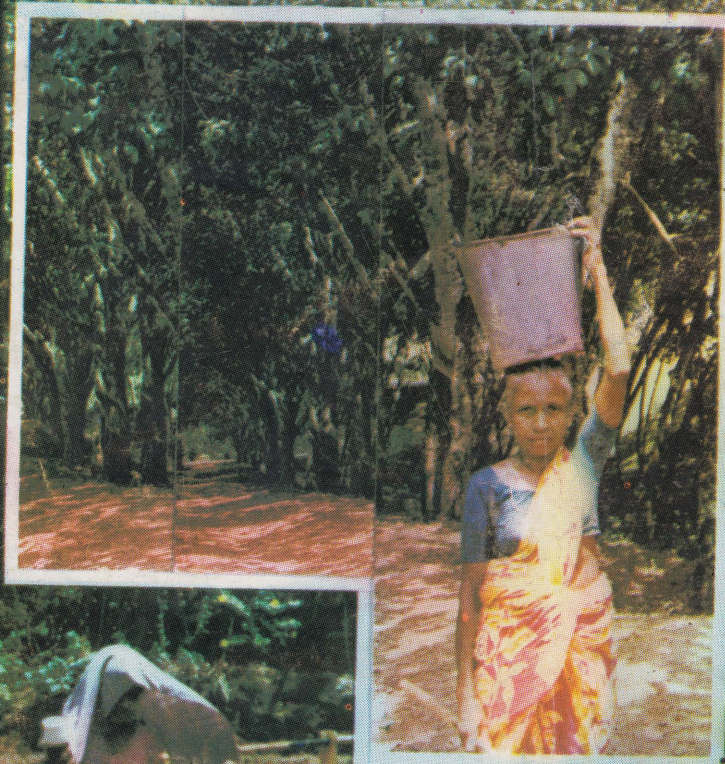
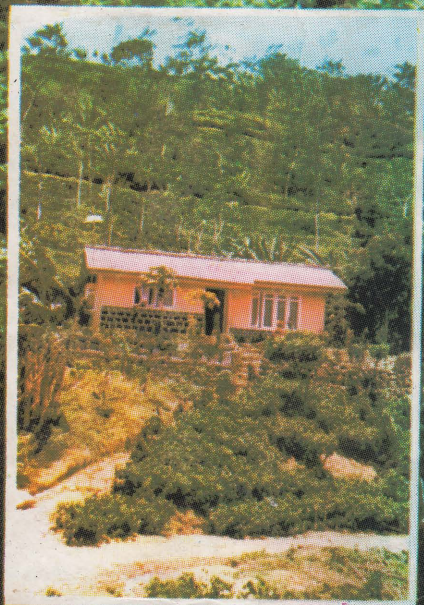


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# ECONOMIC REVIEW

Aug/Sept  
1987



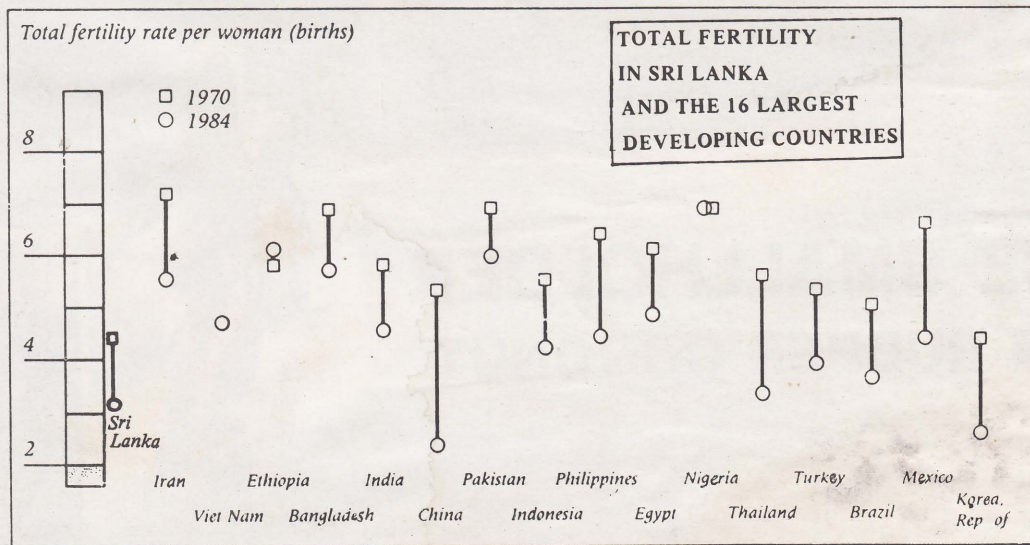
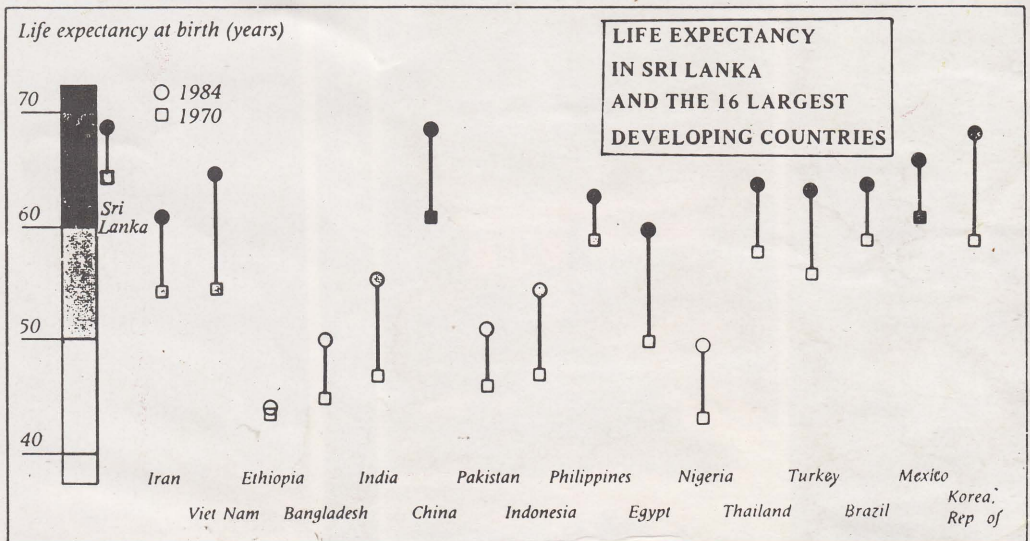
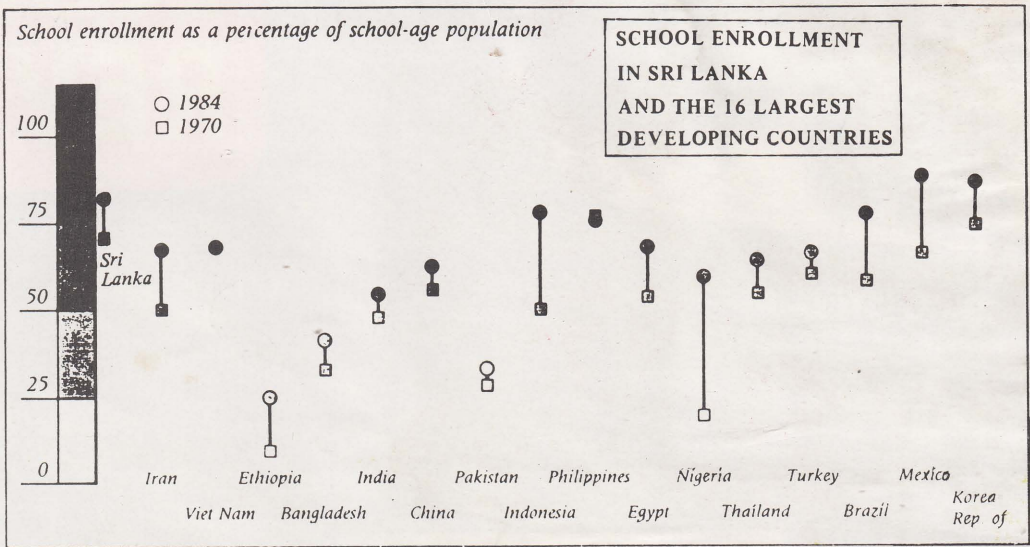
## THE SMALLHOLDER TEA RUBBER COCONUT

A PEOPLE'S BANK PUBLICATION

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THE ECONOMIC REVIEW is intended to promote knowledge of and interest in the economy and economic development process by a many sided presentation of views & reportage, facts and debate.

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### Readers Please Note

We have combined two issues (Aug/Sept 1987) in order to catch up on our backlog on printing which has arisen through circumstances beyond our control. We assure all our subscribers, however, that the validity of their annual subscriptions would extend over 12 separate issues.

- NEXT ISSUE**
- \* Handicrafts: Their place in the changing socio-economic environment - the present state of the industry
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  - \* An assesment of the SMI credit scheme
  - \* Artificial intelligence and the search for a thinking computer

**COVER** Photographs by Mercileen Heenkendha  
Cover design by Sarath Wijeratne

## DIARY OF EVENTS

### June

- 1 The Colombo Consumer's Cost of Living Index for June 1987 was 650.2, the Department of Census and Statistics announced. In May 1987 it was 646.6; while in June 1986 it was 607.5

Japanese aid to developing countries, buoyed, by the stronger yen, increased by 48.4 percent from US\$ 3.8 billion in 1985 to a record US\$ 5.6 billion in 1986, the Foreign Ministry announced.

- 3 The Government announced that it had been decided to prohibit new applications for the adoption of Lankan children by foreign nationals. This was to become effective from June 3, 1987.

- 8 The Import Duty on small cars has been substantially reduced making new and reconditioned cars coming into the country cheaper by Rs 40,000/- to Rs 70,000, stated officials and the trade. The new rates will be applicable only to small cars with an engine capacity not exceeding 1,500 cubic centimeters (cc). The prohibitive 200 percent duty on luxury cars will remain unchanged. Under the revised rates, customs duty for small cars will be 10 percent on the first (CIF) slab of Rs 150,000 and 50 percent on the balance. Earlier the rate was 20 percent for the first Rs 100,000 and 50 percent on the balance.

- 10 The Government approved a proposal by the President for drafting of the necessary amendments to Section 20 (5) and 21 (1) of the Citizenship Act No 18 of 1948, to confer citizenship on persons originally citizens of Sri Lanka by descent, but now holding the nationality of another country. This will enable such citizens who have achieved distinction in academic and professional fields in other countries to take a more active and positive role in the affairs of Sri Lanka. However, this concession will be operative for a specified period renewable only if the beneficiaries have in fact made the contributions expected of them.

- 10 The Government approved a proposal by the Minister of Trade and Shipping for signing of a bilateral shipping agreement with Pakistan. This agreement provides for sharing on a 50-50 basis of the cargo moving between the two countries by the national lines of Sri Lanka and Pakistan. It also provides for co-operation between the two countries in the transfer of technology in the field of shipping and matters connected with the treatment of ships in each others ports.

The Government approved a proposal by Minister of Finance and Planning to sign an agreement for a loan of US\$ 15 million with the American Express Bank, New York and an agreement with US aid, guaranteeing the repayment of the loan. In 1981 the US agency for International Development (US Aid) approved the provision of credit guarantee to enable the government of Sri Lanka to borrow long-term funds from US financial institutions for its housing development. Under the US Housing Guarantee Programme. Loans under this programme could be

raised in five phases. Already two loans have been taken in 1982 and 1986. This is the third phase of the programme, under which Sri Lanka is entitled to raise a loan of US\$ 15 million.

- 11 The Asian Development Bank (ADB) announced it has approved technical assistance grants to Sri Lanka for a fisheries study. This study will review the present status and development potential of the countries fisheries sector.

- 17 The Government approved the award to Marubeni Corporation Japan of the tender for the Greater Colombo Telecommunication network (Improved Project) which is funded by Japanese aid. The value of the tender is Rs 985 million. This project is meant mainly for the laying of new telecommunication cables in the Greater Colombo area. The United Nations Development Programme (UNDP) approved nearly US\$ 50 million (Rs 1,473.5 million) to help Sri Lanka's development efforts during the next five years. This assistance covers almost every field including agriculture, education, industry and health.

- 22 Japan stated it would extend an official development assistance loan upto 19.375 billion yen (US\$ 133.6 million) to Sri Lanka. The loan comprised 15.875 billion yen (\$ 109.5 million) to finance two development projects and a commodity loan of 3.5 billion yen (\$ 24.1 million) to help Sri Lanka improve its balance of payments, officials said.

