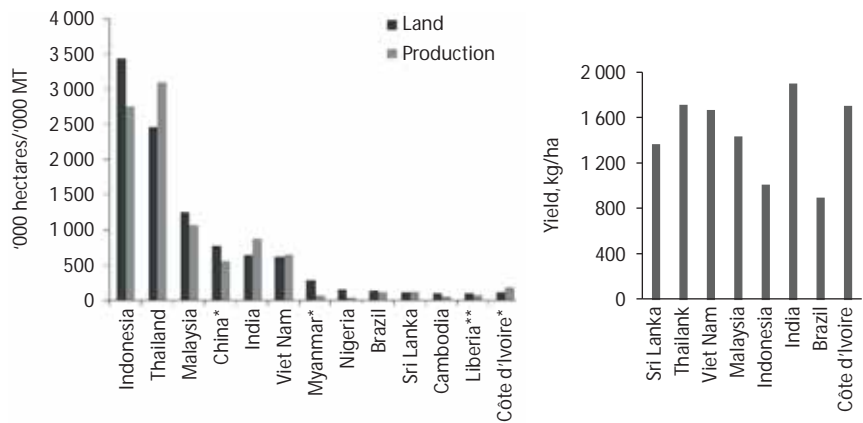
Figure 13: Rubber cultivation, yield and cost of production in Sri Lanka



Sources: MPI (2008); RDD (2009); Central Bank (2008).

Sri Lanka recorded an average yield of 1,353 kg/hectare per year in 2008, well below the yield shown by other Asia-Pacific countries, such as India, Malaysia, Thailand and Viet Nam (figure 14). The yield targets under MRDP are above 2,000 kg/hectare (USAID 2008), nearly a 50 per cent increase from the current productivity levels.

Figure 14: Global rubber cultivation, production and yield in 2008

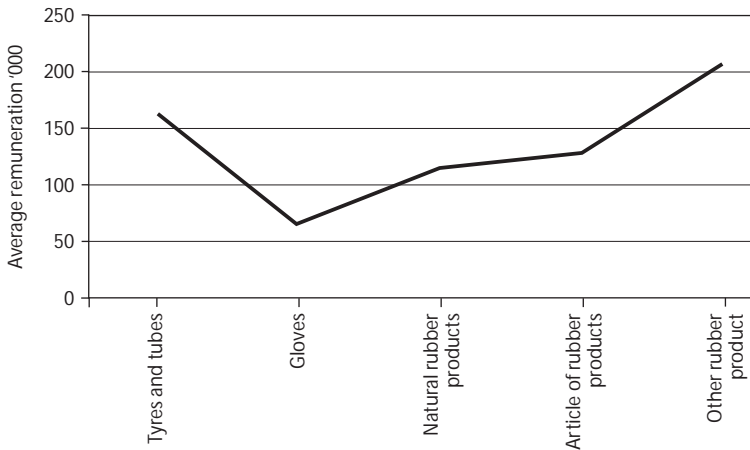


Sources: IRSG (2009), values reported in 2008, 2006*, 1999**.

A major feature in the rubber sector is the number of tapping days. A tapper in Sri Lanka can only tap an average of 260 days per year, whereas in other countries the tapping exceeds 300 days a year (Ali et al. 1997), the difference being the number of days lost to rain. A major share of rubber cultivation in Sri Lanka is located in a wet zone, which cause volatility in rubber prices compared to rubber prices in Singapore.³⁶ The proper use of rain guards can increase the tapping days to over 300 days.

Wages is another important component in the overall cost structure of rubber production. Figure 15 shows the average remuneration per employee during the year 2008. Though rubber glove manufacturing has recorded a high value added, the average remuneration remains low due to the labour intensive process involving low skilled workers. Large-scale manufacturers invest in advanced production facilities and employ a relatively small number of people with better remuneration packages. The labour intensive processes, such as quality inspection and packaging, are generally outsourced and the outsourced workforce tends to receive minimal remuneration.

³⁶ Generally, rubber prices are compared to Singapore Commodity Exchange prices. In his speech, the Senior Minister of State for Trade and Industry, Singapore at the World Rubber Summit in 2009 estimated that Singapore handled more than 50 per cent of the world's annual natural rubber trade and that Singapore has also been recognized as the global pricing centre for the physical trade of rubber, with more than 80 per cent of global rubber trade priced at the Singapore Commodity Exchange (SICOM) prices. Being neither a producer nor a major consumer of natural rubber, Singapore serves as a neutral trading hub that generates financing, procurement and risk management activities. Today the world prices for rubber are not only driven by demand but are also subject to speculations on the futures markets. Japan and Singapore are two major futures markets for rubber.

Figure 15: Annual average remuneration by rubber product segments

Source: ASI (2009).

4.2. Human resources

Sri Lanka has low cost semiskilled and disciplined labour force, engaged at different levels of the supply chain, including 23,813 skilled and 9,383 unskilled workers in rubber product manufacturing industry (ASI 2009). Employment of labour in the rubber industry is directly supervised by the Government that sets minimum daily wage rates, minimum work hours and other rules.

Over the years government and non-governmental rubber related organizations have been actively engaged in providing education and training programmes to further improve the competitiveness of the rubber sector labour force. Furthermore, government and non-governmental research bodies, employee federations and unions, farmer associations, owner associations, civil society organizations and many other statutory and non-statutory institutions have played pivotal roles in uplifting the rubber industry by providing short-term and long-term planning for labour force development. Some institutions like Plastic and Rubber Institute of Sri Lanka (PRISL) provide training facilities to workforce engaged in the rubber industry with a financial support from international development agencies (e.g., ADB and USAID). All these efforts improved the efficiency and further augmented the capabilities of Sri Lankan skilled workforce, ensuring its competitiveness in the coming decades.

4.3. Policies and regulatory framework

There are no export restrictions and no licensing requirements for rubber dealers and exporters; however, the Government imposes duty on the import of synthetic rubber and related input materials. At present synthetic rubber imports are

subjected to a CESS³⁷ of SL Rs 15 per kg, which has led to higher prices for final products. The Government also charges SL Rs 4 per kg as CESS on procurement of natural rubber (EDB 2007), and this has significantly impacted the cost of rubber products. The rubber products manufacturing sector could be further encouraged, if the CESS on domestically consumed natural rubber is reduced while the CESS on raw rubber exports is increased, – thus favouring domestic rubber demand without affecting the Government revenue. The changes in CESS policy should aim at natural rubber to become more competitive locally and to increase export of higher value added rubber products. Although the total CESS collection is said to be available for the development of the rubber industry and the long-term production of raw rubber, both the rubber cultivation and rubber manufacturing sectors complain that the CESS is not utilized for that purpose. However, at present the Government uses the CESS to finance replanting of rubber trees and provide certain social benefits to smallholders.

The Government also plays a pivotal role in rubber research and development, and by extension, rubber cultivation. However, the industry lacks expertise on product and compound developments, introducing only limited innovations. There is currently no centralized rubber- and/or polymer-based product testing facilities, especially the ones focused on quality improvements in Sri Lanka. Although polymer-based and compound material testing facilities exist at several research and academic institutions, cost testing procedures in these institutions do not have official accreditation and their certification is not internationally recognized to testify the quality of Sri Lankan rubber products – an important requirement in the export market. Finally, all rubber product manufacturers must obtain Environmental Protection License (EPL) from the Central Environmental Authority (CEA), affirming their continuous compliance with minimizing noise and dust levels to protect the environment.

5. SWOT ANALYSIS

The value chain dynamics in the rubber industry, as discussed above, can be strengthened by continuous improvements and innovations in production and distribution processes. To understand the factors, affecting the rubber industry in Sri Lanka with regards to global value chains, it is essential to: (a) take advantage of the opportunities; (b) mobilize the strengths; (c) manage the possible threats; and (d) assuage the weaknesses, in order to formulate a long-term strategy and strengthen Sri Lankan position in the global rubber market.

Strengths

1. The rubber industry is a relatively well-established industry in Sri Lanka having a comprehensive legal and institutional framework, good infrastructures, a strong private sector and well-organized professional bodies such as SLAMERP and PRISL. The Government has pledged to

³⁷ CESS is a local levy on a commodity/product for special purpose. Objectives of imposing CESS on rubber export/import are to generate funds for developing rubber cultivation in Sri Lanka and to encourage the export of value added rubber products. CESS is computed as a percentage of CIF value on imports and LKR 4 per (quantity) kg on exports as per the Gazette issued in 2004.

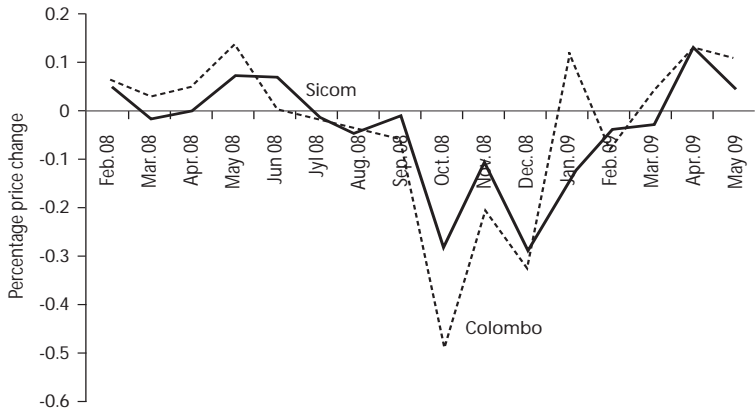
support the rubber industry private sector with pro-business policies, infrastructure development and financial help.

2. Sri Lanka's rubber industry has been successful in supplying foreign niche markets (through joint ventures with renowned multinational/world class companies) with industrial tires and surgical and household gloves by establishing high quality/low cost manufacturing facilities.
3. Competitive though limited logistics support and infrastructure facilities (seaport and airport) are available in the country.
4. Sri Lanka is a natural rubber producing country and has an adequate supply of different grades of centrifuged latex and dry rubber at competitive prices. Also, there is an easy access to rubber product manufacturers with readily available raw materials.
5. Sri Lankan crepe rubber is considered to be of the highest quality.
6. Relatively low labour cost compared to the region's other major labour supplying countries, except Indonesia.
7. Availability of skilled, trainable competitive labour force, at technical, managerial, and supervisory levels and qualified scientists, technologists and engineers.
8. Academic programmes, enhancing the knowledge and skills related to the rubber industry, are continuously provided by universities and private training institutions.

Weaknesses

1. The return on investment in rubber cultivation and production is relatively low due to the limited use of fertilizers, outdated technology, low levels of mechanization, unskilled workforce, financial constraints and inadequate investment. An increase in labour costs combined with low productivity has been a recent trend.
2. Sri Lankan rubber industry experiences high price volatility when compared to Singapore and other regional markets rubber prices (figure 16). The volatility is mainly due to the supply side constraints. For example, during the monsoon season, rubber supply drops sharply and creates significant price hikes at the rubber auctions.
3. Sri Lanka has a small domestic market compared to other competing countries such as India and China. Its rubber sector consists of only a few large producers and a relatively large number of small producers/suppliers – resulting in a weak bargaining power as a rubber-producing nation.
4. During the rainy season, the frequency of rubber tapping which is done manually, decreases and results in fluctuations in the supply of rubber.
5. Rubber production cost tends to be high due to the use of imported materials, including synthetic rubber and rubber additives.
6. There is no government or private formally established institution to provide market information on domestic and international markets. The

Figure 16: Comparative percentage price variations



Source: IRSG (2009).

marketing done by the Government through their export promotion bodies such as Export Development Board (EDB) is still at a nascent stage. This unavailability of international marketing research has hindered attempts to form linkages between local producers and international buyers to advocate product portfolio diversification or withdrawal, which resulted in failure to reach the expected export volume.

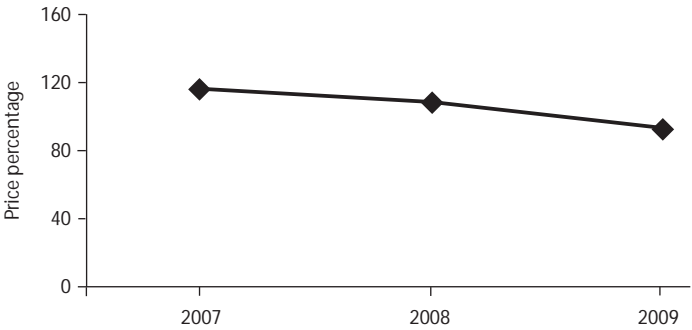
7. A lack of applied research institutions for technological development and innovations hampers the industry's ability to launch and promote new rubber products for niche markets. Also, there is no central product testing facility to cater to the rubber industry. This is a major constraint for large-scale rubber exports from Sri Lanka.
8. Low investment and poor collaboration in research and development activities, especially for product and process developments.
9. A lack of strategic integration and coordination between the existing research bodies and rubber product manufacturers.
10. Though Sri Lanka has established a formal polymer education, the industry still lacks the know-how on compound development aspects. Most research studies in Sri Lanka focuses on local optimizations and very few studies have been done on technology acquisition and/or development of advance technologies for the new product.
11. Sri Lanka lacks an internal system for quality control and product and/or process standardization; only a handful of large export-oriented manufacturers have focused on quality improvement and standardization (e.g., six-sigma and ISO).
12. Policymaking does not completely address the root causes of issues faced by the rubber industry. Restrictions applied on imported high-quality raw rubber have discouraged key stakeholders from further investment in the industry.

13. Sri Lanka records the highest energy cost compared to other rubber-producing nations as the rubber industry consumes a relatively high amount of energy compared to other industries. In particular, dry rubber production has higher energy content compared to latex production.

Opportunities

1. The global demand for natural rubber-based products has witnessed substantial growth over the years and is expected to grow further with the emerging markets in the region, such as China and India.
2. In Sri Lanka, continuous government support is provided to manufacturing by recognizing rubber industry as a “Thrust Industry.”
3. Existence of many regional, unilateral and bilateral trade agreements, such as Indo-Sri Lanka Free Trade Agreement (ISFTA), South Asian Preferential Tariff Agreement (SAPTA), South Asian Free Trade Agreement (SAFTA) and Sri Lanka-Pakistan FTA, provides opportunities to export Sri Lankan rubber products at zero duty, along with many other concessions.
4. During the past few years, a declining trend in natural rubber to Styrene Butadiene Rubber (SBR) price ratio has been observed, which is favourable for natural rubber. Additionally, global demand for natural rubber shows a positive trend (figure 17).

Figure 17: Natural rubber/synthetic rubber relative price ratio



Relative NR/SR price ratio
Source: IRSG (2009).

5. Existence of dedicated industrial parks, with well-designed central treatment facilities, would allow manufacturers to consolidate and control processing costs effectively.
6. Projects for new planting (in non-traditional areas) and replanting of rubber trees have been started by both the Government and private organizations with the technical and financial support from international development agencies.

7. Introduction of rubber trees with high yield clones is expected to increase natural rubber production levels.
8. Plantation companies can form joint ventures with foreign or local product manufacturers, especially to produce goods based on latex crepe.
9. A Mould and Die Design Centre was established at the University of Moratuwa to cater to the local rubber product manufacturing industry and thereby reduce high costs associated with the import of expensive dies and moulds. In addition, vocational training programmes for rubber processing machine operators are being developed by National Apprentice and Industrial Training Authority (NAITA) for the implementation at the University of Vocational Technology (UNIVOTEC).

Threats

1. In the absence of a sector-wide comprehensive marketing strategy, rubber producers in Sri Lanka are dependent on the Government external marketing efforts. Any change in the Government's focus or the withdrawal of donor support could result in the rubber industry's loss of market share.
2. The growth of Chinese rubber product manufacturing sector with its low (compared to Sri Lanka) production costs, poses a serious threat to Sri Lankan rubber industry.
3. Expansion of rubber plantation in African countries, such as Nigeria and Liberia, represent future threats.
4. Increasing wage and other labour costs, coupled with low productivity levels, are becoming serious threats to the rubber industry in Sri Lanka.

Critical issues for consideration

Based on the above strengths, weaknesses, opportunities and threats (SWOT) analysis, Sri Lankan rubber industry requires the following urgent responses:

1. Supply-side constraints have restricted the industry development and every effort should be made by both the public and private sectors to ease those constraints and help further develop the rubber industry. Particular attention should be paid to further modernization of transport and energy infrastructures in the rural areas to effectively link urban rubber industries and rural plantations.
2. The industry's focus on niche markets has resulted in greater dependence on the solid-tire export sector. Unsuccessful entries into other international market niches have hindered the development of the latex sector and attracting FDI.
3. There are no sector-wide marketing efforts for Sri Lankan rubber products and no marketing research mechanism. A well-designed marketing strategy could bring huge dividends to the rubber industry.
4. There is no evidence of strategic collaboration among research institutions, statutory bodies, producers and exporters. A well-functioning public institution with adequate resource provisions should be established.

5. There are no linkages among product development, process development and technological capability improvement entities which hinders the growth and competitiveness of the rubber industry.
6. There is an urgent need for a full-fledged standardization and quality control mechanism for Sri Lankan rubber products for both domestic and foreign markets.

6. ACTION PLAN FOR THE DEVELOPMENT OF THE RUBBER INDUSTRY IN SRI LANKA

As presented in earlier sections on the value chain and SWOT analysis, Sri Lanka could develop a competitive rubber industry and gain enormous benefits by being firmly established in both domestic and international markets. An action plan for the purpose is formulated and presented below.