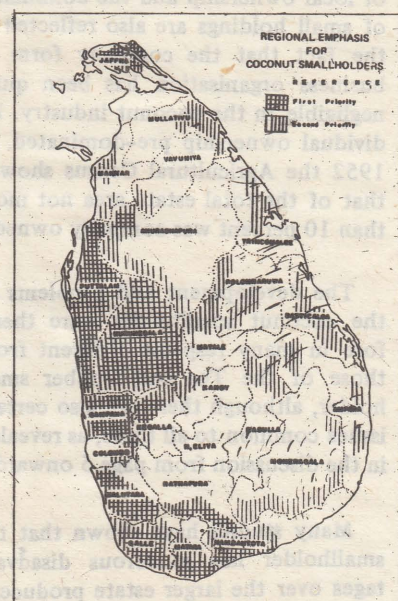
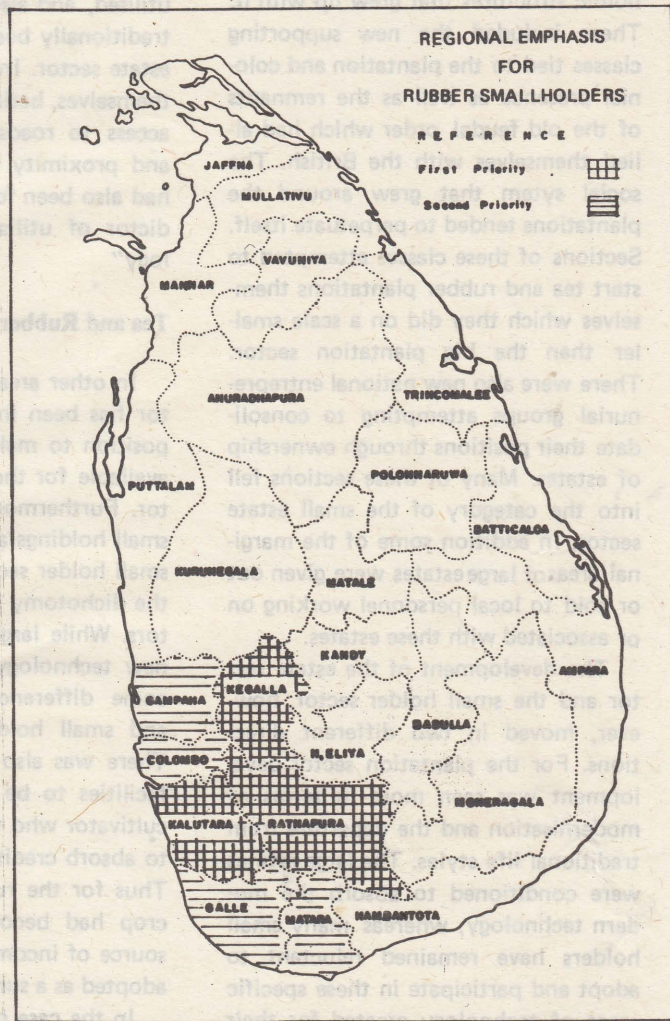
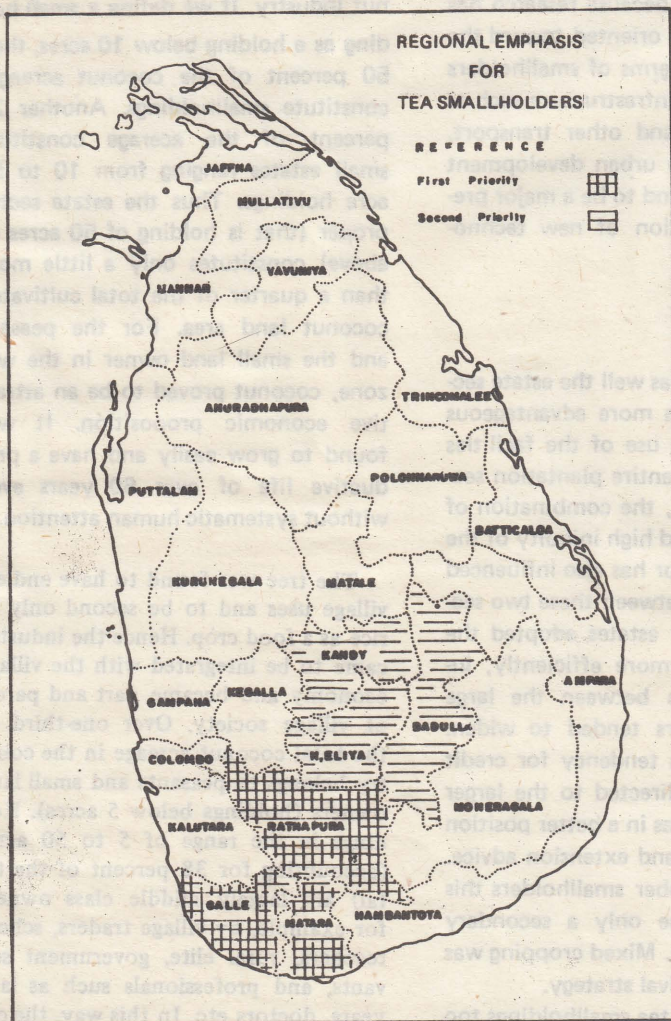
The Government of the United States will donate 20,000 metric tons of wheat in response to an appeal made in March 1987 by the Government of Sri Lanka for emergency food assistance, according to an official announcement. This assistance will help the victims of the prolonged drought and is granted under PL 480 Title II for Disaster Relief.

- 26 The Minister of Finance officially informed the President and Minister that the Aid Group in Paris had granted Sri Lanka aid to the value of US\$ 625 million. This is equivalent to more than Rs 18 billion and a higher sum than that granted last year.

### July

- 1 The Colombo Consumer's Cost of Living Index for July was 653.3 the Department of Census and Statistics announced. In June 1987 it was 650.2 while in July 1986 it was 606.3.

- 2 The Government approved a proposal by President as Minister of Power and Energy, to renew the contract with Abu Dhabi National Oil Co. for the purchase of 480,000 metric tons of upper Zakum crude for one year (1986-1987) on the same terms and conditions as earlier. On many occasions when the Ceylon Petroleum Corporation resorted to the spot purchase of crude oil, Upper Zakum has been the most advantageous offer and the government selling price was usually lower than the spot purchase price.



## THE SMALLHOLDER TEA, RUBBER AND COCONUT

The establishment of plantations in the late 19th century triggered the transition of Sri Lanka's economy from a strictly rural subsistence one to a modern export economy. These plantations, set up at the end of the 19th century, made deep inroads into the existing village economy and helped to create a dependence of the country on foreign sources for even its basic necessities such as food and clothing. A significant feature of the plantation system was its large scale operations and use of factory type technology and procedures, ownership by

British planters, and management through the "Agency House" system. The estate sector produced enormous surpluses and a high level of dividends for its foreign share holders; but this system did not significantly increase production of local goods and services nor were these surpluses invested outside the enclave. The tendency in this so-called modern sector to initiate economic development for the country as a whole was therefore minimal.

The creation of the enclave economy and its continued maintenance was also supported by local social and eco-

conomic structures that grew up with it. These included the new supporting classes tied to the plantation and colonial presence as well as the remnants of the old feudal order which had allied themselves with the British. The social system that grew around the plantations tended to perpetuate itself. Sections of these classes attempted to start tea and rubber plantations themselves which they did on a scale smaller than the big plantation sector. There were also new national entrepreneurial groups attempting to consolidate their positions through ownership of estates. Many of these sections fell into the category of the small estate sector. In addition some of the marginal areas of large estates were given out or sold to local personnel working on or associated with these estates.

The development of the estate sector and the small holder sector, however, moved in two different directions. For the plantation sector development was seen more in terms of modernisation and the departure from traditional life styles. The large estates were conditioned to absorb the modern technology, whereas many small holders have remained reluctant to adopt and participate in these specific areas of technology created for their specific crops. The situation therefore became characterised by two separate types of cultivators (large estates and smallholders) with the estates having a historically institutionalised advantage. The estates were in a better position to take advantage of the innovation and also the facilities made available by a Government dependent on this sector for a large slice of its revenue and the national product.

A study of rubber smallholders in the South East Asia region has shown that the larger estates "are in a better position to take advantage of innovations in technology partly because of their bureaucratic nature that is geared towards Western-style technology, partly because they are situated on transport routes making them more accessible to innovative practices that tend in general to be far more readily

utilised, and also because research has traditionally been oriented toward the estate sector. In terms of smallholders themselves, basic infrastructure such as access to roads and other transport, and proximity to urban development had also been found to be a major predictor of utilisation of new technology"

### Tea and Rubber

In other areas as well the estate sector has been in a more advantageous position to make use of the facilities available for the entire plantation sector. Furthermore, the combination of small holdings and high iniquity of the small holder sector has also influenced the dichotomy between these two sectors. While larger estates adopted the new technology more efficiently, income differences between the large and small holders tended to widen. There was also a tendency for credit facilities to be directed to the larger cultivator who was in a better position to absorb credit and extension advice. Thus for the rubber smallholders this crop had become only a secondary source of income. Mixed cropping was adopted as a survival strategy.

In the case of tea smallholdings too productivity in this sector was low compared with that of the plantation sector. Among the reasons for these bigger constraints for the tea smallholder were the problems that arose in: obtaining his supply of inputs; availability of capital; knowledge of improved technologies of tea culture; and access to institutional support services.

### Coconut

In the case of coconut, however, the role played by foreign capital enterprises was minimal. From almost the beginning of the expansion of this industry in the 19th century indigenous capital enterprise played a dominant role. Besides the fact of a predominantly indigenous ownership, dominance of small holdings was another important characteristic of the coco-

nut industry. If we define a small holding as a holding below 10 acres, then 50 percent of the coconut acreages constitute smallholdings. Another 23 percent of the acreage constitute small estates ranging from 10 to 50 acre holdings. Thus the estate sector proper (that is holding of 50 acres or above) constitutes only a little more than a quarter of the total cultivated coconut land area. For the peasant and the small land owner in the wet zone, coconut proved to be an attractive economic proposition. It was found to grow easily and have a productive life of over 60 years even without systematic human attention.

The tree was found to have endless village uses and to be second only to rice as a food crop. Hence the industry came to be integrated with the village economy and became part and parcel of village society. Over one-third of the total coconut acreage in the country belongs to peasants and small land owners (holdings below 5 acres). Holdings in the range of 5 to 50 acres (accounting for 38 percent of the total) are largely middle class owned, for example, by village traders, school teachers, rural elite, government servants, and professionals such as lawyers, doctors etc. In this way, the coconut industry created an economic opportunity for a whole layer of such middle income groups. The high degree of local ownership and the dominance of small holdings are also reflected in the fact that the company form of business organisation has been quite negligible in the coconut industry. Individual ownership pre-dominated. In 1952 the Agricultural Census showed that of the total estate area not more than 10 percent was company owned.

The development and problems of the coconut smallholder were therefore in many respects different from those of the Tea and Rubber smallholder, although there are also certain issues common to all three, as revealed in the discussion from page 5 onwards.

Many studies have shown that the smallholder has numerous disadvantages over the larger estate producers.

## ROLE OF SMALLHOLDERS IN PLANTATION CROPS PRODUCTION

Prof. C.S. Weeraratne

*Director, Advisory Services Department,  
Rubber Research Board*

From the early stages of civilization, peasant farming has been the main type of agriculture prevalent in the country. A significant feature of agricultural development in the colonial period (1815 - 1948) was the increased emphasis on plantation crops and the development of an export-import economy.

Tea and rubber were introduced into the country in the 1870s. Cultivation of these two crops together with coconut expanded rapidly in subsequent years. More than a million acres of jungle land were brought under plantation crops.

Although large extents of these crops were established to begin with, due to various land reform acts enacted by successive governments, these large estates have been fragmented. Furthermore, the relatively high profits associated with plantation crops would also have induced subsistence farmers to take to cultivation of these crops on a small scale. Thus, a smallholder sector in the plantation crops began to develop in the country. Since the implementation of the Land Reform law in 1972 there have been no private holdings of more than 50 acres in extent. Hence, all such holdings of less than 20 hectares (50 acres) in extent are considered smallholdings.

At present, the smallholder sector plays a substantial role in the production of plantation crops as indicated in Table 1.

According to the Tea Smallholdings Development Authority report 1983 this figure is 159,865.

The smallholder sector is characterised by holdings which are mostly less than 2 hectares. According to the Census of Agriculture, 60.5% of all the

smallholdings in the country belong to this category. Average size of smallholdings in 3 agricultural districts in the country are indicated in table 2. As indicated in this table too, smallholdings are generally very small in extent.

Some smallholdings are operated by the owners themselves. Others owned by employed smallholders are operated by agricultural labourers. Around 197,600 of the agricultural operators do not own any land (3).

The small holder sector is also characterised by lack of capital.

A substantial fraction of the smallholders are involved in activities other than agriculture. According to the 1982 Census, only 54.9 percent of the smallholders are categorised as occupied only in agriculture; while 42.6

percent spend more time on non-agricultural work, such as professional and technical services, clerical, fishing, transport and other activity.

The educational standards of the smallholders are also generally low. Around 12.6 percent of the smallholders have had no schooling while 43.9 percent have passed grade 5 or less. Thus, about 56.5 percent of the smallholders have very low educational levels (4).

### Tea Smallholders

Tea occupies around 200,000 hectares or 3.0 percent of Sri Lanka's land area of 6.57 million hectares. The contribution of tea to Sri Lanka's GDP is in the region of 2.5 percent. In 1985, out of the Rs.36,206 million of export earnings, Rs.12,002 million was derived from tea.

According to the Department of Census and Statistics (1) the total area under tea in 1982 was 207,228 hectares. However, according to the Sri Lanka Tea Board, this figure is 241,716. The extent of tea lands belonging

Table 1

### THE EXTENT AND NUMBER OF SMALL HOLDINGS

Crop	Total extent(ha)	Extent	Number of Small
Tea	207,228	75,770 (36.6)	81,854 80,554* (99.2)
Rubber	171,221	59,487 (34.7)	65,294 62,937 (96.4)
Coconut	384,590	289,517 (75.3)	704,448 698,158 (99.1)

Source: *Census of Agriculture 1982*

\* According to the Tea Small Holdings Development Authority Report 1983, this figure is 159,865 small holdings.

NOTE— The figures indicated in the above table are different from values indicated in reports of other appropriate institutions.

TABLE 2

### AVERAGE SIZE OF AGRICULTURAL HOLDINGS IN 3 DISTRICTS (IN ACRES)

CROP	RATNAPURA	KATUTARA	KEGALLE
Rubber	4.0	2.5	3.6
Tea	1.1	-	1.6
Coconut	1.3	1.2	2.1
Paddy	1.5	1.5	1.2

Source: *Socio-economic conditions of rubber smallholders in Sri Lanka ARTI Research study 61.*

**Table 3**  
**THE EXTENT AND NUMBER OF TEA SMALL HOLDINGS - 1982**

District	Area (hectare)	%	No. of holdings	%	No. of Operators	%
Kalutara	882	1.2	1,843	1.2	1,586	1.2
Kandy	19,259	25.4	40,388	25.3	33,268	25.0
Matale	1,694	2.2	1,631	1.0	1,388	1.0
Nuwara Eliya	6,559	8.6	13,763	8.6	12,155	9.1
Galle	13,603	17.9	36,479	22.8	29,967	22.5
Matara	13,342	17.6	27,964	17.5	22,075	16.6
Hambantota	207	0.3	609	0.4	536	0.4
Kurunegala	124	0.2	224	0.1	200	0.1
Badulla	7,030	9.3	13,171	8.2	11,371	8.6
Ratnapura	9,818	13.0	17,713	11.1	15,198	11.4
Kegalle	3,242	4.3	6,080	3.6	5,129	3.9
Total	75,770*	100	159,865	100	132,873	100

\*Based on a Census of Tea Small Holdings Development Authority - 1983

**TABLE 4**  
**AREA OF ESTATES AND SMALLHOLDINGS AS A PERCENTAGE OF TOTAL TEA LANDS**

SECTOR	1955	1965	1985
Estate	77.5	83.6	68.8
Smallholdings	12.5	16.4	31.2
Total	100.0	100.0	100.0

Source: Tea Commissioner's Department

**AREA OF ESTATES AND SMALLHOLDINGS (IN HECTARES)**

SECTOR	1973 *	1982 **	% Increase/Decrease
Estate	187,204	147,900	-21
Smallholdings	46,782	75,770	+62
Total	233,986	223,670	-4.4

\* Census of Agriculture 1973

\*\* Report of TSHDA - 1983

to the state sector is assessed at 147,900 hectares, and that of smallholdings is 75,770 hectares making a total of 223,670 hectares. The distribution of the 75,770 hectares of smallholdings is indicated in table 3.

As indicated in table 3, the 75,770 acres in 159,865 holdings is operated by 132,873 operators.

Most of the tea smallholdings are less than 2 hectares in extent. According to The Census of Agriculture 1982, 87.8 percent of the holdings belong to this group; around 11.4 percent of the holdings are between 2 and 8 hectares.

The percentage of tea lands in the smallholder sector has changed considerably during the last 30 years (Table 4).

A comparison of the extent of estates and smallholdings in 1973 and 1982 indicate an increase in the latter sector (Table 5).

#### Production

Of the 75,770 hectares of the smallholdings, around 7100 hectares are not in production. The balance i.e. 68,670 hectares are in production. A closer study of the production levels of the

tea smallholdings indicate that around 40% of these are yielding less than 360 kg per hectare per year (table 6).

As indicated in table 6 only around 27% holdings produce more than 1200 kg. per hectare. Most of these holdings are in Galle and Matara districts. The production data of tea in the country indicated in table 7 shows that around 30% of the total tea produced in the country is contributed by the smallholder sector.