Objectives of the action plan

1. *Increasing export earnings:* to increase export earnings by 50 per cent from the current export levels reaching US\$ 800 million by 2014.
2. *Supply, stability of prices and volume:* to increase the supply of natural rubber by 50 per cent and stabilize the year-round supply of natural rubber by 2014 in order to avoid price volatility.
3. *Product portfolio diversification:* to diversify current product portfolio and increase its value added by 20 per cent by 2014; to improve living standards of workers engaged in the rubber industry by upgrading their skills and raising productivity

Strategic options and critical actions

While specific actions are outlined in the matrix in table 10, some of the important measures are emphasized below. Increasing plantation areas, promoting non-tire and non-traditional rubber products FDI, enhancing research and development, pursuing aggressive marketing and own-brand development are the strategic actions, requiring priority attention. For such actions, the following measures should be implemented:

1. *Establish national market research and trade promotion agency:* Sri Lankan rubber products should have an effective access to the regional and global markets through the establishment of a national marketing research and trade promotion institution.
2. *Allow import of raw rubber on a limited scale to meet occasional shortages:* permit the controlled import of raw rubber until the sufficient supply of natural rubber is fully available within the country.
3. *Increase rubber plantation in non-traditional areas along with the measures for the increased productivity to meet the domestic demand in natural rubber:* ensure a consistent supply of natural rubber to help stabilize rubber prices.

Table 4: Action plan matrix for the rubber sector in Sri Lanka

Present status/ constraints	Targets	Actions	Responsible institution
Objective 1: To increase natural rubber supply by 50 per cent by 2014 in order to achieve stable supply at low price volatility. Decline in land area under rubber cultivation due to rapid urbanization. Use of traditional raw rubber manufacturing processes.	Increase natural rubber supply at a competitive price.	Relax restrictions on limited import of natural rubber by introducing a licensing system.	Government, SLAMERP
	Increase the yield level of natural rubber.	Implement scientific agro-management practices.	RRI, MPI, PA
		Expand introduction of modified (high-yielding) clones, and bring down the low yielding acreage.	RRI, MPI, PA
		Introduce new tapping techniques (e.g., to replace manual tapping during rainy season with mechanical devices).	RRI, universities, PA
	Increase rubber cultivation.	Review existing rubber plantation programmes through proper survey. Develop new rubber plantations particularly in non-traditional areas (Moneragala, Hambantota and to the North East).	MPI, Ministry of Lands
		Launch new inter-cropping programmes to diversify the cultivation.	RRI, MPI, PA
	Increase natural rubber production by upgrading raw rubber manufacturing processes.	Introduce cost effective, less labour dependent, user friendly, less energy, environmental-friendly raw rubber manufacturing.	Government, business associations
	Provide better pricing to raw rubber manufacturers.	Establish raw rubber collection centres for cost reduction and higher income.	PA, MPI

Table 4: (continued)

Present status/ constraints	Targets	Actions	Responsible institution
Objective 2: To increase rubber products export revenue by 50 per cent by 2014			
Low value-added exports are popular among grassroots level producers who look for quick cash.	Improve research and product development facilities.	Expand present characterization and physical testing facilities at research institutions and/or universities, and provide services to SMEs.	Research institutions, universities
		Form a research and development association (a cluster of rubber industrialists, manufacturers' associations, researchers from universities and research institutions).	Universities, SLAMERP, PRI, RRI
		Launch a product and process development centre (select a suitable institution for expansion, expand capacity, purchase product testing and analytical instruments and lab scale processing equipment).	Govt.
		Improve human resources and capabilities in R&D, product development and specifications standardization (overseas/local training)	Govt.
	Enhance supply of rubber compound facilities.	Establish a custom compound facility, especially catering to SMEs	IDB, proposed technical innovation centre
	Reduce raw rubber exports by enhancing product manufacturing.	Bring necessary changes to CESS policy and other levies and duties on domestic natural rubber procurement to promote the value-added product manufacturing.	Govt., SLAMERP
		Relax restrictions on imports of synthetic and natural rubber and input material by introducing licensing mechanisms.	Govt., SLAMERP
		Establish new production facilities, especially for crepe rubber-based products (e.g. food and medical components), high end value-added products (e.g., automotive parts), and eco-friendly products (e.g., rubber with coir)	SLAMERP members, proposed product and process development centre

Table 4: (continued)

Present status/ constraints	Targets	Actions	Responsible institution
	Produce better quality products.	Launch quality awareness programmes at all levels of export production processes, including calibration. Develop infrastructure necessity for proper maintenance of quality. Establish a national accreditation body to assess conformity of institutions and their infrastructure for quality, with possible services extended to other regional countries. Encourage and assist more testing conducted by several institutions to be accredited to international standards.	SLSI, industries, ITI, universities and research institutions or proposed product and process development centre
	Reduce production costs.	Conduct in-house programmes on waste minimization and good housekeeping practices. Introduce cheaper alternative energy sources and energy efficient techniques.	NCPC, universities, Energy Authority
	Reduce raw material costs.	Form a central rubber-recycling unit with necessary equipment. Provide recycled rubber to industrialists at a reduced cost and encourage incorporating them in export-rubber products.	Proposed product and process development centre
	Produce import substitutes for low performance products by SMEs.	Establish promotion schemes for rubber-related SMEs manufacturing import substitutes. Develop new production lines.	SME rubber association, MID
	Facilitate exporters with steady orders.	Provide technical know how to SMEs for manufacturing of new products. Establish long-term purchase agreements with major importers.	IDB, RRI, proposed technical innovation centre Statutory bodies, SLAMERP

Table 4: *(continued)*

Present status/ constraints	Targets	Actions	Responsible institution
	Minimize discrepancies between BOI and non-BOI incentives.	Maintain a level-playing field for all exporters.	BOI
	Boost marketing efforts of currently manufactured products, and identify end users' requirements by manufacturers through marketing research.	Export promotions – strengthening the trading arms of foreign missions. Creation of own brand.	EDB, SLAMERP members, BOI
		Position Sri Lanka as a high value-added rubber product manufacturer.	EDB
		To make research and development institutions market-oriented and market-driven, and to establish an international market research and trade promotion entity to boost marketing efforts for Sri Lanka rubber.	International market research entity or RRI, ITI, IDB

4. *Promote research and development, increase testing standards and improve accreditations facilities:* establish research and development facility to enable product- and process- related innovations and enhance testing standards and international accreditation related to the natural rubber industry.
5. *Attract more latex- and rubber-related FDI:* increase manufacturing of the latex-based and non-traditional rubber-based products.

Action plan matrix for Sri Lankan rubber industry

The action plan (table 4) aims(a) to achieve a 50 per cent increase in the production of natural rubber by 2014, and (b) to increase export revenues from rubber products by 50 per cent by 2014.

The Electronic Products Sector in Sri Lanka

7. OVERVIEW OF THE GLOBAL ELECTRONICS INDUSTRY

Globally, the electronics industry is a rapidly growing sector of economy that is expected to grow into a trillion dollar industry in 2011. During the past decade, the industry that encompasses consumer appliances, ICT, industrial electronics, aerospace and defense and several other industries has experienced a steady expansion that were both demand-and industrial infrastructure-driven. The exponential growth of Internet for business and personal data collection and management and communications will continue to be the driving phenomenon in this decade. Within this context, ICT equipment accounted for roughly two-thirds of global electronic production in 2007, with the increased demand for core components like semiconductors and printed circuit boards.

The growth of the electronics industry is underpinned by transnational corporations' ability to make the production process more efficient. Due to the global nature of the electronics industry, its production facilities have spread to locations with the lowest labour and production costs. The production process in most electronics sub-sectors has been organized in such a way that individual parts can be manufactured at different places and the final product assembled in yet another location thus providing low costs and high profitability (see table 5).

International electronic manufacturers are increasingly reliant on sales in established economies (i.e., the United States of America, the European Union and Japan) and emerging markets (e.g., BRICS: Brazil, the Russian Federation, India, China and South Africa) to increase their revenues. Within this framework, the criteria for choosing a suitable location for production hubs are crucial in terms of production effectiveness and optimal distance to numerous markets.

The main difference between the electronics industry and other manufacturing industries lies in the fast introduction of technological innovations and adaptations that has created rapid market expansion over the past 30 years. Presently, electronic product manufacturing is expanding at an unprecedented scale in the Asia-Pacific region. Many

Table 5: Apple iPhone 3G's major components and cost drivers

Manufacturer	Component	Cost (US Dollars)
Toshiba (Japan)	Flash Memory	\$24.00
	Display Module	\$19.25
	Touch Screen	\$16.00
Samsung (Republic of Korea)	Application Processor	\$14.46
	SDRAM-Mobile DDR	\$8.50
Infineon (Germany)	Baseband	\$13.00
	Camera Module	\$9.55
	RF Transceiver	\$2.80
	GPS Receiver	\$2.25
	Power IC RF Function	\$1.25
Broadcom (United States of America)	Bluetooth/FM/WLAN	\$5.95
Numonyx (United States of America)	Memory MCP	\$3.65
Murata (Japan)	FEM	\$1.35
Dialog Semiconductor (Germany)	Power IC Application Processor Function	\$1.30
Cirrus Logic (United States of America)	Audio Codec	\$1.15
Rest of Cost of Materials		\$48.00
Total Cost of Materials		\$172.46
Manufacturing Costs in China		\$6.50
Grand Total		\$178.96

Source: Xing and Detert (2010).