The average yield of the estates sector is comparatively high. In 1982 it was 1264 kg per hectare and 1308 kg per hectare for SPC and JEDB estates respectively. However, the average yield of tea smallholdings in 1982 was 928 kg/ha (table 8).

#### Fertilizer Use

One of the factors responsible for the low average yields in the smallholdings could be the low level of fertilizer use as shown by the figures given in table 9. Lack of capital and motivation are considered the most pressing reasons for lower application of fertilizers (1). In 1982, fertilizers were applied only in 43% of the smallholdings (1). Except in Galle, Matara and Kalutara, in all other districts the percentage values are less than the average (Table 10).

**TABLE 6**  
**YIELD DATA OF TEA SMALLHOLDINGS 1983**

DISTRICT	PERCENTAGE OF HOLDINGS IN THE YIELD CLASSES (KG/HECTARE)		
	360	360-1200	1200
Katutara	39.4	28.1	32.4
Kandy	73.9	21.8	4.3
Matale	76.8	20.5	2.6
Nuwara Eliya	74.0	20.7	5.2
Galle	15.2	28.3	56.4
Matara	10.9	39.2	49.8
Hambantota	48.1	47.4	4.5
Kurunegala	83.7	14.6	1.7
Badulla	31.5	51.8	16.7
Ratnapura	31.1	48.0	20.8
Kegalle	76.6	20.2	3.2
Total	41.2	31.9	26.9

Source: Report of the Census of Tea Smallholdings in Sri Lanka 1983



**TABLE 7**  
**TEA PRODUCTION IN DIFFERENT SECTORS (MILLION KG.)**

	1982	1983	1984	1985
Total	187.8	179.3	208.0	214.1
JEDB Estates	69.9	64.8	79.0	78.2
SPC Estates	70.4	65.2	72.1	73.1
Smallholder Sector	47.5	49.3	56.9	62.8
%	25.3	27.5	27.3	29.3

Sources: *Central Bank of Sri Lanka - Review of the Economy 1983, 1984 and 1985.*

**TABLE 8**  
**PRODUCTION AND AVERAGE YIELD OF TEA SMALLHOLDINGS 1982**

Kalutara	1,377
Kandy	399
Matale	294
Nuwara Eliya	472
Galle	1,908
Matara	1,315
Hambantota	469
Kurunegala	205
Badulla	751
Ratnapura	760
Kegalle	384
Sri Lanka	928

Source: *Report of the Census of Tea Smallholdings - 1983*

At field level, fertilizer availability is poor as retail outlets are insufficient. This is likely to be major factor for the low fertilizer input levels. Lack of capital is also another factor. The cost of 100 kg of tea fertilizer mixtures varies from Rs.280 - Rs.335. On an average, the cost of applying the recommended dose of fertilizers to a hectare of mature tea could be Rs.2000-3000 per year.

(Note - The amount of fertilizers applied to mature tea depends on the yield. If the annual production is 1000 kg about 450 kg of the fertilizer mixture U709 is recommended. For those holdings where the yields is 2000 kg about 750 kg of the fertilizer mixture has to be applied, for tea at immature stages, other mixtures are recommended).

#### Planting material

Productivity of a tea holding, for that matter any agricultural holding,

depends on the yield potential of the clone or the variety and also on the density. Smallholders obtain their supplies of planting material for planting and in-filling from private nurseries and also those of state plantations and Tea Research Institute. However the quality of the seedlings available to the smallholder is not upto the standard due to a number of factors (2).

#### Labour

Non availability of a steady labour supply also limits production of tea smallholdings. Unlike tea estates where there is a resident labour, tea smallholdings have to depend on non resident labour for which there is a seasonal competition from food crops.

#### Processing

Smallholders green leaf is processed

mainly by private, bought leaf factories and also by factories of the Tea Smallholdings Development Authority (TSHDA) and the two state corporation in the tea sector, SPC and JEDB. Altogether there are around 500 such factories.

#### Cropping Pattern

All tea smallholdings are not only planted with tea. While 72% of the area under tea smallholdings are under tea only, 16% is inter-cropped with minor export crops, 4% with coconut and the rest with other crops (1).

**TABLE 10**  
**PERCENTAGE OF SMALL HOLDINGS TO WHICH FERTILIZERS WERE APPLIED**

DISTRICT	%
Kalutara	44
Kandy	11
Matale	10
Nuwara Eliya	20
Galle	82
Matara	68
Hambantota	11
Kurunegala	04
Badulla	39
Ratnapura	37
Kegalle	10

**TABLE 9**  
**FERTILIZER USE IN TEA SMALLHOLDINGS (1000 mt.tons)**

	1982	1983	1984	1985	1986
* Fertilizer used in the tea sector	102.6	115.5	137.2	149.9	128.8
* Fertilizer used in the private sector	30.6	42.6	49.2	37.9	48.4
Average fertilizer used Kg/hect.	404	562	650	506	639

\* Source - National Fertilizer Secretariat  
The extent of tea smallholdings is assumed as 75,770 hectares.

TABLE 11

## THE PATTERN OF DISTRIBUTION OF RUBBER SMALLHOLDINGS (IN 1000s)

District	0 - 4 Hectares		4 - 40 Hectares	
	No. of holdings	Area	No. of holdings	Area
Colombo	25.3	10.6	0.7	6.5
Gampaha				
Kalutara	48.2	15.9	1.1	10.2
Galle	19.7	6.2	0.9	4.3
Matara	4.7	2.6	0.7	2.9
Hambantota	-	0.04	-	0.04
Ratnapura	14.1	10.1	1.3	10.6
Kegalle	26.6	16.3	1.2	8.6
Kurunegala	1.3	0.7	0.2	1.3
Kandy	2.5	1.2	0.4	1.5
Matale	1.9	0.8	0.2	1.8
Badulla	0.2	0.2	0.1	0.4
Total	144.5	64.64	6.8	48.14

Note: Area is indicated in 1000 hectares

Source: Rubber Control Department

#### Assistance to Tea Smallholders

A number of institutions established in the country assist the tea smallholders. Among these are Tea Commissioners Department, Tea Small Holdings Development Authority, Tea Research Institute, State Plantations Corporation and Janatha Estates Development Board.

Subsidies to assist tea smallholders under various schemes are under operation. In addition they are assisted by supplying fertilizers and planting material.

#### Rubber Smallholders

Rubber has been the country's second most important crop next to tea. Nearly 0.8% of the GDP in 1985 was contributed by this sector. Out of the Rs.36,206 million of foreign exchange earned in 1985, 2,566 million was derived from rubber.

The extent under rubber in 1982 was approximately 205,000 hectares, according to the Rubber Control De-

partment (RCD) (2) However, according to the Department of Census and Statistics (3) this figure is 171,220 hectares. Out of the 205,000 hectares around 137,550 (67%) belong to the private sector and the balance 68,222 (33%) are managed by the state sector (2). Most of the private sector rubber holdings are smallholdings (less than 20 hectares). The total number of rubber holdings is around 152,000.

Out of this about 151,000 are less than 20 hectares. The distribution of total smallholder area and holdings by size of rubber holdings according to RCD is as follows:

SIZE OF RUBBER HOLDING	NO. OF HOLDINGS (%)	AREA (%)
Less than 0.8 ha	79.5	32.1
0.8 - 1.6 ha	13.0	18.0
1.6 - 4.0 ha	5.1	15.4
4.0 - 20.0 ha	2.4	34.5
Total	100.0	100.0

The pattern of distribution of rubber smallholdings in the country is indicated in table 11.

According to table 11 most of the smallholder rubber holdings are in Kalutara district followed by Kegalle and Ratnapura districts.

Rubber smallholders, like other smallholders cultivate small land areas. The land sizes vary considerably (4). The average monthly income of the smallholders is relatively low, ranging from Rs.1,389 to 2,303 per household (4). Rubber is not the only source of income for most smallholders. They cultivate other crops and in addition some family members are engaged in other forms of employment. According to a survey carried out by ARTI (4), for an average of 32.8% of the rubber smallholders, rubber is a major source of income. Around 45.5% get income mainly from non-agricultural sources; about 21.7% have their main source of income from paddy and other agricultural crops.

TABLE 12

## PRODUCTION LEVELS OF RUBBER IN SRI LANKA (MILLION KG)

	1980	1981	1982	1983	1984	1985
Sheet rubber	72.4	62.1	62.2	56.6	65.9	66.1
Crepe rubber	49.6	47.1	48.5	72.9	64.3	51.6
Others	11.2	14.7	14.5	10.4	11.7	20.0
Total	133.2	123.9	125.2	140.0	142.0	138.0
RSS production as a % of total	54.3	50.1	49.6	40.4	46.4	47.8

## Production

Smallholder latex is mostly used in the manufacture of ribbed smoked sheet (RSS) rubber. Scrap is used for brown crepes (scrap crepes). Around 10% of smallholder latex is used in the manufacture of crepe, technically specified rubber (TSR) and various rubber products. There are about 45 factories which manufacture rubber products such as latex thread, solid tyres, latex sheets, rubber bands etc. and it is the smallholder latex that is mostly used in these factories.

The RSS produced in the country accounts for nearly 48% of the total rubber produced in the country (Table 12) and most of its produced from smallholder's latex.

There is a wide variation in the system followed in processing of small-

holder latex to RSS. Those who have a few sheets to make tend to do the coagulation at home. Rolling and smoking are also done at home if the smallholder owns a pair of rollers and a smoke house, or at a private processing unit. About hundred group processing centers (GPCS), established by the Advisory Services Department of the Rubber Research Board also have facilities for coagulation, rolling and smoking. About 1.3 million kg of RSS is produced at these GPCs per year and around 90% of it is in Grades 1 and 2.

The cost of production of RSS varies. When all the operations are done at home in a very crude form (rolling done on the road and smoking in the kitchen) the cost may be as little as 50 cts. per kg. In GPCs the average cost is around 1.50 per kg.

The bulk of the smallholder RSS is categorised into lower grades (RSS 111, 1V and V) because of their lower quality. This is mainly due to lack of proper facilities for processing and/or inadequate know how on proper processing techniques. A closer study of RSS produced by smallholders indicate that correct techniques have not been followed.

## Marketing

Smallholders usually sell their rubber to village dealers and Commodity Purchase Department purchasing depots. There are around 2500 licenced rubber dealers and they generally pay a relatively lower price than CPD depots. (Table 13)

Note— The data indicated in the above table were obtained in 1981. Hence the lower price for rubber.

Private dealers form the main channel for smallholders RSS inspite of their lower prices and sometimes down grading. This preference to private dealers could be attributed to their easy accessibility, convenience of selling on any day etc. An important feature in the private dealer market is the bilateral services involved. The rubber dealer usually provides many household items to the smallholder, even on credit, unlike the CPD depots. However, the CPD prices compel the dealers to pay higher prices than otherwise they would pay the smallholders, for their RSS.

## Low Yields

The average rubber yields of the state and private sector, indicated in table 14 show that private sector averages are considerably lower.

The lower yields in the private sector could be due to a number of factors one of which is lower levels of fertilizer application. Values indicated in table 15, show that the smallholders apply on an average lesser amounts of fertilizer to their holdings, compared to those in the state sector. Most smallholders do not fertilize their mature holdings.

Another factor responsible for the low yield levels in the smallholder sector is the type of the clones planted

TABLE 13  
PRICES RECEIVED FOR RUBBER BY SMALLHOLDERS

SOURCE	AVERAGE PRICES PAID IN		
	RATNAPURA	KALUTARA	KEGALLE
Private dealers	6.82	6.53	6.95
CPD	7.36	7.65	7.29

Source: ARTI Research Study No. 61

Note- The data indicated in the above table were obtained in 1981. Hence the lower price for rubber.

TABLE 14  
AVERAGE RUBBER YIELDS (KG PER HECTARE)

YEAR	NATIONAL AVERAGE	STATE SECTOR	PRIVATE SECTOR
1980	718	1071.2	595.8
1981	705	1011.7	537.3
1982	729	1071.6	626.5
1983	821	1065.8	746.8
1984	840	1111.9	751.2
1985	820	991.1	764.6

TABLE 15  
FERTILIZER USE BY STATE AND PRIVATE SECTOR RUBBER HOLDINGS

YEAR	THE TOTAL AMOUNT OF FERTILIZER USED (M.TON)		AVERAGE AMOUNT OF FERTILIZER USED	
	STATE	PRIVATE	STATE	PRIVATE
1982	12141	4344	197.4	30.3
1983	13594	8679	160.0	60.5
1984	13594	9902	221.0	69.0
1985	15429	8817	372.0	61.6

Source: National Fertilizer Secretariat

National Fertilizer Secretariat.

Around 70% of the clones grown is budded rubber while clonal rubber and unselected seedlings account for the balance (2). PB 86 is the predominant clone. Its yield potential in the 5th year of tapping is around 1100 kg/ha. The Rubber Research Institute has developed a number of improved clones such as RRIC 100, 102. The yield potential of these clones in the 5th year of tapping is around 2000 kg/ha. Since 1981 the extent under these clones has increased to around 10% at present.

The economic lifespan of rubber is

about 30 years. The first 6 years represent the immature period. The subsequent 12 years constitute tapping on the virgin bark followed by another 12 years of tapping on the renewed bark. Thus, after about 30 years there is hardly any yield.

It is because of the large extent of overaged rubber in the smallholder sector, that a project to replant these lands with high-yielding clones was started in 1981. This project, identified as Smallholder Rubber Rehabilitation Project, was implemented to replant 18,800 hectares in 3 major rub-

ber growing districts (Kalutara, Kegalle and Ratnapura) over a five year period, in addition to other activities. During the last five years (1981-1985), 14,485 hectares have been replanted in the 3 districts while the total extent replanted during this period is 30,151 hectares. Thus, the average extent of replanting is around 6,000 hectares per year representing nearly 3% of the total extent under rubber.

#### Assistance to Rubber Smallholders

A number of institutions assist rubber smallholders. Among these are Rubber Control Department, Advisory Services Department and Rubber Research Institute of the Rubber Research Board, Commodity Purchase Department, Export Development Board, Co-operative Department, State Plantations Corporation and Janatha Estates Development Board.

A subsidy scheme administered by the Rubber Control Department is under operation to assist replanters and new planters. In addition, there is a scheme to assist private RSS processing units under the Commodity Purchase Department.

#### Coconut Smallholders

Coconut is the third important plantation crop in the country. Nearly 3.5% of the GDP in 1985 was contributed by this sector. It earned Rs.3,093 million of foreign exchange during this year which is around 2.5% of the total exports earnings.

The extent under coconut reached a peak in 1962 and since then it has declined. At present, the area under coconut is around 416,000 hectares (3). This area consists of 289,000 hectares in smallholdings, 103,200 hectares in estates and around 23,800 hectares of scattered trees. Thus about 70.0 percent of coconut lands are smallholdings. The pattern of distribution of coconut smallholdings in the country is indicated in Table 16.