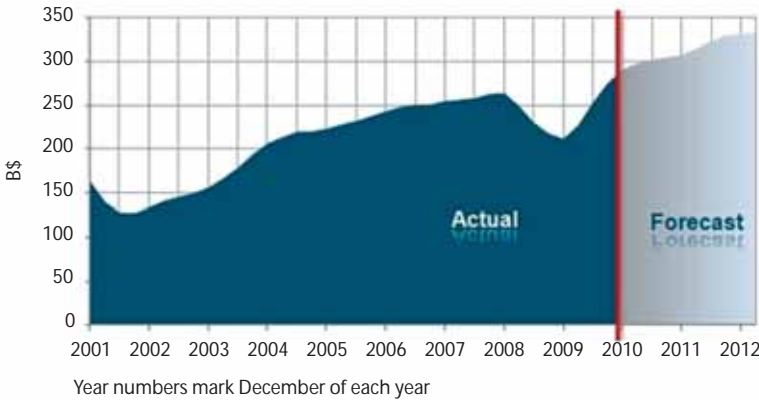
countries in the Asia-Pacific region – particularly Japan, Republic of Korea, China, Taiwan Province of China, Malaysia, Thailand, India and Singapore – have become principal manufacturing hubs for electronic goods and products. Significantly, China is becoming the global manufacturing centre of consumer electronic products. In 2002, Asia had 41 per cent of the global electronics market share and that has risen to 56 per cent in 2009 (Digivity Report 2009).

According to JEITA (2009), global IT production, including electronic equipment, components and devices and information technology, totalled \$1.67 trillion in 2005. Global production of electronic equipment, components and devices totalled \$1.73 trillion in 2005. The annual global growth of the electronics industry was estimated at 6.6 per cent. In addition to fast growth, the electronics industry's value added is considered high when compared to the value added of other industrial sectors. For example the value added in manufacturing of electronic components ranges from 40 to 50 per cent, while the value added in equipment manufacturing ranges from 10 to 15 per cent. Since the aggregated data on the global electronics industry is difficult to attain because various sub-sectors are involved and different classifications are used

by different nations, a specific electronics sub-sector was chosen to provide a quantitative assessment of the growth in the electronics sector in the past decade.

With this in mind, the semiconductor industry³⁸ is widely recognized as the key driver in the growth of the entire electronics industry, with its dual role as a multiple lever and technology enabler for the electronics value chain. According to Semiconductor Industry Association, total annual sales of semiconductors for 2008 amounted to \$248.6 billion compared to \$255.6 billion in 2007, a decrease of 2.8 per cent (SIA Report 2009). Along with the strong growth of Internet use, smartphones, 3DTVs and tablet PCs, the global recovery from the recent financial shock will provide strong impetus for sustained growth in the electronics industry (SIA 2011). With semiconductors being a vital component in those ICT products/services, strong growth in their sales and manufacturing would indicate strong demand for electronic products (figure 18). Sri Lanka could tap this potentially lucrative market by carefully selecting certain high value-added electronic products for manufacturing within the country.

Figure 18: Performance of the semiconductor sector, 2001-2010 (actual); 2011 and 2012 (forecast)



Source: WSTS (2011).

8. ADVANCEMENT OF ASIA-PACIFIC DEVELOPING COUNTRIES IN THE ELECTRONICS SECTOR

Developing Asia-Pacific nations, such as China, India and ASEAN countries, have expanded its production capacity as suppliers of components and manufacturing systems to major electronic transnational corporations (TNCs) and significantly

³⁸ Semiconductors are materials that have conductivity between conductors (general metals) and nonconductors or insulators (such as ceramics) and play a pivotal role in the fabrication of electronic devices. And even though many electronic devices can be produced using vacuum tube technology, breakthrough in semiconductor technology in the past 50 years has allowed electronic devices to become smaller, faster and more reliable (SIA 2011).

increasing their production facilities throughout the first decade of this millennium. Several notable developments were observed:

- a. Many Asia-Pacific producers, mainly from North-East Asia, have successfully transitioned from technology-followers to technology-leaders in handling local system design and component production. They maintain the advantage of low labour costs by spreading their operations throughout the region.
- b. Global value chains for electronics equipment in the region were well-developed, especially in countries of North-East and South-East Asia. They linked various levels of production inputs, such as materials, electronic parts and components, technology, production facilities and labour to assemble competitive final products for export.
- c. A consolidation of upstream suppliers of value chains in the electronics industry occurred when the leading materials and equipment supply companies became major global suppliers, developing capabilities for system design, such as integrated modules that offered short lead-time and cost reduction (e.g., electronic system manufacturing (EMS)).
- d. “Green” manufacturing and environmentally-friendly electronic products emerged in response to new market demands and technological advancement.
- e. Emerging markets in the region e.g., China, India and the Russian Federation have increasingly expanded their share in the global electronics market.

Thus, the trend is obvious that developing countries of Asia and the Pacific have become production hubs for electronic products. Following in the steps of other developing countries, such as China, India and ASEAN countries, Sri Lanka could have developed a potential to become a competitive electronics industry. And in order to further gauge this potential in Sri Lanka, a brief overview of the Sri Lankan electronics industry is presented below.

9. POTENTIAL FOR THE DEVELOPMENT OF THE ELECTRONICS INDUSTRY IN SRI LANKA

Despite the immense global growth of the electronics industry, Sri Lanka has yet to partake in this sector even though the issues that constrained most developing countries are not present in Sri Lanka. Sri Lanka has a great potential to procure and develop a competitive electronics industry having the low-cost and skilled labour, relatively well developed infrastructure and, most important of all, Indo-Sri Lanka Free Trade Agreement providing access to the rapidly growing neighbouring market. With this being said, the engine that has driven Sri Lanka’s economic growth has been its apparel industry annually accounting for over 40 per cent of exports since 2000 (DOC 2009). Compared to its leading manufacturing sub-sector, apparel manufacturing, the electronics industry in Sri Lanka is rather small.

Box 1: Experience of Malaysia and Taiwan Province of China in the development of the electronics industry

Malaysia

Malaysian electronics industry has come a long way in the past 40 years, from its inception in the 1970s to becoming one of the world's largest exporters of semiconductor devices and ASEAN preeminent leader in electronics manufacturing. The key factor behind this impressive rise is the Government's success in attracting electronics targeted FDI. Three main waves caused the relocation of TNC production facilities to Malaysia: 1) between 1972 and 1974, when American and Japanese TNCs relocated some of their electronic assembly operations; 2) between 1987 and 1989, as a result of the Plaza Accord of 1985, Japanese TNCs moved their labour-intensive consumer electronic manufacturing to low labour cost nations; and 3) between 1990 and 1994, when American disk drive and computer manufacturers decided to move their production to locations with supplier networks of key components. TNCs were attracted to Malaysia because of its relatively modern infrastructure, efficient bureaucracy, low tariffs and tax incentives, political stability and non-unionized, low-cost skilled labour.

Source: Rasiah (1999).

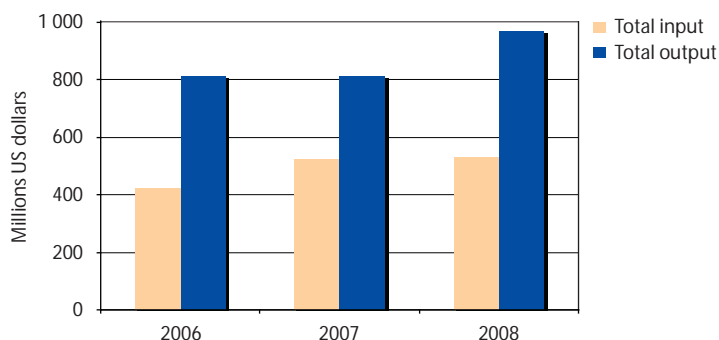
Taiwan Province of China

The rise of Taiwan Province of China as one of the global leaders in the electronics industry is closely linked to the relentless efforts of the industry stakeholders and the support of the Government. First, Taiwan Province of China overcame technology/capital barriers using task distribution among SMEs. For example, manufacturing of printed circuit boards (PCB) requires the use of expensive specialized equipment, which SMEs cannot afford. Taiwanese electronics industry solved this problem by establishing specialized drilling mills that undertake the most capital-intensive part of the PCB production process, thus allowing small PCB imprinting operators to survive and cater to other similar fields. This vertical disintegration of the PCB production process allowed for two things to happen: 1) the continual growth of SMEs in niche categories; and 2) capital-intensive producers, such as PCB imprinting, became large independent subcontractors benefiting from economies of scale. Second, Taiwanese firms evolved starting with relatively primitive electronic products and then moving to more sophisticated ones through developing advance production processes and supplier networks. A typical example is notebook PC manufacturers in the 1970s. Assembling notebook computers is a highly complex task that requires deep technological understanding. Taiwanese SMEs overcame technological constraints by relying on an earlier experience of producing calculators. The experience, working with a large number of component suppliers for calculator production, gave them a competitive advantage over their rivals in terms of cost control and work coordination. Third, the success of Taiwanese electronics industry depended on the active participation of the Government. In addition to indicating export processing zones and initiating a series of tax and financial incentives, the Taiwanese Government actively supported and fostered SMEs in the electronics industry by conducting promotional activities, such as organizing trade fairs and exhibitions that aimed to foster foreign investor and local manufacturer relationships to attract more electronics related FDI to the island.

Source: Chen and Ku (2002).

Sri Lanka's domestic electronics market is still small. In 2008, the electronics industry accounted for just 160 of the total 3,309 manufacturing enterprises in Sri Lanka and employed 27,000 people. For example, the apparel industry consists of 564 enterprises that employ a whopping 340,000 people. A look into the value of Sri Lankan imports and exports provides a perspective of the current level of the electronics industry. In 2008, the electronics industry had \$967 million in outputs from the inputs of \$531 million. Figure 19 shows the levels of Sri Lankan inputs and outputs between 2006 and 2008. As seen, the level of electronics industrial output has remained stable.

Figure 19: Total value of inputs and outputs in the electronics sector in Sri Lanka



Source: DCS (2011).

The electronics industry shows a great potential as a driver of future economic growth. When compared to the apparel and rubber/plastics sectors, the productivity level of the electronics industry (both at micro- and macro-levels) is considered high with the value output per worker being \$16,200, which is the highest level among the three manufacturing sectors. High productivity level is seen as an important competitiveness indicator (table 6). In 2008, the apparel sector had exports valued at \$2.98 billion, while the electronics sector exported only one third of this value and employed only 10 per cent of the apparel sector workforce. The electronics industry, due to its high value added, is more efficient in converting inputs into outputs than other manufacturing sectors and thus has a much higher productivity level.

Table 6: Productivity levels across the three sectors in Sri Lanka

Indicator	Apparel	Rubber and Plastics	Electronics
Output/Input Ratio	1.68	1.83	1.82
Output/Worker (in dollars)	8 767	20 599	35 972
Value Added/Worker (in dollars)	3 540	9 335	16 200
Value Added/Input Ratio	0.68	0.83	0.82

Source: Calculated by the authors with the data obtained from DCS (2011).

10. ACCESS TO MAJOR MARKETS

As previously mentioned, the electronics industry in Sri Lanka has been neglected and is underdeveloped even by the standards of lower middle income nations.³⁹ On average, lower middle income nations had high technology exports share of 22 per cent in their manufacturing exports from 2001 to 2008 while Sri Lanka only had a paltry 1.6 per cent (World Bank 2011b).

Sri Lanka's five main export destinations are the European Union, the United States of America, India, United Arab Emirates and the Russian Federation – with the first two having close to 60 per cent share of exports in 2010 (EC 2011a). And unsurprisingly, Sri Lanka's leading exports are apparel and clothing accessories. After a detailed look into the export data of the four major markets, including the European Union, the United States of America, India and China, one can see that there are negligible exports of electronic products to these markets with the exception of the European Union. And even though the export of electronic goods to the European Union increased more than six-fold from \$22.5 million to \$148.4 million in the period from 2002 to 2007, it still represents only five per cent of Sri Lankan total exports to the European Union (DOC 2007).

Sri Lanka is well situated in the middle of the main maritime transport corridor that links Europe to Asia and the Pacific and North America, which provides logistic access to key overseas markets such as the European Union, China, Japan, ASEAN and the United States of America. Sri Lanka, with its supply of relatively skilled workers and low labour costs, could market its domestic capabilities for manufacturing low-cost electronic components that could easily be exported to overseas assembly hubs (for the finished products). The following sections will briefly describe potential key export markets for Sri Lankan electronics industry, namely India, ASEAN, the European Union and the United States of America.

India

Sri Lanka's proximity to India allows it benefit from the Indian economic growth with its growing demand for electronic products. As more Indians can afford modern luxury and the necessary items such as televisions, refrigerators, personal computers, mobile phones, cars, etc. more opportunities emerge for the electronics industry of Sri Lanka. Sri Lanka stands to benefit from Indo-Sri Lanka Free Trade Agreement, which was signed in 2000 with the aim of promoting economic linkages between India and Sri Lanka (ISFTA 2007). This agreement allows over 4,000 Sri Lankan goods a duty-free access into India⁴⁰; included among the list of eligible-products are various electronic

³⁹ The World Bank classifies countries, according to GNI per capita, into four income groups: low income, \$1,005 or less; lower middle income, \$1,006-\$3,975; upper middle income, \$3,976-\$12,275, and high income, \$12,276 or more. Sri Lanka is classified as a lower middle income nation with a GNI per capita of \$2,290 (World Bank 2011b).

⁴⁰ Conversely, ISFTA also provides preferential tariffs for petroleum, natural gas, steel and other core infrastructural products exported from India to Sri Lanka – so that enterprises in Sri Lanka also have access to key manufacturing inputs from India.

goods: household appliances, printed circuits, semiconductors, electronic integrated circuits, electrical machinery parts, motor vehicles, televisions, personal computers and telephones (DOC 2009). The ISFTA has brought about a rapid growth of exports from Sri Lanka to India or a nine-fold increase from \$55.7 million to \$516.4 million in the period from 2000 to 2007 India now represents the third largest export market for Sri Lanka (table 7). More than 70 per cent of Sri Lankan exports to India presently fall under the tariff preferences offered through ISFTA.

Table 7: Trade between India and Sri Lanka, 2000-2007 (value in millions of dollars)

Year	Exports to India	Imports from India	Total Trade
2000	55.7	600.1	655.8
2001	70.1	601.5	671.6
2002	168.9	834.7	1 003.6
2003	241.1	1 076.2	1 317.3
2004	385.5	1 358.0	1 743.5
2005	559.3	1 440.4	1 999.7
2006	494.1	1 822.1	2 316.2
2007	516.4	2 785.0	3 301.4

Source: ISFTA (2007).

The current economic environment fosters the expansion of the Sri Lankan electronics industry as it has an advantage in supplying low-cost electronics parts and components to the Indian market. Since most electronic products are not manufactured in India and have to be imported, Sri Lanka could act as a production site for the electronic components (and finished products) destined for the Indian market.⁴¹ Sri Lanka could act as secondary supplier of electronic car parts for Indian automotive manufacturers (especially small sized). With an investment from Japanese TNCs and an experience in exporting to foreign nations, Sri Lanka has been developing a capacity for producing products to international standards.⁴² Despite a growth potential in bilateral trade, the level of exported electronic products to India is minimal at best.

Since the implementation of ISFTA, the growing mutual dependence of Sri Lankan and Indian economies is obvious (see table 7). Taking into consideration the supply of skilled workers and low labour costs, there is a golden opportunity for foreign investors to invest in the manufacturing of high value added electronic components/products in Sri Lanka and export them to the Indian market.

⁴¹ India has attracted FDI in its electronics sector mostly for research and development (R&D) operations rather than manufacturing and production (cf. Ernst 2009).

⁴² Companies such as Toslanka, Kik Group, Nippon Maruchi, Soar Technologies, and FDK Lanka.

ASEAN

Association of Southeast Asian Nations (ASEAN) has undergone rapid industrialization that has transformed it from an agrarian-based economy to the one based on industry and services. The subregion's FDI-driven development strategy has integrated its industries into global and regional value chains. Next to China, ASEAN (specifically Malaysia and Thailand) has risen to become a global manufacturing centre for electronic and electrical products. However, rising labour costs are seen as a major challenge for South-East Asia, which hamper its future reliance on assembly manufacturing. A small number of skilled labour in the subregion has limited the type of manufacturing to assembly manufacturing that has drastically capped the high valued-added activities. The result is that ASEAN imports the necessary components and parts for the final assembly from abroad .

Sri Lanka is in a unique position, due to an abundance of skilled labour and low labour costs, to take advantage of the situation in ASEAN. Because of its proximity to ASEAN and its low labour, resource and transportation costs, Sri Lanka could market itself as a low-cost manufacturer of electronic and electrical components for a further integration into the ASEAN electronics value chain. Additionally, Sri Lanka could produce computer hardware components and car electronic parts (similar for those it produces for India) for the ASEAN high tech and auto industries. Since these export industries already exist in Sri Lanka (albeit minimally) through affiliation with TNC subsidiaries, their further development should be relatively straightforward.