Around 60 percent of the coconut smallholdings are concentrated in the coconut triangle consisting of Colombo, Gampaha, Kurunegala and Puttalam districts. Among the other districts Galle, Matara and Hamban-

TABLE 16 DISTRIBUTION OF COCONUT SMALLHOLDINGS IN SRI LANKA

DISTRICT	EXTENT UNDER SMALLHOLDINGS (HA)	AS A PERCENTAGE OF THE TOTAL EXTENT IN THE DISTRICT
Colombo	7,245	78.6
Gampaha	43,272	75.8
Kalutara	9,823	79.5
Kandy	4,818	57.9
Matale	6,203	66.7
Nuwara Eliva	562	67.4
Galle	9,346	70.5
Matara	10,661	74.1
Hambantota	17,588	86.0
Jaffna	3,870	38.6
Mannar	750	63.5
Vavuniya	1,109	50.8
Mullaitivu	1,109	50.3
Batticaloa	1,924	47.0
Ampara	2,131	54.8
Trincomalee	1,344	74.3
Kurunegala	102,175	68.5
Puttalam	28,884	55.8
Anuradhapura	4,137	72.2
Polonnaruwa	2,423	80.6
Badulla	338	38.2
Moneragala	3,409	81.7
Ratnapura	9,831	79.0
Kegalle	17,444	85.4
Total	289,512	

Source: *Census of Agriculture 1982*

TABLE 17 COCONUT PRODUCTION OF COCONUT 1980-1985

Year	Dessicated Coconut	Oil	Copra	Fresh nuts	Total
1980	217	482	1	1,326	2,026
1981	277	620	10	1,351	2,258
1982	286	840	19	1,367	2,521
1983*	295	663	18	1,379	2,312
1984*	221	295	12	1,408	1,942
1985*	362	1,039	37	1,431	2,958

Source: Coconut Development Authority and Central Bank Review of the Economy

**TABLE 18**  
**COCONUT PRODUCTION**

	1965	1970	1975	1980	1985	1986
Production	2,676	2,510	2,398	2,026	2,958	3,089
Exports of Kernal Products (Mn Nuts Eqvlt.)	1,279	887	914	242	935	1,105

Sources: Coconut Development Authority  
Central Bank of Sri Lanka - Bulletin

**TABLE 19** FERTILIZER USED IN THE COCONUT SECTOR

Period	1958-1962	1963-1967	1968-72	1973-77	1978-82	82-85
Average Fertilizer used annually (1000 mt)	42	52	60	31	44	42

Source - Coconut Development Authority and National Fertilizer Secretariat

to have a substantial extent of coconut smallholdings. Most of these are very small in size. About 99.1% of the coconut holdings in the country are smallholdings and out of these around 87 percent of the holdings are less than 2 hectares in extent.

The total area of coconut smallholdings has decreased during the last 30 years. In 1952, this area was 295,448 hectares while in 1982 it has decreased to 289,000 hectares. However, during the last 2 decades, the coconut area has decreased in some districts such as Colombo, Gampaha, Kurunegala, Puttalam, Kegalle, Galle, Matara, Hambantota, Jaffna and Batticaloa but has increased in Matale, Vavuniya, Anuradhapura, Polonnaruwa, Badulla, Mone-ragala and Rathnapura districts (5).

There are about 100,000 coconut growers in the country. Most of these are smallholders. They are not full time growers and generally short of adequate capital. Most of the smallholdings are represented by homesteads with only a few coconut palms.

Most of the smallholder coconut are mainly used for household consumption. Some of it is processed into desiccated coconut or coconut oil at the mills.

Assuming the area to be under co-

conut is 416,000 hectares, the average production per hectare is 5615 nuts per hectare (2273 per acre).

(Note - As most of the coconut holdings are smallholdings the average product in these also could be assumed to be around 2000 nuts per acre).

As indicated in table 18, the production level shows a decreasing trend after 1967 but since 1977 this tendency has reversed.

The key input which affects coconut production is fertilizer and the declining trend in coconut production, specially during the latter period of 1968 - 1977 could be attributed to decrease in fertilizer application. Since 1978, with the application of higher amounts of fertilizer the coconut yields too has increased. Table 19 indicates the amounts of fertilizer used in the coconut sector.

The age of the coconut tree is also a factor which influences the yield. According to a sample survey carried

out in 1970, around 5.0% of the coconut palms are above 60 years. The replanting rate of senileareaper annum is only around 1% hence the area containing trees above 60 years continues to increase causing a decline in the total production in the country.

#### Intercropping

Intercropping coconut lands would enable the smallholders to maximise their income from coconut lands. Also, at national level, intercropping is of considerable importance in relation to increase in crop-animal production

in the country, as nearly 23% of the cultivated area is under coconut. There is a considerable potential to intercrop coconut lands. Crops such as pineapple, banana, ginger, turmeric, pepper, coffee and cocoa are suitable for intercropping in coconut lands.

In addition, production of cattle and poultry is also possible.

#### Assistance to Smallholders

A number of institutions established in the country assist coconut smallholders. Among these are Coconut Cultivation Board, Coconut Research Institute, Coconut Marketing Board.

The Coconut Cultivation Board grants cash subsidies to assist coconut growers to make their lands more productive. These subsidies are (a) Rehabilitation subsidy scheme (b) Underplanting/replanting subsidy scheme and (c) new planting subsidy scheme. Subsidy is also given to grow pasture and crops such as coffee, cocoa and pepper.

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# DEVELOPMENT CONSTRAINTS IN THE SRI LANKAN TEA INDUSTRY WITH SPECIAL REFERENCE TO THE SMALLHOLDING SECTOR.

S. Vidanagamachchi

## Tea in the Sri Lankan Economy

Sri Lanka is mainly an agriculture country and its agricultural pattern shows dualistic characteristics in the economy. This can be explained as a traditional subsistence agriculture economy and highly modernized plantations agriculture economy. The plantation agriculture in Sri Lanka constitute three tree crops. Tea, Rubber and Coconut. These constitute 41 percent of the total cultivated area of Sri Lanka and contribute 47 percent of the export earnings and generate 14 percent of the budgetary revenue. (Ministry of Finance & Planning 1985) They also provide employment for 1.2 million persons.

Of those three major crops Tea is and has been the main crop of the country's economy. It is the single largest source of foreign exchange, accounting for 30 percent of the country's export earnings. Tea continues to be Sri Lanka's main export. Although its share in total export revenue fell from 50 percent in 1979 to 30 percent in 1982. Even so, Tea contributes a significant amount to the government revenue by way of taxes and duties, which was 8.8 percent in 1983 (NIPM 1985). The total force employed in the industry is around 600,000 comprising 11 percent of the national workforce. The Smallholder sector constitutes 34 percent of the tea land of the country.

## Land Use Pattern in Tea

The area under Tea is approximately 343,006 hectares or 3.5 percent of the total land area of the nation. It is distributed in three elevation zones referred to as High (1200 m), Mid (600-1200 m) and Low (600 m). The distribution proportion of tea land in these three zones are 38, 28 and 34 percent respectively. It is also noted that, old seedling tea makes up 85 percent of the plant and only 15 percent of the total area under vegetative pro-

pagated (v.p.) plants. The two state corporations namely Janatha Estate Development Board (JEDB) and State Plantations Corporation (SPC) manage around 128,000 ha or 57 percent of the area while the remaining 43 percent of the tea lands owned by the private sector, which is made up of smallholding and small estates. Major concentration of these smallholding are in Kandy, Galle and Matara districts. About 65 percent of these smallholdings are under 5 acres (2 ha). Since 1950 there has been a 100 percent increase in the number of smallholders.

## Historical Perspectives

Tea is not indigenous to Sri Lanka. According to records in the country's archives tea seed was first brought to Sri Lanka from China in the year 1824 and from Assam in 1939. James Taylor, the father of Sri Lanka's tea industry who planted the first tea plant after clearing of 20 acres in the up country area of Sri Lanka (Bansil 1971). During the 1840-1937 period, with introduction of the crown land encroachment ordinance, most of the hill country lands were taken by the Britishers and other local wealthy people for tea plantation. The extension of a railway line to the plantation area, expansion of Colombo harbour and setting up of Agency Houses to manage tea estates were developments which took place with the tea industry.

Up to 1969 the tea industry was the mainstay of Sri Lankan economy and the major export earner. But during the 1970s with the nationalization of foreign owned estates and other organizational changes with land tea production began to decline. Apart from land reform, frequent drought, low price, bad management practices and government taxes and foreign exchange policies were attributed to the decline of production. As a result of these factors, the use of fertilizer dropped drastically, stand

maintenance was poor and field investment activities such as replanting infilling etc. were neglected.

The replanting programmes which had averaged about ha (6200 ac) a year during the early 1970's fell steeply to 1000 ha (2500 acres) per annum in 1976 - 78. More than half of tea bushes in Sri Lanka are over 70 years old and well past their level of economic viability. The infilling of vacancies due to bush death has been long neglected. The agriculture practices such as soil conservation etc. have been deferred. (National Institute of Plantation Management 1985).

All these factors have combined to adversely affect the output of tea in Sri Lanka.

## Management Pattern of Tea Estates and Smallholdings

Prior to nationalization of privately owned estates in 1975, which belonged to large companies that were either registered in Sri Lanka as Rupee companies or abroad as Sterling companies, about 70 percent of tea estates were owned by expatriates, while the Sri Lankans ownership was very much less. With the land reform policies approximately 67 percent of these lands became state owned; bulk are managed by two states organizations; the Sri Lanka State Plantations Corporation (SPC) and the Janatha Estates Development Board (JEDB). Attempts have been made to manage some estates on a cooperative basis, but due to political disfavour after 1977 they were abandoned.

Basically management patterns vary from that of the big tea estates to the small holding sector estates. On the one hand more reputed tea estates are under the supervision of well experienced planters and supporting staff, while on the other hand small holders have to depend on their own family labour and their own experienced to manage their blocks of tea land.

The Ministry of Plan Implementation has stated "It is doubtless that these smallholders would have taken to the cultivation of tea on account of

its reputed profitability, as observed on estates neighbouring their villages. However while management skilled and technical knowhow through experienced planters and the Tea Research Institute, were available to the estates, smallholders were initially left fend for themselves with the knowledge they were able to acquire on their own. (Ministry of Plan Implementation 1980).

Apart from that Indian Tamil labourers are employed in large estate sector while smallholders have to depend their own resource for planting, soil conditioning manuring, plucking of tea and transport to the nearest factory etc.

#### Production Constraints

It was revealed that the productivity of tea smallholding sector is low in comparison with the plantation sector. The main reasons for this situation are due to the following constraints;

##### Supply of Inputs

##### Availability of Capital

##### Knowledge of tea culture

##### Processing & marketing

##### Institutional support (Ministry of Plantation Industries 1984)

#### Supply of Inputs

The major supply of inputs in the cultivation of tea are fertilizer, plants agro chemicals and labour. Constraints in the supply of these items have affected the performance of the smallholding tea sector.

#### Fertilizer

Fertilizer usage is very important to achieve high yield from a tea plant. At present the application of fertilizer by smallholders is very limited. According to a study done by the fertilizer secretariat, Sri Lanka in 1983, it was revealed that 57 percent of the smallholders had not fertilized their lands in 1982; (Ministry of Plantation Industries 1985) This is due to non availability of fertilizer at grass root level as well as due to high prices of fertilizer, poor smallholder cannot afford to buy at high price. Except Matara and Galle

districts, the rest of the country does not operate any credit scheme in association with banks, to supply fertilizer on credit to smallholders.

#### Clonal Tea plants

Apart from fertilizer, smallholders also find difficulty in obtaining necessary clonal tea plants. The productivity of tea plantations depend on the yield potential of a plant as well as the number of plants per unit area. Therefore it is necessary to replace their old seedling tea as well as to filling vacancies in existing fields by planting them up with vegetative propagated (VP) tea plants. (Ministry of Plantation Industries 1983). The present setup of supplying these plants are being done through the nurseries of State Plantation Corporations, Tea Research Institute and the Tea Smallholding Development Authority. It was revealed that these plants are provided to smallholders, after removing their own requirements from the nurseries. This results in both the issue of weaker plants to the smallholders as well as receipt of plant in old planting season or late in the planting season. (opcit p.4).

#### Agro chemicals

In the case of agro chemicals, constraints will be higher prices. Due to financial difficulties, ordinary smallholder cannot afford to buy the necessary agro chemicals to eradicate weeds and other pests from his smallholding.

#### Labour

Smallholders use mainly are family labour in their holdings. Labour will be a constraint if a smallholder is to depend on resident labour or non resident labour. Non resident labour will be a problem specially when the rice crop harvesting season is begun.

#### Capital

Availability of capital will be the other production constraint faced by the smallholders. At present they have to depend on their own capitals, bank loan and subsidies provided by the Tea Smallholding Development Authority

(TSHDA) to develop their smallholdings. The outright grants given by the TSHDA for replanting, new planting and infilling of vacancies are sufficient only to cover 40 percent of their cost. This is not adequate to develop their land.

#### Knowledge of Tea Culture

Lack of knowledge of tea culture will be another production constraint faced by smallholders. This can be explained as lack of basic management practices in tea plantation, such as condition of bushes, spacing, terracing, draining, mulching, fertilizing, pest and disease control, weed control and control of soil erosion. Because of these there is a large yield gap between the tea smallholdings and those big tea plantations. The former will be around 360 kilograms per hectare while the latter will be around 1500 kilograms per hectare. This is a result of the poor impact the extension services have had. Advisory and extension service to this sector at different times was the responsibility of the Tea Research Institute, the Tea Commissioner's Division of Sri Lanka Tea Board and Tea Smallholding Development organizations. But it was revealed that all these organization did not have sufficient personnel to carry on these functions effectively and the few officers those who incharge with this responsibility some does not have sufficient training to do so.

#### Processing and Marketing

The major constraint in this subsector are marketing limitations. Tea can be processed only in expensive tea factories. Tea factories in many smallholding areas are rather scarce. The scarcity of factories and the need to dispose of the leaf immediately after harvesting results in the exploitation of smallholders by middle man. According to the percent of tea smallholders sell their leaf direct to a factory and 54 percent of smallholders sell their leaf dealers or to leaf collectors. It was also noted that only 9 percent of them are sell to cooperative societies.

#### Institutional Support

Apart from the other production constraints discussed here lack of ins-

stitutional support could be another constraint. Smallholders have to depend on a subsidy provided by the Tea Smallholding Development Authority for replanting, new planting, infilling and fertilizer application of their tea lands. The present subsidy for replanting will be around Rs.36,000 and will be paid at a different stages depending on performance of each holding. The major 6 stages of planting are uprooting, soil rehabilitation, soil conservation, planting of V.P. tea, first year maintenance and the second year maintenance. Actual cost of replanting will be around Rs.68,000. The present level of subsidy payment is not sufficient to encourage smallholders to grow more tea. For this reason they are not willing to replant their tea land and on the other hand, due to poor management practices along with lack of application of fertilizer ultimately resulted in low yield from their land, which effected their level of income.

Apart from that, too many institutions involve in tea plantation also attributed to poor extension relations with smallholders. As indicated earlier, TSHDA and the Tea Research Institute should work in liaison with the smallholders to provide better and effective advisory service in order to improve their lands. On the other hand they have to sell their green leaf either to government tea factories of SPC, JEDB or TSHDA of private tea factories.

In addition to that, Agrarian Services Department and the Cooperative societies at village level should also provide with them necessary fertilizer and other chemical used for tea plantations. But due to the present setup, there is no coordination between these institutions which confused the smallholders.