The European Union

The European Union (EU) has incorporated the World Trade Organization (WTO) Generalized System of Preferences (GSP)⁴³ into its trade agreement with Sri Lanka and other 175 other developing countries and territories, which provides them with a preferential access to the European market. It achieves this by reducing tariffs⁴⁴ on over 7,000 products destined for sale in the European market. As an extension to the European GSP, there is a non-reciprocal preferential import regime for developing nations, known as the *special incentive arrangement for sustainable development and good governance* (colloquially as GSP plus). The GSP plus provides additional preferences to economically vulnerable developing countries, including Sri Lanka, that have ratified, implemented and maintained international conventions dealing with sustainable development, good governance and human and labour rights (EC 2011b).

⁴³ GSP is a formal exemption mechanism from the WTO provision that requires all WTO member nations to treat imports from all other WTO member nations equally, i.e., by imposing equal tariffs on them. Under the GSP, qualifying nations such as Sri Lanka have preferential access, due to lower or non-tariffs, to all WTO member nations (WTO 2011). The aim of the GSP is to contribute to the reduction of poverty and promotion of sustainable development and good governance. Within this framework, preferential tariff rates for exports to EU markets would enable developing nations to participate more fully in international trade and generate export revenue to support its developing industries, jobs and poverty reduction (EC 2011b).

⁴⁴ The tariff preferences differ according to the sensitivity of products: non-sensitive products enjoy duty-free access to the EU market while sensitive products benefit from a tariff reduction. For specific duties, however, a 30 per cent reduction is the general rule (EC 2011b).

Driven by GSP plus programme, Sri Lankan exports of electric goods, machinery, sound recorders, televisions, vehicles and parts to the EU increased from \$22.5 million to \$148.5 million from 2002 to 2007 (DOC 2009). In 2009, the EU was responsible for 5.6 per cent of Sri Lankan electronic exports (EC 2011b). However, in 2010 the EU suspended Sri Lanka from the GSP plus programme due to its failure to meet three United Nations human rights conventions (EC 2011c).⁴⁵ Despite this, Sri Lanka still receives regular GSP tariff preferences from the EU. This brings uncertainty about the benefits Sri Lanka may receive in the form of future electronic-related exports to the European Union.

The United States of America

Similar to the European Union GSP, the United States of America (The United States) has incorporated World Trade Organization GSP into its trade agreements with Sri Lanka and other 129 designated countries and territories, which provide preferential duty-free treatment to over 3,400 products. The purpose of GSP programme is to give exports from developing nations a competitive edge in the United States market; the United States companies, on the other hand, are interested in buying goods through GSP programme because no tariff is charged on the products' entry into the United States.⁴⁶ GSP programme covers many eligible items and among them are industrial items and inputs for manufacturing. The total United States import under GSP programme in 2006 amounted to \$32.6 billion, 20 per cent of which was classified as "machinery, electronics or transportation" product types. Sri Lanka was the 14th top user of US GSP in 2006 with \$143.6 million worth of exports and benefitted greatly from the programme. For example, the duties for certain electrical transformers exported were reduced by 6.6 per cent (USTR 2007). Despite this, Sri Lankan exports through GSP programme accounted for only 6.7 per cent of the total United States imports from Sri Lanka, with electronics export non-existent. As such, there is an immense potential for Sri Lanka to utilize the United States GSP programme to market itself to foreign investors for manufacturing of electronic components or finished products to be marketed in the United States.

11. VALUE CHAINS IN THE ELECTRONICS INDUSTRY IN SRI LANKA

One of the major players in the electronics industry value chain are brand owners or own brand manufacturers (OBMs). The OBMs have marketing expertise in identifying the needs of the user, doing in-house product design (i.e., own design manufacturers (ODMs)) or ordering it from outside product designers. There are a number of players in Sri Lanka that provide contract manufacturing services to the OBMs and to several other support industries such as printed circuit board (PCB) manufacturers, plastic enclosure producers, precision metal parts manufacturers and die and mould makers. The support industries provide accessories and parts/components needed for the production of electronic goods. However, the contract

⁴⁵ Those include the International Covenant on Civil and Political Rights, the Convention against Torture and the Convention on the Rights of the Child.

⁴⁶ Otherwise, the tariffs could range between two per cent and seventeen per cent of the product's cost.

manufacturers and support industries provide their services to the OBM with relatively low profit margins.

Figure 20 depicts a typical value chain of electronic components, which includes plant developers, process developers, raw material suppliers, electronic component manufacturers, distributors and industrial customers. In the production of semiconductors, for example, raw materials (such as silicon wafers) are converted into various discrete devices and integrated chips. The design of an integrated circuit is an expensive process and is the key factor that determines the final quality and thus the value of the product. Usually designs are protected by patents and copyrights to ensure that the expenses incurred during the design stage are recovered. Thus, production under license agreements is practiced by many companies (i.e., licensed manufacturers). The cost of plants and machinery required for integrated circuit manufacturing is also considerably high. Semiconductors manufactured in large volumes, such as microprocessors and memories, are typically marketed under a brand names such as Intel, Motorola, AMD, Samsung and Hitachi.

Figure 21 depicts a value chain of electronic products for which electronic components are major inputs. Laminates are processed chemically into PCBs while electronic components are later assembled into PCBs. The assembly process is usually outsourced to contract manufacturers. Plastics and metals are major raw materials used in the industry to make enclosures and accessories. Die and mould makers provide the dies and moulds needed by the industry while plastic enclosure/component producers and metal fabricators supply the enclosures and accessories. The PCB manufacturers, die and mould makers and enclosure/component producers can be treated as related support industries for the electronic product manufacturing industry. In addition, design service providers mainly for die and mould, electronic circuit and prototyping assist ODMs and OBMs in engineering and designing electronic products.

Figures 20 and 21 also suggest that certain functions of both the electronics components and electronics products value chains could be developed in Sri Lanka. As far as the local electronics industry is concerned, the raw materials and required facilities (e.g., plant and machinery) are mainly imported at present and such trend could be continued for the foreseeable future. At present, the Sri Lankan electronics industry could be identified as a supporting industry to OBMs and ODMs that provide significant opportunities for Sri Lankan manufacturers to work for contract manufacturing services in exporting parts and components for display technologies, entertainment devices, optical storage devices, passive components and telecommunication equipment. The Sri Lankan electronics industry should attract foreign TNCs for local contract manufacturing during trade fairs organized by the EDB. Foreign direct investment could increase the sector's output and productivity due to the use of advanced manufacturing techniques and higher productivity capacities of newly constructed plants. However, technological inputs, which play a major role in value added, are expected to be provided by the leading brand owners. The quality control and marketing of the final product should be done according to TNCs standards.