It was also noted that, more than 65 percent of tea smallholding are not registered with the Tea Commissioner's Division of the Sri Lanka Tea Board. This is necessary for each smallholders to apply for free subsidies. The registration work was delayed due to problems of land ownership pattern.

#### Conclusion and Recommendations

As we discussed in this paper the tea sector is one of the important plantation tree crop of the country. We also discussed the land use pattern

in Tea. It was noted that smallholder sector is now playing a prominent role in tea plantation sector. After that, we have looked at the historical prospective of tea industry in Sri Lanka, economy than we discussed about management pattern of tea estates and tea smallholders. Production constraints has been discussed there after. Under this title various sub topics also discussed to elaborate the magnitude or production constraints which has effected to the smallholding sector and finally looked at the possible solution and recommendations to overcome these difficulties.

It could be concluded that the Sri Lankan tea industry faces many developments constraints. Particularly to the Smallholding sector. Among these land will be a crucial item, because 63 percent of tea holdings are less one acre and 87 percent are less than two acres. Due to small size of their land average yield also low, it is less than 300 kilograms per hectare of green leaf. Historically with land reform policies it was tried to upgrade smallholders from the poor level with distributing well manage tea land to them, but due to poor management practices may were not been able to obtain high yields from their lands. Apart from that production constraints also attributed for low performance of their smallholdings. These production constraints also be a part of development constraints faced by smallholders.

#### Recommendations

a) Facilities should be provided at TSHDA, SPC, JEDB and other private factories to make available fertilizer to smallholders. They should also supply these fertilizer on credit basis. The

cost of fertilizer could be deducted from their green leaf.

b) More facilities should be provided at the factory premises, enabling smallholders to obtain the necessary V.P. clones for replanting their tea lands. Also from TSHDA, and the Tea Research Institute should provide more plant from their nurseries; cause present demand for plants cannot be met by them. Therefore they should encourage smallholders to run their own nurseries.

c) Present subsidy payment does not sufficient to carryout their replanting activities and most smallholders do not have the capital to commence replanting and new planting work with their own funds. Apart from that those who are not registered their lands also not eligible to obtain subsidies, are also find difficulty to do their replanting activities. Therefore necessary credit facilities should be arranged with commercial banks or maintained a resource fund under the TSHDA.

d) Extension and Advisory Services should be reorganized and it should be a vehicle to carryout research findings to the smallholders. Coordination between Research Institutions, Management Institutions and the smallholders through proper Extension and Advisory Service has to be strengthened.

e) The Tea Commissioner's Division of the Sri Lanka Tea Board should speedup its registration work, if not smallholders should not be able to obtain their subsidies. This has to be carried in liaison with land Registry Department, Assistant Government Agent of the area and the Ministry of Plantation Industries, in order to speedup the land registration work.

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## DEVELOPMENT CONSTRAINTS ON PERFORMANCE IMPROVEMENT IN THE RUBBER SMALLHOLDING SECTOR

### Production Structural Factors

The rubber smallholder sector is dominated by the very small producer or mini-holder. 98% of total holdings are below 4 ha, and 88% of the total private holdings are under 1 ha. Holdings below 4 ha. comprise 71% of total private rubber extent. The very small, fragmented pattern of holding, limits the choice of technology available for efficient cultivation. In addition 5% of the private landowners own 39% of the total land area. The combination of small sized holdings and high inequity in land distribution characterises the smallholder sector. As a consequence, the larger farmers are able to adopt new technologies more efficiently and hence, income differentials between the smallholder and the very small (mini) holder widen. In addition, credit and extension facilities tend to be directed towards the larger cultivator, for he is generally in a better position capital and education-wise to absorb the credit and extension advice.

An analysis of monthly income sources shows that rubber was only a secondary source of income in the mini-holder category. Non-agricultural income, in fact, accounted for the largest share of income for this class of farmer (Table 4). This implies that the small farmers cannot devote the greater part of their time or capital resources to rubber, as it only supplies a minority of their household income needs.

In many areas, joint ownership and absentee ownership are common forms of tenurial relationships. Where sole ownership does not exist, replanting decisions and general management decisions often are delayed. In many areas, the mini-smallholder has a significant part of his lands in other crops. One survey showed that 18% of the land was in paddy, 10% in mixed crops and 9% in coconut. Mixed cropping is a wise survival strategy. However, this leads to a spreading of resources which limits the investment on rubber and the farmers receptivity to new technologies.

The structure of smallholder rubber, the importance of rubber versus other income sources in the crop rotation and the capital and managerial resources of the landowner vary considerably from region to region. The heterogeneity of the sector and the regional variation in socio-economic conditions underscores the need for sophistication and flexibility in strategies aimed at improving the situation.

### Age and Clonal Distribution

Rubber has an economic life of up to 30 years with the more vigorous yields concen-

trated in years 11 to 27.

The Rubber Replanting Subsidy Scheme (RRSS) does not provide for a complete inventory of rubber at any one time and there is a need for accurate information on clonal composition and age of the trees. This is most important because the age and clonal composition of rubber exerts a great effect on the productivity of the trees and hence on the profitability of the farming enterprises.

Survey results suggest that the immature extent of rubber is 20% in Kalutara, Ratnapura and Kegalle districts, with no significant regional variations. The percentage of rubber over 30 years is highest in Ratnapura district. Rubber acreage over 25 years in Ratnapura is twice that of the Kalutara and Kegalle districts and the performance in replanting is poorest in that district.

The clonal composition of rubber has a significant impact on yield and production. Survey results show that budded rubber predominates; averaging 70%. Clonal rubber and unselected seedlings account for the balance. In the budded rubber areas, PB 86 is the predominant clone. Nationally, of a replanted extent of 401,000 acres there were 278,000 acres (1982) in budded varieties and 123,000 in clonal and unselected. Since the yield differences between the budded and the others is nearly 100%, it is important to identify and replant in areas of low productivity.

### Management Practices

Proper fertiliser use can increase smallholder yields significantly although no impact is generally seen until two to three years after application. Under the RRSS programme, fertiliser is provided in kind as assistance in the immature replanting phase. In the mature phase, with no such facility available, and with the high fertiliser prices, its use is reduced significantly. Survey results suggest that only 5% of the smallholders use chemical fertiliser on mature rubber stands. Even with existing varieties, expansion of fertiliser use could have considerable impact on rubber output.

Although precise estimates are not available, it is known that the lack of credit at a reasonable rate limits the ability of the

smallholder to afford fertiliser. Since the results from increased fertilisation do not appear until two years after application, farmers tend to view fertiliser as a long-range capital investment. The insitutional credit sources, on the other hand, consider fertiliser a short-term production credit item and expect repayment after tapping.

### Replanting Schemes

The amount of subsidy given strongly influences the smallholders, decision to replant. In the 1970's the subsidy was depressed and consequently, replanting rates were low. That position has been corrected and at present the subsidy is approximately Rs.9000/acre which accounts for approximately 62% of the costs of replanting (1983).

Re-imbusement for the full material cost and one third of the labour cost, or roughly 62% of the replanting cost, appears to be an adequate incentive level of replanting. This figure was derived largely from Ministry review. Generally, the subsidy granted is a result of discussions between the Ministry of Finance and the Ministry of Plantation Industry. A regular joint review is required if parity is to be maintained in the subsidy payment.

Lengthy procedures in issuing permits, processing the permits and inspecting the fields have proved to be major constraints to improved replanting performance, especially where ownership patterns are uncertain. Many of the individual applications are incomplete and this often delays the issuing of replanting permits. There is a substantial gap between those eligible for the first subsidy payment and those who receive the subsequent payment. Part of the reasons for this decline is the procedural difficulties involved in administering the replanting scheme. The decentralisation of RCD activities and the use of computers to speed-up processing are expected to relieve this situation substantially.

30% of the rubber smallholders are not covered under the SRRP. For smallholders especially outside the SRRP, there are many problems in obtaining proper inputs and support services. For example, these cultivators must purchase planting material from registered private commercial nurseries, which are not closely monitored and tend to sell substandard products. For these smallholders, replanting has a higher risk, because there is little guarantee that what they are replanting is from good quality stock.

Cropping Pattern of the Rubber Smallholder\*

District	Cropping Pattern (%)					Total (in acres)					
	Rubber	Tea	Coconut	Paddy	Mixedcrop						
Ratnapura	68%	24,892	0.5%	184	9%	3,295	18%	6,771	4%	1,464	36,506
Kalutara	26%	39,390	—	—	8%	5,627	25%	17,585	11%	7,737	70,339
Kegalle	59%	40,248	1%	682	10%	6,821	15%	10,233	15%	10,233	68,217
Total		104,530		866		15,743		34,589		19,434	175,162

\* Below 10 Acres  
Source: ARTI, op cit.

Until very recently, the new replanting programme for rubber was fairly ineffectual due to low subsidies. A correction was applied to the subsidy, bringing it up to Rs.8, 250 which is close to the amount provided for replanting. However, the new planting of rubber receives relatively little institutional support compared to replanting. Smallholders must obtain their own planting materials and fertiliser and there is little back-up provided by the extension services.

### Extension

Smallholder extension activities are the responsibility of the ASD's (Advisory Service Department) office. However, this extension cadre is also responsible for implementing the various subsidy schemes handled by the Rubber Controller's Department. These pre-empt the bulk of the time of the ASD's staff.

Many of the extension officers have minimal technical qualifications or training in rubber. Consequently, they are reluctant to give any form of advice to the cultivators. In addition, the ratio of rubber extension officers (REO's) to farmers is approximately 1 to 1500 - 2000. Consequently, individual based extension is nearly impossible, although that is the present system.

In the post replanting phase, the extension effort declines significantly. This confirms the belief that the REC's are allocating a fair amount of their time to administering subsidy schemes. In addition, proper direction is lacking for post-replanting work. However, it is precisely in the post-replanting phase that the problems of over-tapping and under fertilisation occur. Consequently, a much greater extension input is required for the latter years of rubber cultivation.

### Processing

Smallholder latex is largely processed and marketed as ribbed smoked sheets (RSS) and the scrap is used for brown (or scrap) crepes. Latex collection that is geared to centralised processing for latex crepes, centrifuged latex and TSR is limited in scope and accounts for less than 10% of all smallholder latex. Even the new Group Processing Centres (GPC's) only accounted for under 5% of all smallholder latex. The three stages involved in processing are coagulation, rolling and smoking. Bulk of the processing is often done on an individual basis and the three principal methods are:

- 1) all stages done by producer;
- 2) coagulation by producer but rolling and smoking elsewhere for a fee;
- 3) coagulation and smoking by the producer but rolling elsewhere for a fee;

Type (1) above is followed mainly by the larger owners and (2) and (3) by the small producers. The bulk of smallholder

rubber that is processed is classified as either RSS 11, 111, or IVJ the lowest quality and lowest priced rubber. Smallholder smoke houses generally do not meet the cleanliness requirements for Grade 1 RSS. However, the processing technology is relatively simple and it is technically possible for the smallholder to provide high quality rubber.

The investment required to establish a smoke house is often greater than the capital available to the smallholder. Generally, the smallholder will resort to rolling and smoking elsewhere or buying substandard processing equipment. Many smallholders simply lack proper processing knowhow, as is evidenced by the use of impure water, inadequate or excessive doses of coagulation acid, excessive smoking and the production of thick and uneven sheets. Often the smallholder cannot afford to store the processed product because of his subsistence cash requirements and his need to meet his agricultural operating costs from his processing profits.

At present, the larger factories servicing the estates are operating well below capacity. These factories meet part of their demand from smallholders rubber, yet the smallholder supply is bought only after the estates are serviced. The uncertainty of the large scale institutional demand for smallholder latex contributes to the high volatility and downgrading, underweighing and late payment that characterises the market for their rubber.

At present, with high rubber prices, traders are coming to collect sheet rubber and latex directly from the smallholder. This implies that the higher profits from exporting offset their additional marketing costs. Yet the traders tend to classify smallholder latex as low quality, low price latex.

### Marketing

The obstacles in the way of smallholder based processing are compounded by marketing problems. The lack of group marketing institutions aside from the GPC's, limits the bargaining power of the producer. Traders buy their rubber based on visual grading and often the trader will try to downgrade the rubber he is buying. The types of smallholder rubber marketing systems are as follows:

- (a) via village dealer to town dealer to exporter
- (b) via brokers to rubber auctions
- (c) via purchasing centres of the Department of Commodity Purchase (CPD) to the CPD depots.
- (d) direct sale to exporters.

Although channel (a) is the longest, 90% of the sheet rubber is handled by them. The longer the rubber marketing chain, the higher the profits involved and the greater the opportunity for downgrading and other unfair practices.

### Research

The available technologies, produced through many decades of research, do not appear to be reaching the smallholders. Evidence of this are the under fertilisation rates on smallholder lands, the widespread over tapping, improper planting and use of traditional planting materials. Yields on the experimental fields are often around 2000 acre compared to 600 to 700 kg/acre on smallholder fields. Part of the reason for the large yield gap is a problem of poor vertical and horizontal communication between the research and the extension service. Research tends to be more geared to the needs of estates than smallholders. For example, the new varieties of clones, the RRI 100, 101 and 103 series, are designed for good management cultivation systems and the standard tapping techniques.

In addition, there is very limited socio-economic research conducted on the smallholder sector. At one time, the ASD had an economic research unit but this has never progressed very far due to lack of trained personnel.

### Planning

A comprehensive plan is clearly required to direct programmes and project initiatives in the smallholder sector. Under the SRRP a rubber policy planning unit was proposed, yet this was not fully activated due to problems of inter-agency coordination.

Planning in the smallholder rubber sector suffers from a lack of priority agro-economic baseline information. Of information already available, little analysis is actually conducted. This will be partially corrected by the rubber census that is now being proposed. Although two cost based subsidy programmes are operated for the smallholder rubber sector there are no regular cost of production surveys.

### Institutional Organisation

A number of Institutions service the needs of the rubber smallholder. The Apex Institution in charge of policy making is the Ministry of Plantation Industries. Under the Ministry is the office of the Rubber Controller and the Rubber Research Board. Both the ASD's office and the RRI are under the Rubber Research Board. The Estates: the JEDB and the SPC, are outside of this structure. Consequently, the interaction and interface between the smallholder planner and the Estates is rather limited. It is generally felt that coordination between the various agencies responsible for serving the needs of the smallholder are poor and that this is a major factor explaining the lack of direction and poor performance of programmes geared to helping the smallholder.

Source: "Smallholder (Tea & Rubber) Development Strategy". Ministry of Plantation Industries.

### Protectionism, the MFA and Garment Exports

The growth of 'protectionism' in recent years has raised questions whether (1) the movement towards a more liberal trading environment has stalled; or (2) the new protectionism is a temporary response to the current international economic crisis situation; or (3) the beginning of a new trend brought about by a lack of faith in an open trading system. There is no doubt that the new protectionism is being demanded by groups who see their interests damaged by imports and is permitted by governments that see their interests served by giving way to these demands. In such a situation economic arguments play a minor role.