Figure 20: Value chains for electronic components

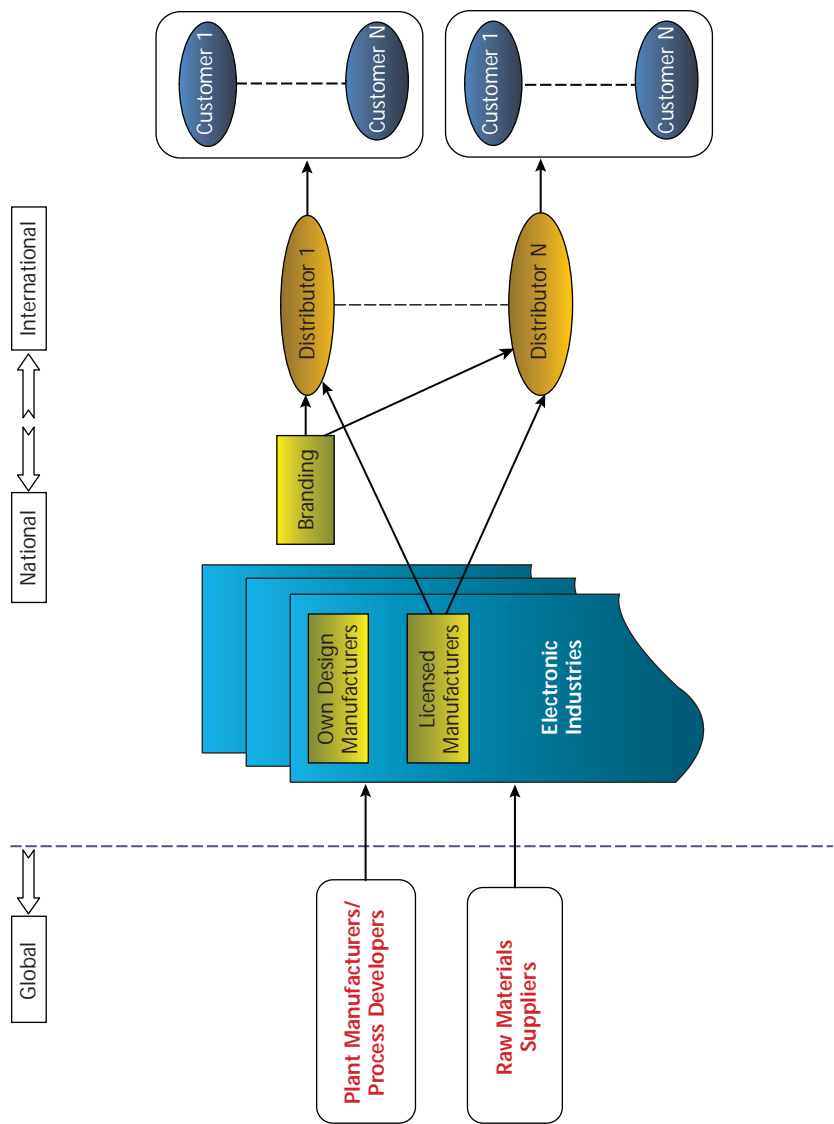
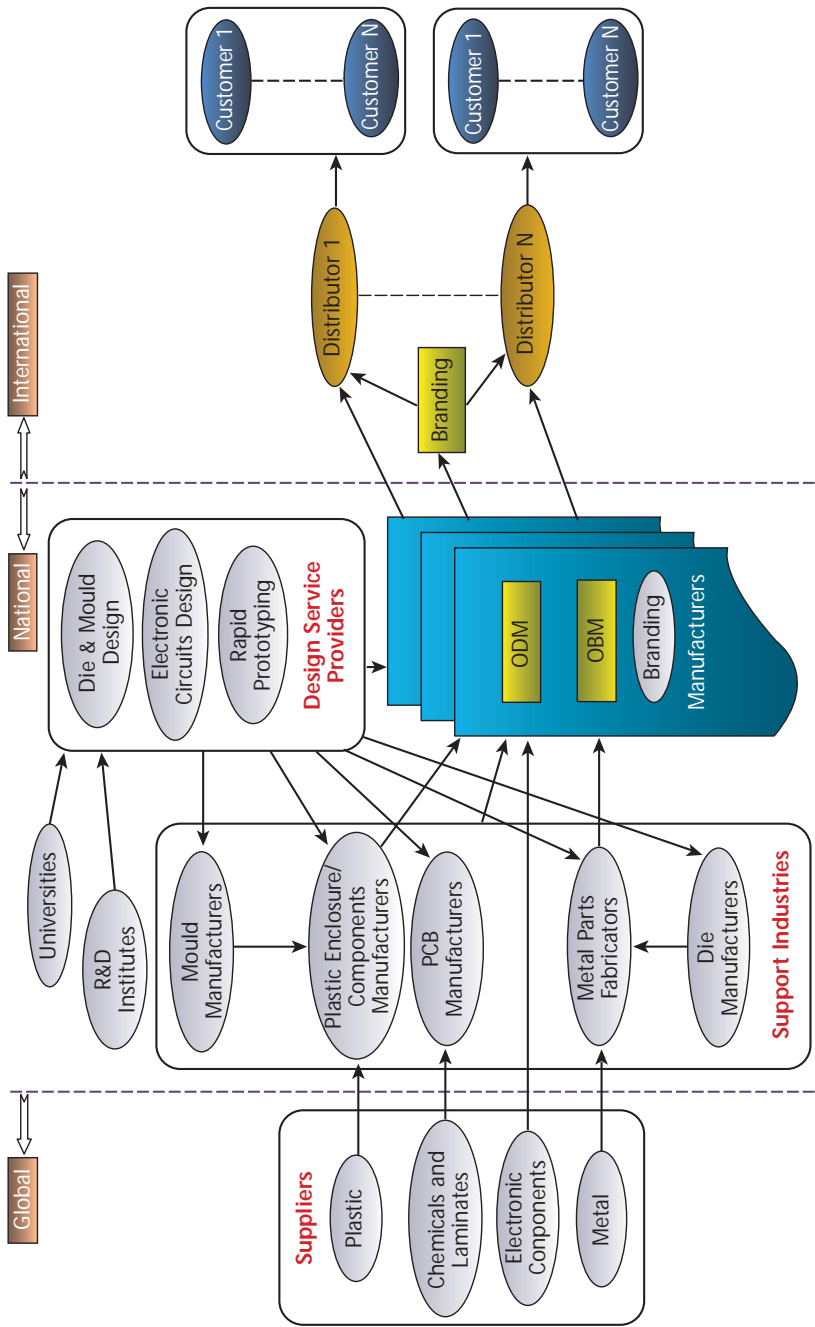


Figure 21: Value chains for electronic products



Over time, electronics contract manufacturers in Sri Lanka should attempt to come up the electronic value chain by providing the finished product to OBMs and ODMs as original equipment manufacturers (OEMs) and developing their own brands by enhancing their engineering and marketing capabilities. The local universities and R and D institutions could provide the required human resources for engineering and marketing activities. Various suppliers (e.g., raw materials, plastic enclosures/ components and metal parts) should be established near such universities and institutions to form industry clusters.

As stated earlier, the major strength of the electronics industry in Sri Lanka is the relatively skilled and adaptable local labour force, which is flexible and is used to frequent designs changes in the production of electronics components and products and to quality and delivery requirements of leading electronics manufacturers. On the flip side, the major drawback of contract manufacturing is the low value added for Sri Lankan industries. And as marketing has not been done to any discernible extent by Sri Lankan electronics industries, one could not expect that any Sri Lankan electronics brand emerge in the global market in the short term. The second major drawback is the heavy dependence on imported machinery and raw materials, such as precision metal parts required for some electronics products. The third major drawback is a lack of engineering and design activities for the electronic export products in Sri Lanka.

Within this context one key issue that the electronics industry in Sri Lanka should address is the identification of niche markets. Sri Lankan firms engaged as contract manufacturers could learn from their principal buyers, typically TNC-brand manufacturers, how to reach the regional and global markets. However, buyers may resist helping Sri Lankan contract manufacturers, who could become their competitors over time. The strategy that Sri Lankan contract manufacturers could adopt to overcome this resistance is to develop products that are not marketed by their customer TNCs.

12. SWOT ANALYSIS OF THE ELECTRONICS INDUSTRY IN SRI LANKA

Strengths

- Availability of low-cost, skilled workforce that is trainable, adaptable and capable of working in high tech environments.
- Preferential access to major overseas markets, such as the European Union, the United States of America and India, which, by way of reduced or zero tariffs, give Sri Lankan products a competitive advantage.
- Relatively low international transportation costs due to a proximity to maritime corridors.
- High productivity levels when compared to other key export sectors (i.e., apparel and rubber/plastic industries).
- Ample duty-free supply of natural resources (iron, oil, etc.) from India.
- Foundation of the Government supported microfinance institutions assisting in funding SME development.

- Presence of foreign TNCs subsidiaries, exporting quality electronic components to ASEAN and Japan, and thus displaying the feasibility and success of electronic manufacturing in Sri Lanka.
- Increase of designated industrial parks and export processing zones equipped with electric power supply, transportation access and infrastructure for manufacturing operations.

Weaknesses

- Despite relatively modernized urban centres, the rural infrastructure remains underdeveloped with neglected roads and rail lines and uneven supply of electricity, which undermines rural SMEs development.
- High corporate tax rates and convoluted tax regulations are deterrents to foreign investments in Sri Lanka.
- Arcane labour regulations restrict the free flow of labour force and hinder SMEs' ability to react to market changes.
- Lack of access to institutional credit and high costs of borrowing restrict the capital needed for SMEs startups and expansion.
- Lack of adequate local auxiliary services (precision engineering, high tech testing and calibration) for electronics goods manufacturing necessitates the import of machinery and components.
- Lack of specific training and technological capability-building facility to promote and improve electronic goods manufacturing.
- Lack of an influential electronics industry association.

Opportunities

- Proximity to India allows Sri Lanka to benefit from the growing domestic demand.
- Low levels of electronic goods exports and the electronics industry high productivity levels (relative to the apparel and rubber/plastic industries) allows for tangible gains from economies of scale.
- The growing global demand for electronic products combined with the TNCs desire to lower production costs allows Sri Lanka to market itself as a low-cost manufacturing country.
- Ability to assimilate into the existing ASEAN regional value chains (i.e., Malaysia and Thailand) as low-cost component suppliers and offer secondary components for the Indian manufacturing markets (e.g., electronics parts for automobile).
- As production costs rise in the more developed neighbouring economies such as ASEAN, Sri Lanka, with its ample supply of skilled workforce and low labour costs, represents a cost effective alternative for TNCs.
- Government sponsored electronics sector-specific investment campaign to promote Sri Lanka as an electronic manufacturing hub to foreign investors.

Threats

- Further growth of Chinese, Indian and ASEAN manufacturing electronic product markets threatens Sri Lanka prospects of electronic product market development.
- Bureaucratic processes, tax and labour regulations create confusing business environment that hinders future foreign investments.
- Weak access to credit hinders SMEs growth.

13. ACTION PLAN FOR THE DEVELOPMENT OF THE ELECTRONICS SECTOR VALUE CHAINS IN SRI LANKA

Asia and the Pacific is fast becoming the manufacturing hub of the global electronics industry and Sri Lanka should capitalize on the great opportunity. By 2020, venturing into electronic component and product manufacturing as specified in the action plan, Sri Lanka aims at capturing a 0.1 per cent share of the global electronics market, which would correspond to approximately \$2 billion (as compared to \$967 million in 2008).

The strategic perspectives of the action plan are based on the electronics industry maturity level and specific areas within the electronics industry where the production and sales of precision and branded electronic components and products would fit. The perspectives and action plan are presented in the following matrices (tables 8 and 9). Several priority actions and activities specified below are as follows:

1. Vigorously promote electronics component manufacturing by attracting FDI from major component manufacturers;
2. Commence electronic component manufacturing by promoting joint ventures to manufacturers under license;
3. Develop and modernize education/training and R and D for the electronics industry;
4. Establish market information and advisory system for the identification of new markets;
5. Promote design and manufacturing of electronic components for niche markets by establishing Sri Lankan brands;
6. Establish and strengthen design service providers in electronic circuit design, die and mould design and rapid prototyping;
7. Establish supporting industries capable of manufacturing precision plastic and metal components for the electronics industry;
8. Promote establishment of links with foreign brand manufacturers to consider Sri Lanka as a suitable destination for own design manufacturing in addition to contract manufacturing;
9. Promote and support technology parks that cooperate closely with educational and R and D centres;

10. Prepare the industry to comply with the environmental laws and regulations (e.g., lead-free soldering, electromagnetic compatibility, etc.);
11. Promote the establishment of links with foreign brand manufacturers to market Sri Lankan brands for niche markets where foreign brand manufacturers are not currently providing any services; and
12. Promote the establishment of foreign subsidiaries to promote Sri Lankan brands.

Box 2: An example of the electronics sector FDI in Sri Lanka

FDK Lanka was established in 1990 as one of foreign subsidiaries of FDK Corporation, a Japanese manufacturer of electronic-related materials and products that received over \$1.2 billion in revenue in 2010. The FDK Lanka employs over 1,100 people and is located within the Katunayake EPZ, which provides a convenient access to transportation hubs. FDK Lanka started with producing magnetic heads for floppy drives in 1990, but recently, after five expansion stages, has overhauled its product portfolio to include optical isolators (for fibre optic communication equipments) and ferrite cores and rotary transformers (for VCR/Video cameras). FDK Lanka is equipped with computerized production machineries, precision cutting, cleanroom manufacturing environments of Class 100, 1,000, and 10,000, where optical components and rotary transformers are processed and assembled up to the final product. Its products are shipped to China; European Union; Hong Kong, China; Indonesia; Japan; Malaysia, Republic of Korea; and the United States of America. The success of FDK Lanka demonstrates a business opportunity for the electronics sector TNCs in Sri Lanka.

Source: <http://www.fdklanka.com>

Table 8: Action plan matrix for the electronics sector in Sri Lanka

Objective	Present Status	Target	Actions	Responsible Institution
Main objective: To capture 0.1 per cent share in the global electronics market by 2020 by venturing into electronics component and product manufacturing.				
Commence the production of electronics components.	Only one foreign investor is involved in manufacturing capacitors.	Commence production and market electronic components, such as capacitors, resistors, inductors, connectors, etc.	A1. Attract FDI by major component manufacturers.	BOI, SLEMEA
			A2. Promote joint ventures to manufacturers under license.	BOI, SLEMEA
			A3. Promote design and manufacture electronic components for niche markets by establishing Sri Lankan brands.	EDB, SLEMEA
Commence the production of electronic products.	At present, mainly contract manufacturing is carried out.	Commence production and market electronic products in consumer electronics, telecommunication, computer and office automation sector, as well as industrial electronics sectors.	A4. Development and modernization of education and R and D for the electronics industry.	Universities
			A5. Promotion and support for technology parks cooperating closely with educational and R&D centres.	MID
			A6. Preparation of industry for environmental directives (e-g., lead-free soldering), electromagnetic compatibility, etc.	Ministry of Environment
			A7. Establish market information and advisory system for identification of new markets.	EDB
			A8. Establish design service providers in electronic circuit design, die and mould design, rapid prototyping and strengthening them.	MID
			A9. Establish supporting industries capable of manufacturing precision plastic and metal components for the electronics industry.	MID

Table 8: (continued)

Objective	Present Status	Target	Actions	Responsible Institution
			A10. Promote establishment of links with foreign brand manufacturers to consider Sri Lanka as a suitable destination for ODM, instead of contract manufacturing.	EDB, SLEMEA
			A11. Promote establishment of links with foreign brand manufacturers to market Sri Lankan brands for niche markets where foreign brand manufacturers are not providing any service.	EDB, SLEMEA
			A12. Promote establishment of foreign subsidiaries to promote Sri Lankan Brands.	EDB, Sri Lanka Electronic and Exporters Association

Table 9: Sub-activities for the action plan

	Action (budget required)	Proposed Activities
A1	Attract FDI by major component manufacturers.	<ul style="list-style-type: none"> • Establish investment policies promoting FDI from component manufacturers. • Dispatch delegations comprising government and private sector stakeholders to major component manufacturers to attract FDI. • Set up a steering committee to promote FDI for component manufacturing.
A2	Promote joint ventures with manufacturers under license.	<ul style="list-style-type: none"> • Establish investment policies promoting joint ventures for component manufacturing. • Dispatch delegations comprising government and private sector stakeholders to major component manufacturers to promote joint ventures. • Set up a steering committee to promote joint ventures for component manufacturing.
A3	Design and manufacture electronic components for niche markets by establishing Sri Lankan brands.	<ul style="list-style-type: none"> • Use activities of A7 to promote marketing electronic components for niche markets. • Set up a mechanism to promote technology spillover from FDI and joint ventures to Sri Lankan brand manufacturers.
A4	Develop and modernize education and R&D for the electronics industry (SL Rs. 10 Million)	<ul style="list-style-type: none"> • Provide training programmes to academics/researchers in electronic product design. • Commence undergraduate course specializing in electronic product design. • Set up technology incubation facilities at Universities of Moratuwa, Peradeniya and Ruhuna to promote start-up electronics industries.
A5	Promote and support technology parks that will cooperate closely with educational and R&D centres.	<ul style="list-style-type: none"> • Identify suitable location to set up technology parks closed to Universities of Moratuwa, Peradeniya and Ruhuna. • Construct infrastructure for technology parks using foreign grants/loans. • Promote start-ups in incubators to commence commercial operation in technology parks.
A6	Prepare the industry for compliance with environmental directives (e.g., lead-free soldering, electromagnetic compatibility, etc.)	<ul style="list-style-type: none"> • Set up an expert team to identify environmental directives, standards, etc., related to major markets such as United States of America, European Union and Japan. • Identify consultants to conduct training programmes to the industry.

Table 9: (continued)

	Action (budget required)	Proposed Activities
A7	Establish market information and advisory system for the identification of new markets (SL Rs. 10 Million).	<ul style="list-style-type: none">• Establish a network of trade missions at Sri Lankan Embassies to identify new markets for electronic products and components.• Establish an information bureau to gather and disseminate market information among electronic product and component manufacturers.• Create a funding mechanism to explore market potentials identified by the above two points.• Set up a service bureau to provide marketing expertise to electronic product and component manufacturers.
A8	Establish and strengthen design service providers in electronic circuit design, die and mould design and rapid prototyping (SL Rs. 10 Million).	<ul style="list-style-type: none">• Provide financial support to the private sector to establish design services for electronic circuit design.• Provide tax concessions to design service providers.• Strengthen rapid prototyping facilities at University of Moratuwa.• Strengthen die and mould facilities at University of Moratuwa.
A9	Establish supporting industries capable of manufacturing precision plastic and metal components for the electronics industry.	<ul style="list-style-type: none">• Provide financial support to the private sector to commence precision plastic and metal components.• Provide tax concession to precision plastic and metal component manufacturers.
A10	Promote the establishment of links with foreign brand manufacturers to consider Sri Lanka as a suitable destination for ODM, instead of contract manufacturing.	<ul style="list-style-type: none">• Use activities of A4 to promote ODM.• Use activities of A5 to promote ODM.• Use activities of A7 to promote ODM.
A11	Promote the establishment of links with foreign brand manufacturers to market Sri Lanka brands for niche markets where foreign brand manufacturers are not providing any services.	<ul style="list-style-type: none">• Use activities of A7 to promote links with foreign brand manufacturers to market Sri Lankan brands.
A12	Promote the establishment of subsidiaries to promote Sri Lankan brands.	<ul style="list-style-type: none">• Provide financial aids to establish subsidiaries.• Provide tax concession to companies who establish foreign subsidiaries.