Recent studies have shown that the barriers which most affect many developing countries are the non tariff barriers (NTBs) against textiles and clothing. The manufacture of these products have seemed suitable for many developing countries because, at least until quite recently, since the technologies were simple and relatively labour-intensive. Textiles and clothing represent approximately 25 percent of developing countries' manufactured exports. But restrictions on imports into the developed countries began to be imposed from the 1970's and were formalised with the first multifibre arrangement (MFAI) in 1974. Each successive version of the MFA has been more restrictive and has covered more products and exporters.

The Multifibre Arrangement (MFA) was ostensibly intended as a temporary measure at the start also to provide developing countries with growing access to industrialised country markets for their textiles and garments. After MFAI, (1974-77) however restrictions began to be tightened. By the time of MFA IV, (1986-91) it was clear that the MFA's successively tougher versions had acquired an air of permanence. MFA IV, signed in July 1986, has proved the desire of industrial countries to block loopholes in their barriers to textile and clothing imports exploited by the big Asian exporters and is likely to limit newcomers to minimal quotas.

The questions being asked are: what does this imply for the future?

The World Bank, in its Annual Development Report, 1987 comments strongly on the situation thus: "Trade in textiles and clothing has become the paradigm of managed trade. Its use of discriminatory quota restrictions, negotiated bilaterally, violates the most basic rule of the GATT. The history of the MFA has shown increasing coverage and stringency, and it has recently (July 1986) been renegotiated ....."

#### The case of Bangladesh

The World Bank Report has argued that the MFA can adversely affect new exporters such as Bangladesh; because of the 'detailed' agreement this country has to enter into with its buyers such as USA. The following is the Bank's argument on how investment in the garments export sector is discouraged in Bangladesh although it has a clear comparative advantage in producing of readymade garments.

"Article 13 of MFA IV reads in part: "The participating countries (are) conscious of the problems posed by restraints on exports of new entrants and small suppliers

They agree that restraints shall not normally be imposed on exports from small suppliers, new entrants and the least industrial countries".

There can be no question that Bangladesh fits this description. With a 1984 per capita income of \$ 140, it is one of the poorest countries in the world. In 1978, when it began building a textile and clothing industry with the help of the Republic of Korea, there were less than a dozen textile manufacturers in Bangladesh. By 1985 the number had grown to about 450 operational companies; these employed a total of 140,000 people and produced more than 300 million pieces a year. With 300 more companies ready to start up, Bangladesh has the potential to produce and export much more, although it will remain a tiny supplier compared with such textile

giants as China, Hong Kong, and Korea.

Despite the agreement not to restrain exports from countries like Bangladesh; France and the United Kingdom imposed quotas as early as 1984. The United States initiated an arrangement in February 1986 which restricted Bangladesh's textile exports through January 31, 1988. Although the industrial countries are allowed under the MFA to limit imports in the case of sudden surge of imports and market disruption, there is no apparent justification for such limits on Bangladesh. In 1984, even after achieving spectacular growth, Bangladesh still held only 0.25 percent of the developing country share of clothing exports to the industrial countries. The four biggest Asian NIC exporters held 60 percent. In the United States, Bangladesh's market share was 0.32 percent while the "super-exporters" held 66.7 percent. Bangladesh hardly posed a serious threat to the U.S. industry.

The bilateral agreement signed between Bangladesh and the United States allowed a mere 6 percent yearly growth rate in MFA imports. Between 1981 and 1983-84 Bangladesh had an unrestrained growth rate of 386 percent. Moreover, the agreement was extremely detailed: it restricted exports down to seven-digit SITC categories. This meant, for example, that Bangladesh had a quota not only on shirts but also on shirts made from dyed yarn in particular sizes. So detailed an arrangement would make diversification into uncontrolled goods well nigh impossible. Because of it, Bangladesh stopped expanding its textile industry and for a time had operational facilities standing idle. Since the most recent bilateral arrangement, the situation has eased somewhat. But quotas are still detailed, and Bangladesh has already (in May 1987) reached the ceiling on quotas for major categories. It is possible for Bangladesh to borrow, within limits, from other categories underused quotas from the previous year or the succeeding year's quota. But these complications create uncertainty, and the administration of the quotas absorbs scarce managerial ability and discourages investment in a subsector in which Bangladesh clearly has a comparative advantage".

TEA: prices picking up

The average gross price of tea has shown an upward trend from May this year. In August gross averages amounted to Rs 42.18 per Kg.. The highest price for the year, however, was Rs 42.62 recorded in January. The biggest increase in prices was recorded for high grown teas, which went up from Rs 30.10 per Kg in June to Rs 45.06 per Kg in August. Medium grows too recorded a considerable increase in this period, though low grows tended to show a fall in prices. The average gross price in 1987 (Jan.-Aug.) amounted to Rs 38.52 per Kg as against Rs 28.51 per Kg in the same period last year, which clearly indicates the increasing trend in prices during recent months.(See Table 1).

According to the F.A.C. reports, the present increased demand and price recovery was due to the fact that

the economic activities in many countries had improved lately and oil prices were stronger than a year ago, both stimulants to tea consumption. On the other hand there was the possibility that tea consumption in India would increase in 1987 and would recover from the 1986 setbacks.

Tea production in 1987 (Jan.-July) amounted to 126.7 mn kgs showing a 3 percent decline compared to production in the same seven months of last year. Production of high grown teas declined continuously and reached Kg 5,395,210 in July this year. The medium and low grown figures revealed favourable conditions till June but in July production declined by 38 percent and 41 percent respectively against June production. The fall in crops partly due to the drought conditions.

Although Sri Lanka's production upto July was 3 percent less than in the same period of 1986 both Kenya and India showed atleast a 20 percent increase and tea production had gone up over 500 mn.kgs upto July this year compared to about 225 mn kgs. in the same period last year.

RUBBER: Growth in demand forecast

The fall in oil prices has not resulted in the growth of expected Natural Rubber (NR) consumption. NR prices are therefore not expected to change much over those of 1986. World rubber consumption forecasts show that the increase expected would average around 2.8 percent per annum in the 1986-2000 period. Recent broker's reports record that currently major producing countries are making continuous efforts for integrating production with manufacture. A large number of consumer rubber products and automobile rubber components which are comparatively more labour intensive can be made in all producing countries for meeting the local demand as well as for supply to international markets. All producing countries should make efforts to meet their entire domestic requirements of rubber and to export their rubber as far as possible as value added rubber products.

Greater demand can also be generated for N.R.by developing new uses and by production and supply of chemically modified N.R. which can recapture some of the markets already lost to D.R.

Overall it was an year of fluctuating prices with the drop of the US dollar against almost all other currencies being the most significant factor, influencing the rubber prices. Value of rubber expressed in EEC currencies remained almost unchanged whilst the same prices expressed in US dollars showed sharp increases. Currency fluctuations were a vital factor in trading which gave a very different look to domestic prices in different area. Adverse weather conditions affecting supply lines also contributed to fluctuating prices in International Markets.

TABLE I

GROSS AVERAGE PRICES OF TEA (RS PER KG.)

MONTH	HIGH	MEDIUM	LOW	TOTAL
1987 June	30.10	29.20	44.08	34.63
July	35.96	32.89	46.95	38.82
August	45.06	37.28	42.64	42.18
Cumulative				
1986 Jan.-Aug	29.20	25.54	29.89	28.56
1987 Jan.-Aug.	37.45	34.31	42.23	38.52

Source: Broker's Reports

TABLE II

TEA PRODUCTION (IN'000 KGS)

MONTH	HIGH	MEDIUM	LOW	TOTAL
1987 May	9,956.5	5,594.2	7,007.7	22,558.4
June	7,282.2	5,733.4	8,884.5	21,900.1
July	5,395.2	3,559.8	5,277.7	14,232.7
Cumulative				
1986 Jan-July	50,032.1	32,937.9	47,582.4	130,552.5
1987 Jan-July	45,932.7	32,139.7	48,606.8	126,679.2

Source: Broker's Reports

Although world N.R. consumption increased during 1986, it was in general a disappointing year. The sharp fall in oil prices did not lead to expected growth. High unemployment persisted in many industrialised nations in the west; pattern of consumption too, appears to be changing globally with the fastest growth recorded in the Asia Pacific region. Imports of N.R. by Japan, Korea, Brazil, India and China, increased reflecting the expansion of motor vehicles and rubber based industries in those countries.

When considering the outlook for Natural Rubber prices one cannot ignore the effect of falling Petroleum prices on N.R. consumption. Although negative in the short run, the effect is likely to be positive in the long term boosting major industrial activities such as the transportation and motor vehicle industries.

Natural Rubber prices are also influenced by the trend of synthetic rubber prices, which generally move with petroleum prices. The relative positions of N.R. and S.R. in their joint use in rubber goods manufacture is the cumulative effect of long term development, since the 1950's. The competitiveness of N.R. in end uses will undoubtedly be enhanced through N.R. improvements aimed at increasing its complementarity with the range of synthetic rubbers. However, such efforts will be fruitful only if N.R. producing countries make a concerted effort to monitor technical developments in the S.R. industry world wide. Improved understanding of new S.R. technologies should assist efforts aimed at promoting complementarity between N.R. and S.R. and to assist the future marketing of N.R.

To ensure prosperity in the rubber industry in the long term a more realistic and positive approach should be made giving considerations to the measures that can be taken to improve the profitability of producing any quantity of N.R. reduction in the cost of production is important to N.R. producers. It is another method of en-

suring remunerative prices. Technology is available for producing over 200 kgs per hectare per year. In certain rubber growing countries, the average is low as 900 kgs per hectare. If such technology is utilised judiciously, it will be possible to enable substantial reduction in the cost of production.

N.R. producing countries in Asia with the exception of China, India and Bangladesh have now to depend on free and open markets, where they have to compete with S.R. Ironically, in China and India, synthetic rubbers are produced to supplement the raw rubber requirements. It will help if these countries can keep out from making huge investments on production of S.R.'s and make efforts to set up facilities for the production of chemically modified forms of N.R. which can easily replace some of the special purpose S.R.

It may also be possible to generate greater demand for N.R. and ensure long term prosperity through the adoption of aggressive marketing strategies. Inadequacy of informations has been a major factor inhibiting the efficiency of the marketing process.

In Sri Lanka the Broker's report has suggested that we must endeavour to expand production to meet foreseeable demand in the future for Natural Rubber. Around 70 percent of the total production of rubber in the country comes from small-holdings and their productivity is relatively low being in the region of 750 kgs per hectare. A main factor responsible is that around 30 percent of small-holders rubber is over-aged whilst most of the old rubber is unselected material with low yield potentials. This situation must be overcome and all assistance must be given to small-holders to replace with higher yielding material. Meanwhile the Medium Term Investment Programme with its main objective to reverse the decline in Sri Lanka's production of rubber 1985-1989, is progressing. But it will take a much concerted effort to increase productivity as the bulk of the rubber is produced by small-holders.

Being the backbone of the industry, the small-holders must be given all the encouragement and assistance to adopt better agronomic practices. Its heartening to note that the Export Development Board, along with the Rubber Controller's Department and the Rubber Development Board have envisaged a rehabilitation programme, under which rubber export development villages will be set up. The necessary inputs to process rubber at concessional rates will be provided to small-holders, whilst arrangements for marketing this rubber will be streamlined.

Whilst every effort must be made to increase production, supply rationalisation schemes envisaged by planners, must be carefully scrutinised as it would mean a drop in valuable foreign exchange, for a country like Sri Lanka, where our share of the total world supplies is only 5 percent. Therefore, any decline in our production, will have a negligible impact on the quantity of N.R. produced globally.

Currently on the production side, there are yet more important problems which need urgent attention. The authorities concerned must give priority to eradicating diseases affecting rubber trees, which from time to time has caused considerable hardship to N.R. producers. The rubber industry in Sri Lanka at present is faced with the dreaded corynespora leaf disease, which authoritative sources believe has already affected 12000 hectare of rubber. It apparently affects a variety of clones with RRIC 103 being the most vulnerable to the disease. The corynespora monitoring committee with the R.R.I. at the helm must endeavour to bring the problems under control before it escalates further.

The report also highlights the advantages of having rubber based industries in N.R. producing countries, which will not only help to meet the entire local demand, but will boost the export of rubber as far as possible as value added rubber products. In 1986 there was hardly any improvement in domestic consumption. Therefore, any serious constraints preven-

ting the expansion of rubber based industries, must be irrigated.

### COCONUT: Drastic Drop in Exports

The exports of coconut kernel products had dropped drastically during the period of first half of 1987. Export values fell by 50 percent compared with those of the first six months of 1986. Products most affected were coconut oil and coconut poonac, which declined at a rate of 25 percent. Also exports of Copra (edible) declined by 90 percent. The main factor attributed to the fall in exports was the lower level of production due to the adverse weather conditions that caused serious crop failure in the coconut growing areas.

Export earnings also showed a 27 percent decline during this same period of 1987. A significant feature is that value of exports declined marginally, though volume of exports declined at higher rate. The reason is that F.O.B. values per unit increased favourably in the first half of 1987. The exports of coconut oil, (average F.O.B. value per MT) was Rs.15,432 in the first half of 1987, while it was Rs.9,839 in the same period of 1986. The export of desiccated coconut averaged an F.O.B. per M.T. of Rs.18,495 and Rs.14,615 respectively in the 1987 and 1986 periods.

There was a significant increase in local market prices of coconut oil, copra and poonac by June 1987. Compared to local prices a year earlier Coconut oil (per metric ton) was Rs.17,542 in June 1987 as against Rs6,699 in June 1986. Poonac (per metric ton) was Rs.4,087 in June 1987 as against

## HEALTH

### Growing incidence of cancer in Sri Lanka

Cancer is one disease where in advanced cases there is no hope of recovery, since cancer in the human being is a group of over 100 related diseases that may arise in any of the body's tissues and these grow rapidly in the form of an uncontrolled and disorderly multiplication of abnormal cells. When their growth cannot be checked, these cells multiplying and destroy adjacent tissues. They are often transported to different parts of the body where they grow as colonies.

The reasons for cancer differ from country to country. In Australia people get cancer on their skins and lips, when they are seriously affected by sunshine. In Africa they develop cancer in the liver as a result of a kind of virus in peanuts. Again, there are possibilities of contracting cancer in the bladder among the people who eat salted fish in Japan. In Sri Lanka the strongest factors associated with cancer are betel chewing, smoking, alcohol, chemicals, foods and medicines which are given at the time of pregnancy.

Among the commonest of cancers in Sri Lanka are cancers of the mouth, womb and breast. Over the past decades the number of cancers in Sri Lanka have increased upto 70% and reported deaths were 4% of this population.

In most western countries it is one

Rs 2,192 in June 1986; while Copra was Rs.2,995 (per 250 kgs) as against Rs. 1,143 in June 1986.

of the primary causes of death. In Australia the precise causes for cancer are difficult to determine although chemicals, radiation, genetic factors repeated trauma and viruses have been found to cause or be strongly associated with certain forms of cancer. Recorded deaths in Sri Lanka, due to cancer, have been on the increase from 3,445 in 1967 to 4,225 in 1976. The largest proportion of mortalities (36%) have been recorded in the oral cavity and mouth cancer, followed by Cervix of Uterus 13%, and breast 11%. In the case of cancer in the breast there has been an increase in incidence until the age of 50 in all countries. The associated factors are early menarche, late menopause, late age at first pregnancy, multiparous women, high fat diet, obesity and genetic predisposition. Cancer of the Cervix of the Uterus is commonest in the age group of 35-60 with the risk factors been multiple sex partners, multiparity and poor hygiene. Incidence considerably higher among the lower socio economic classes.

The factors associated with oral cancer are associated with betel chewing, smoking, alcohol, chronic irritation and vitamin A deficiency. The Health Department has launched a programme to reduce morbidity and mortality due to cancer in Sri Lanka. A programme of cancer health education and measures to increase awareness of cancer risks in the community and health professions is now been undertaken. Among the special considerations in this programme are:

- Providing scientific information
- Emphasis on curability
- Emphasis on prevention and early detection
- Elimination of fear and anxiety
- Prevention of delay in seeking treatment
- Recognition of early symptoms and signs
- Stress on avoidance of unscientific forms of treatment

### COCONUT EXPORTS

	1986 Jan.-Aug	1987 Jan.-Aug	Change
Kernel Products (In Mn. nut eqvnt)	647.32	322.41	-50
Value (SL Rs.Mn)	1004.52	764.17	-27

Source: Coconut Development Authority

## FEATURES

### EMPLOYMENT AND PRODUCTIVITY IN THE MANUFACTURING SECTOR IN SRI LANKA, 1970-85

Dilesh Jayantha

*This paper reviews the employment and productivity situation in industry upto 1985. The situation could have altered in subsequent years. Dr. Dilesh Jayantha who is an economics officer with the World Bank Resident Mission in Sri Lanka has prepared this paper in his personnel capacity; and the views expressed here do not necessarily reflect those of the World Bank.*

This paper is divided into three parts. Part 1 tries to estimate employment level trends in the manufacturing sector since 1970, analyze the breakdown between the public and private sector (and then within the private sector), and finally identify the chief sources of employment growth by industry group (with particular attention paid to the role of foreign investment). Part 2 examines labour productivity differentials between the public and private sectors. Part 3 summarizes and concludes the paper.

Table 1 suggests that employment in the manufacturing sector fell in the early 1970s, rose in the immediate post-liberalization period, and fell slightly thereafter. The decline in the period 1978/79 to 1981/82, may appear paradoxical, but can be explained. Although the overall rate of unemployment fell (the proportion of employed income receivers in the labour force rising from 85% to 88%) during this period, the crude activity rate (of the population in the labour force), fell from 38.0% to 34.3%. This latter phenomenon was probably due to the exodus of migrants to the Middle East and the repatriation of plantation workers. The removal of these workers, some of whom were from the employed labour force, meant that total employment (and implicitly that in the manufacturing sector) would have been reduced.

Table 2 gives details of the employees registered with, and active accounts in, the Employees Provident Fund (EPF) over the period 1972 to 1980. The classification of registrations is by the employer's number and not the employee's. This means that when an employer registers with the EPF, all the employees in his business are also registered. There is no provision to update these figures. Thus, if an employee leaves (or dies) or if a new employee joins, the number of employees classed as being registered

under that employer, is not changed accordingly. Similarly, if an employee shifts from one employer to another he is counted twice over. Thus the figures on registration are not a good index of actual employment in manufacturing, and may provide an overestimate; an overestimate which increase with time.

The number of active accounts with the EPF probably provides an underestimate of the numbers employed in manufacturing. This is because many employers (including some large state corporations) deduct their employees' contributions from the salary, but do not pay it into the EPF. (An active account is defined as one where at least one contribution is made during the year).

Table 2, then, is useful in two respects. First, the registrations provide an upper estimate and the active accounts, a lower estimate, of the numbers employed in manufacturing. Accurate estimates probably lie some-

There have been six major national surveys of employment in Sri Lanka since 1969/70. Estimates of employment in the manufacturing sector, derived from these surveys are given in summary form, in Table 1, below. (Where estimates have been indirectly derived, as from the Central Bank's "Consumer Finance and Socio-Economic (CFS) Survey", the methods used are given in Appendix A).

TABLE 1  
ESTIMATES OF EMPLOYMENT IN THE MANUFACTURING SECTOR  
1969/70-1981/82 (IN THOUSANDS)

Study/Source	Reference Year	Number employed (thousands)
1. Labour Force and Socio Economic Survey (Dept. of Census and Statistics)	1969/70	379.4
2. Census (Dept. of Census & Statistics)	1971	339.4
3. Consumer Finance and Socio-Economic Survey (Central Bank)	1973	313.7
4. Consumer Finance and Socio-Economic Survey (Central Bank)	1978/79	630.0
5. Census (Dept. of Census & Statistics)	1981	416.8
6. Consumer Finance and Socio-Economic Survey (Central Bank)	1981/82	577.5

TABLE 2  
REGISTRATION AND ACCOUNTS WITH THE EMPLOYEES PROVIDENT FUND (EPF) IN THE MANUFACTURING SECTOR 1972-80 (IN THOUSANDS)

	1972	1973	1974	1975	1976	1977	1978	1979	1980
Employees registered	na	na	349.0	370.2	398.9	427.2	440.9	531.3	588.5
Active Accounts	126.3	152.4	151.4	145.9*	157.5	170.6	194.3	207.3	235.2

Source: Central Bank

where in between, approximating the figures given in Table 1. Second, the active accounts (not being cumulatively wrong like the registrations), provide an indication of the trend in manufacturing employment which is consonant with that in Table 1. This suggests a drop in manufacturing employment in the early 1970s, followed by a rise which becomes especially marked after the post 1977 liberalization.

In analyzing the sources of employment generation in industry a distinction between the private and public sectors is useful. The chief data sources

for private sector industrial employment can be found in the Greater Colombo Economic Commission (GCEC), the Foreign Investment Advisory Committee (FIAC) and the Local Investment Advisory Committee (LIAC).

GCEC investments are (with the notable exception of Air Lanka), concentrated largely in the Katunayake Investment Promotion Zone (IPZ), though a new IPZ in Biyagama is now being developed. There are no restrictions on the proportion of equity held by foreign interests. As the Appendix Tables BI and B2 show, during each of

the years from 1978 to 1985 inclusive, foreign investment has accounted for a major share of total approved and contracted investments, and in some years well over three quarters. GCEC investments enjoy generous tax holidays and are almost purely export oriented. Their contribution towards revenue is only just beginning to be enjoyed.

FIAC investments allow foreign participation, but this is generally restricted. As Table B3 shows, in most years from 1978 to 1985 inclusive, foreign interests accounted for less than two thirds of total FIAC approved investments, and sometimes less

#### APPENDIX A

NUMBER AND PROPORTION EMPLOYED BY ECONOMIC SECTORS 1973, 1978/79 AND 1981/82

Economic Sector	1973		1978/79		1981/82	
	Numbers Employed	Proportion(%) Employed	Numbers Employed	Proportion(%) Employed	Numbers Employed	Proportion(%) Employed
<b>1. Primary</b>						
1.1 Agriculture and Forestry	1,801,057	53.4	2,319,931	50.1	2,162,388	47.5
1.2 Fishing	37,100	1.1	62,951	1.4	77,423	1.7
1.3 Mining and Quarrying	10,118	0.3	55,082	1.2	77,423	1.7
<b>2. Secondary</b>						
2.1 Manufacturing	313,667	9.3	629,973	13.6	577,487	12.7
2.2 Construction	60,710	1.8	217,551	4.7	255,042	5.6
<b>3. Tertiary</b>						
3.1 Electricity, Gas and Water	10,118	0.3	23,607	0.5	15,485	0.3
3.2 Wholesale and Retail Trade and Restaurants	236,094	7.0	448,063	9.7	485,945	10.7
3.3 Transport, Storage & Communication	145,029	4.3	211,071	4.5	200,390	4.4
3.4 Finance, Insurance & Real Estate Business Services	10,118	0.3	24,070	0.5	72,414	1.6
3.5 Public Administration & Defence Services	198,993	5.9	122,662	2.7	171,698	3.8
3.6 Community, Social & Personal Services	539,642	16.0	480,464	10.4	442,679	9.7
<b>4. Other/Activities not adequately described</b>	10,118	0.3	33,327	0.7	15,940	0.3
<b>Total implied number of employed income receivers</b>	<b>3,372,765</b>	<b>100.0</b>	<b>4,628,752</b>	<b>100.0</b>	<b>4,554,314</b>	<b>100.0</b>

Source: CFS Surveys 1979, 1978/79, 1981/82

In 1973, approximately 33.9% of the population was economically active or in the labour force. Assuming a population of 13,091,000, this implies that there were approximately 4,437,849 economically active people (or labour force constituents). We shall take the number (and proportion) employed as a proxy for employed income receivers. In that case, employed income receivers constituted 76% of the labour force, or approximately 3,372,765 people. Using the CFS data we can then estimate the absolute numbers employed in each economic sector in 1973 as above:

In 1978/79 approximately 38.0% of the population was economically active or in the labour force. Assuming a population of 14,330,500, this implies that there were approximately 5,445,590 economically active people (for labour force constituent). We shall take the number and proportion employed as a proxy for employed income receivers. In that case employed income receivers constituted 85% of the labour force, or approximately 4,628,752 people. Using the Consumer Finance Survey (CFS) data, we can then estimate the absolute numbers employed in each economic sector in 1978/79 as above:

In 1981/82 approximately 34.3% of the population was in the labour force. Assuming a population of 15,088,500 this implies that there were approximately 5,175,356 labour force constituents. We shall take the number (and proportion) employed as a proxy for employed income receivers. In that case employed income receivers constituted 88% of the labour force, or approximately 4,554,313 people. Using CFS data we can then estimate the absolute numbers employed in each economic sector in 1981/82 as above:



**Table B 1** INDUSTRIAL INVESTMENTS APPROVED BY THE GCEC

Item	Year	1978	1979	1980	1981	1982	1983	1984	1985
Foreign Investment (Rs Mn)		938	814	2,699	981	1,171	190	436	167
Total Investment (Rs Mn)		1,351	1,070	3,264	1,663	1,600	284	678	286
Foreign Investment as % of Total Investment		69.4	76.1	82.7	59.0	73.2	66.9	64.3	58.4
Employment Potential		23,079	14,164	20,632	11,408	4,789	4,147	4,010	6,078

Source: GCEC

**Table B 2** INDUSTRIAL INVESTMENTS CONTRACTED BY THE GCEC

Item	Year	1978	1979	1980	1981	1982	1983	1984	1985
Foreign Investment (Rs Mn)		208	525	943	312	1,976	948	379	135
Total Investment (Rs Mn)		377	626	1,266	493	2,296	1,312	597	200
Foreign Investment as % of Total Investment		55.2	83.9	74.5	63.3	86.1	72.3	63.5	67.5
Employment Potential		16,119	4,218	14,037	4,813	7,661	4,190	4,033	4,075

Source: GCEC

**Table B 3** INDUSTRIAL INVESTMENTS APPROVED BY THE FIAC

Item	Year	1978	1979	1980	1981	1982	1983	1984	1985
Foreign Investment (Rs Mn)		106	1,214	2,291	4,588	1,943	4,934	558	318
Total Investment (Rs Mn)		230	2,066	3,630	6,836	3,037	7,049	1,454	747
Foreign Investment as % of Total Investment		46.1	58.8	63.1	67.1	64.0	70.0	38.4	42.6
Employment Potential		3,887	14,875	15,124	14,415	12,712	15,741	10,040	4,151

Source: FIAC

**Table B 4** INVESTMENTS APPROVED BY THE LIAC

Item	Year	1978	1979	1980	1981	1982	1983	1984	1985
Envisaged Investment (Rs Mn)		1,061	875	337	262	231	422	567	321
Potential Employment		43,313	32,617	15,371	11,026	8,429	10,038	21,524	12,850

Source: Ministries of Industries and Scientific Affairs; Textile Industries; and Fisheries

TABLE 3  
ACTUAL INVESTMENT AND EMPLOYMENT IN THE GCEC, 1979-FIRST HALF OF 1985

Item/Year	1979	1980	1981	1982	1983	1984	1985 June
Investment (Rs.Mn) a	47.0	420.9	1,674.6	2,504.0	6,273.4	8,329.3	n.a
Employment (b)	5,876	10,538	19,727	24,926	28,705	32,725	34,991

a/ Figures refer to the financial years 1978/79, 1979/80, 1980/1981, 1981/82 1982/83 and 1983/84

b/ End of the year figures

Source: GCEC, Reproduced in UNIDO/IS,613, 25 February 1986, Tables A 13-15 inclusive

TABLE 4  
ACTUAL INVESTMENT AND EMPLOYMENT IN FIAC APPROVED PROJECTS, 1978-FIRST HALF OF 1985

	1978	1979	1980	1981	1982	1983	1984	1985
Investment (Rs.Mn)	na	na	1,007(a)	1,016	2,200	2667	2,388	2,165
Employment (b)	---	---	---	16,746	22,079	33,563	38,733	40,725
								40,835 (end Dec)

a/ Figure refers to cumulative investment in 1977-80

b/ End of the year figures

Source: FIAC reproduced in UNIDO/IS.613, 25 February 1986, Table A16, and International Economic Co-operation Division, Ministry of Finance and Planning, Field Survey of Projects approved by the FIAC, 1977-85, Colombo 1986

than a half. FIAC investments generally attract less generous tax treatment than the GCEC does, and are not necessarily export oriented, the sale of output to the domestic market being permitted.

The third major source of private industrial investment falls under the jurisdiction of the LIAC. Here, there is no foreign participation. Details of the envisaged investment approved by the LIAC in the years 1978 to 1985 inclusive and the potential employment this could generate, are given in Table B4.

The tables in Appendix B only give an idea of the potential employment in the GCEC, FIAC and LIAC. This is not necessarily a good indicator of the actual employment generated by these authorities. Details of the actual investments and employment made under the jurisdictions of these authorities is not freely available for all years, and up to the present.

However, some information is available for narrow time periods. Table 3 shows actual investment and employment in the GCEC from 1979 to mid 1985, and Table 4, the same information for the FIAC. Table 3 suggests that by the end of 1984 employment in the GCEC totalled 32,725. This represents approximately 40% of the GCEC approvals and 59% of the con-

tracts as of the end of 1984 (calculated by aggregating the employment potential of projects approved and contracted in the period 1978-84 inclusive which amounted to 82,229 and 55,071 respectively, data of which is given in Tables B1 and B2 respectively). Similarly, Table 4 suggest that by the end of 1984 employment in the FIAC totalled 38,733 or 45% of the employment potential of 86,794 of projects approved by the authority in the period 1978 to 1984 inclusive as described in Table B3.

Data on actual employment in the LIAC is not available. However, the employment potential of LIAC investment approvals for the period 1978-85 inclusive is given in Tables B4 and 5. From these it can be seen that by the end of 1984 the employment potential of LIAC project approvals amounted to 142,318. If we assume that, as in the GCEC and FIAC, actual employment at the end of 1984 amounted to 40% - 45% of the employment potential of investments approved to that date, then we can estimate actual LIAC employment as being 60,000 at the end of 1984.

Table 5 shows details of actual employment in the State industries, GCEC and FIAC, and potential employment in the LIAC over the period 1975-85 inclusive. Non Air Lanka GCEC employment (which would re-

present manufacturing industrial employment in the GCEC) totalled 29,477 as at the end of 1984. (See Table 6) Industrial investment in the FIAC represented 26% of the total at the end of 1985. Assuming the same sort of ratio prevailed at the end of 1984 and that the capital labour ratio in industry is approximately similar to that in other sectors, we can assume that about 26% of total FIAC employment was accounted for by industry. This means that industrial employment in the FIAC at the end of 1984 would have totalled about  $(0.26 \times 38,733 = 10,070$  or around) 10,000. At the end of 1984 about 99.94% of total LIAC employment was accounted for by the manufacturing sector. Thus, we can estimate that at the end of 1984, LIAC industrial employment totalled about 60,000. Aggregating the industrial employment figures in the GCEC, FIAC, and LIAC we get a total of about  $(30,000 + 10,000 + 60,000 =)$  100,000.

The figure of 100,000 must be taken as a lower estimate of the actual

1/ International Economic Co-operation Division, Ministry of Finance and Planning : Field Survey of Projects approved by the FIAC, 1977-85 Colombo, 1986

2/ Central Bank estimates

number employed in the private manufacturing sector as there would be several other industries begun before 1977 which do not fall within the jurisdiction of the GCEC, FIAC and LIAC. In some ways it represents new jobs created in the private manufacturing sector as a result of the post 1977 innovations. It is markedly more than the 65,000 or so jobs existent in the state industrial sector at the same time. Nevertheless, it still represents a small fraction (perhaps about 17%) of the unemployed population of over 600,000 as estimated by the Central Bank Consumer Finance Survey of 1981/82.

Examining trends, Table 5 suggests employment in state industries as having risen until 1979 or so, and declined gradually thereafter. Due to certain data gaps it is difficult to estimate industry's share of total employment in the, FIAC and LIAC for early years.

However non-industrial and particularly tourist sector investment in the FIAC was very heavy in the pre 1983 years. Thus industry's share of total investment and employment in the FIAC in the pre 1984 years is unlikely to have exceeded that in 1984. Industry's share of total employment in the GCEC fell only slightly from about 100% in 1979 to about 90% in 1982 and remained about constant thereafter (Table 6). The available evidence suggests that industry's share of total employment in the LIAC has remained constant at over about 95% from 1978 onwards. Thus overall industry's share in total employment in the GCEC, FIAC and LIAC in 1984 is unlikely to have been much less than that in earlier years. Given that total employment in the projects under these authorities rose over the period 1978 to 1984, we can therefore deduce that industrial employment also rose correspondingly.

Table 6 shows the distribution of employment by industry group in the GCEC from 1979 to June 1985. This shows that investment in wearing apparel and textile products has overwhelmingly been the chief generator of employment. This sector accounted for as much as 96% of total employment generated in the GCEC in 1979. Its share of total employment fell gradually until 1982 largely due to new investments in other sectors, since which it has stabilized at around 70%.

Table 7 shows the distribution of employment by industry group in the FIAC from 1981 to 1985. (The employment levels relate to the end of each year). The table shows that the manufacturing sector accounted for the major share of employment only after 1983. This is due to the large share of employment accounted for by the tourist sector until 1983. As in the GCEC, within the manufacturing sec-

(1) Central Bank estimates.

TABLE 5  
EMPLOYMENT IN THE STATE INDUSTRIES, GCEC, FIAC AND POTENTIAL EMPLOYMENT IN LIAC, 1975-85

Employment/Year	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
State Industries	44.3	47.6	56.0	66.7	73.2	69.7	65.8	67.4	67.5	65.9	na
GCEC and FIAC	na	na	na	na	na	na	36.5	47.0	62.3	71.5	na
LIAC potential (b)	na	na	na	43.3	75.9	91.3	102.3	110.8	120.8	142.3	155.2

(a) provisional

(b) cumulative figures

TABLE 6  
DISTRIBUTION OF EMPLOYMENT BY INDUSTRY GROUP IN GCEC ENTERPRISES, 1979 - JUNE 1985

Industry Group/Year	1979	1980	1981	1982	1983	1984	1985 June
1. Wearing apparel and Textile products of which Ready made Garments (a)	5,664	9,252	16,167	17,219	20,644	23,653	25,495
2. Rubber Products	5,496	8,994	15,800	16,427	19,469	21,942	23,292
3. Jewellery and Lapidary	26	129	920	761	325	472	497
4. Electronics and Electrical goods	110	154	311	587	684	830	922
5. Footwear	-	46	282	304	431	120	112
6. Air Lanka	-	-	956	1,634	1,588	1,388	1,416
7. Other	-	-	-	2,320	2,652	3,248	3,477
7. Other	76	957	1,091	2,101	2,381	3,014	3,072
Total	5,876	10,538	19,727	24,926	28,705	32,725	34,991

a) The proportion of total employment accounted for by the wearing apparel and textile products group is given in parenthesis

Source: GCEC, Reproduced in UNIDO/IS.613, 25 February 1986, Table A-15.

TABLE 7

## DISTRIBUTION OF ACTUAL EMPLOYMENT AT THE END OF THE YEAR BY INDUSTRY GROUP IN THE FIAC, 1981-85

	1981	1982	1983	1984	1985
1. Manufacturing Industries of which (a) Textile and Readymade Garments	455 (37.3)	803 (40.9)	1,498 (33.9)	28,869 (74.6)	26,633 (65.2)
(b) Food, Beverages and Vegetable Oils	366	564	542	19,468	16,119
(c) Wood and Paper Products, Printing and Publishing	34	80	495	1,390	1,084
(d) Chemicals, Chemical Products Plastics and Rubber-based Industries	18		125	482	189
(e) Non-Metallic Mineral Products	37	60	20	2,337	3,838
(f) Basic Metal and Engineering Industries	na	2	235	2,022	2,209
(g) Other Industries	na	40	18	659	783
2. Tourist Hotels and Recreational Facilities	na	57	63	2,511	2,411
3. Other	672	1,084	1,594	4,921	4,808
	94	65	1,326	4,891	9,380
	1,221	1,962	4,418	38,681	40,821

\* Comprises Agriculture, Animal Husbandry and Fishing, Civil Engineering, Construction and Property Development and Services. The share of employment in manufacturing industries in all FIAC employment is given in parenthesis in Row 1.

n.a. denotes not available.

Source: FIAC

tor, investment in textiles and ready made garments have so far been the chief generators of employment. However absolute employment in this sub-sector fell between 1984 and 1985. Increased protection in the West must cast doubt on the potential of this sub-sector to maintain the rate of growth it achieved in the early 1980s.

Data on the share of actual foreign investment in actual total investment by industry group in the GCEC, is not available. However, this data is available for the FIAC. Table 8 shows the share of foreign investment in FIAC investment by industry group as at the end of 1985. From this it appears that foreign investment accounted for a relatively small proportion (about a quarter) of total investment in the textiles and readymade garments subsector. It accounted for a relatively large proportion (nearly 90%) of total investment in the food and beverages sub-sector and also over half of that in non-metallic and mineral products. Nevertheless, these two sub-sectors have not been important sources of employment generation, as Table 7 shows.

By the end of 1985, the manufacturing sector in the FIAC had attracted a relatively small share (only 19.3%) of total foreign investment in

TABLE 8  
ACTUAL FIAC INVESTMENT BY INDUSTRY GROUP AS AT THE END OF 1985

	Foreign Investment (Rs.Mn)	Total Investment (Rs.Mn.)	Foreign Investment as a % of Total
a. Textiles and Readymade Garments	213	841	25.3
b. Food and Beverages	280	313	89.5
c. Wood and Paper Products, Printing and Publishing	6	38	15.8
d. Chemical, Plastic and Rubber Based Industries	92	571	16.1
e. Non-metallic Mineral Products	455	882	51.6
f. Basic Metal and Engineering Industries	45	130	34.6
g. Other	26	115	22.6
Total (Manufacturing)	1,117	2,890	38.7
Total (All Sectors)	5,791	11,564	50.1
Manufacturing as a proportion of All Sectors	19.3	25.0	--

Source: FIAC

the FIAC. The manufacturing sector in the FIAC had also attracted only a quarter of total investment in the FIAC. Thus by the end of 1985, although the manufacturing sector was the most important generator of employment in the FIAC, it had received relatively little of total investment. This may have been due to two reasons. First, manufacturing may have generally had a lower capital to labour ratio than the other sectors. Second, the tourist sector although attracting

much investment, may not have been able to expand employment to its full capacity due to the aftermath of July 1983.

Examining the sub-sectors of the manufacturing sector, the same argument holds for textiles and ready made garments. Although the most important sub-sector in manufacturing in the FIAC in terms of employment generation (as shown in Table 7), textiles and ready made garments attracted less than a fifth ( $19.1\% = 213 \div 1,117$ )

**TABLE 9**  
**PRODUCTIVITY (VALUE ADDED PER EMPLOYEE) CLASSIFIED BY SECTOR AND**  
**SIZE CLASS OF FIXED CAPITAL AT THE END OF 1981 (RS. THOUSAND)**

Size class of fixed capital		Productivity			
		Private Sector	GCEC	Public Corporations	GOBU
0-	499.9	11.3	11.1	35.5	16.9
000-	999.9	12.2	15.1	49.3	17.9
1,000-	4,999.9	21.5	10.2	20.0	21.6
5,000-	9,999.9	26.6	15.4	23.3	16.7
10,000-	14,999.9	31.9	18.8	23.1	36.7
15,000-	19,999.9	37.3	8.0	18.5	-
20,000-	24,999.9	47.1	-	35.7	-
25,000-	34,999.9	47.5	24.6	29.8	21.8
35,000-	44,999.9	119.5	30.8	-	-
45,000-	54,999.9	-	15.1	23.0	-
55,000-	64,999.9	-	-	41.1	18.7
65,000-	74,999.9	-	-	28.2	14.2
75,000-	99,999.9	405.9	-	19.4	7.5
100,000-	124,999.9	109.1	-	15.8	7.4
125,000-	149,999.9	31.6	-	12.6	-
All classes (average)		41.5	17.0	32.2	18.2

\* There were four public corporation reporting units with a size capital of Rs.150 million or more which have been included in computing the average, but do not appear in this table. In the case of the other three sectors, all reporting units used in computing the average appear in the table.

Source: Department of Census and Statistics, Report of the Survey of Manufacturing Industries in Sri Lanka, 1981.

**TABLE 10**  
**PRODUCTIVITY (VALUE ADDED PER EMPLOYEE) CLASSIFIED BY SECTOR**  
**AND SIZE CLASS OF EMPLOYMENT AT THE END OF 1981 (RS. THOUSANDS)**

Size class of Employment		Productivity			
		Private Sector	GCEC	Public Corporations	GOBU
0-	5	24.0	29.5	19.5	17.0
6-	9	28.5	-	106.8	22.4
10-	19	27.1	6.9	38.2	19.4
20-	29	23.1	12.8	34.4	16.6
30-	39	19.6	-	13.8	17.6
40-	49	26.3	11.2	77.2	17.0
50-	74	28.0	14.9	29.1	29.3
75-	99	20.2	9.6	24.1	-
100-	124	39.1	45.5	6.5	-
125-	149	26.3	14.0	18.0	-
150-	174	43.6	26.3	15.1	45.0
175-	199	18.6	11.0	14.0	29.0
200-	249	29.2	17.9	126.2	-
250-	299	28.2	17.1	20.6	-
300-	349	20.2	3.3	17.8	8.5
350-	399	39.1	3.5	15.9	17.8
400-	449	26.4	-	4.4	-
450-	499	15.9	21.6	17.3	-
500-	549	-	20.8	21.5	10.2
550-	599	25.2	-	25.4	-
600-	699	308.6	14.1	17.1	35.1
700-	799	53.3	-	14.5	14.0
800-	899	14.7	20.3	-	-
900-	999	19.2	-	37.4	-
1000 and above	-	8.2	16.9	37.1	16.4
All classes (average)		41.5	17.0	32.2	18.2

Source: As for Table 9

of total foreign investment in manufacturing in the FIAC, and less than a third (29.1% = 841 ÷ 2,890) of total investment in manufacturing in the FIAC at the end of 1985. Again this may have been due to textiles and ready made garments having a lower capital to labour ratio than other sub-sectors.

Detailed analysis of actual investment and employment by sub-sector in the manufacturing sector in the LIAC is not possible due to the lack of requisite data. However here too, textiles and ready made garments were probably the major generators of employment, LIAC approvals in this sub-sector accounting for 84% of the employment potential of total LIAC manufacturing approvals in 1984 and 66% in 1985.

To sum up, employment in the manufacturing sector seems to have risen after 1977, and perhaps 100,000 new jobs were created in the formal private sector after this. In manufacturing, the textile industry was probably the chief generator of employment, although it did not attract a correspondingly preponderant share of total investment or foreign investment. State industries, by and large, failed to offer increased employment opportunities, and the total work force here seems to have contracted after 1979.

#### Productivity

The latest published data on labour productivity (defined as value added divided by employment), by sector appears in the Report on the Survey of Manufacturing Industries in Sri Lanka, 1981. This is used as the key source in the analysis which follows. Similar reports for the years 1978 to 1980 inclusive are available, but these cover too short a time frame to permit meaningful time series comparisons. Thus no attempt to make a time series analysis has been made.

Table 9 shows productivity classified by sector and size class of fixed capital at the end of 1981. Table 10 shows productivity classified by sector and size class of employment at the end of 1981.

Looking at the mean average, labour productivity in the private sector (at Rs.41.5 thousand per employee per

annum) is greater than that in public corporations (at Rs.32.2 thousand) which in turn is greater than that in Government Owned Business Undertakings (GOBUs) (at Rs.18.2 thousand). The GCEC with a rate of Rs.17 thousand seems to be the least productive sector. These averages, however, can be slightly misleading. Private sector labour productivity for instance, has been skewed upwards by some very high readings (in the case of enterprises with a fixed capital Rs.75 to 125 million and employment of 600 to 699).

Given this, private sector labour productivity is less than that of pub-

million).

GCEC labour productivity is less than that of the private sector over all size classes of employment and all but one size class of fixed capital. It is also less than that of public corporation and (to a lesser extent) GOBUs for a almost all size classes of employment and fixed capital. This may reflect the fact that in 1981 (at the time of this survey), most GCEC enterprises had invested heavily in capital and labour, but had not begun to operate at full capacity. GCEC labour productivity at the present moment (when production is in full swing) may well be much higher both in absolute and relative terms, than in 1981.

that in public corporations and eight times that in GOBUs. The private sector also has a large edge in terms of labour productivity over the public corporations in basic metal industries. It has a slight edge over the state sector in the (i) paper, paper products, printing and publishing and (to a lesser extent) the (ii) fabricated metal products division.

However, private sector labour productivity lags that in public corporations in four industry divisions (i) textile, wearing apparel and leather products, (ii) wood and wood products, (iii) chemicals, petroleum, rubber and plastic products, and (iv) non-metallic mineral products (except petrol and

TABLE 11  
PRODUCTIVITY\* BY (ISIC) INDUSTRY DIVISION AND SECTOR, 1981 (RS.THOUSANDS)

ISIC Number	Industry Division	Sector			
		Private	GCEC	Public Corporations	GOBU
31	Food, Beverages and Tobacco	181.4	-	16.3	21.6
32	Textiles Wearing Apparel and Leather Products	13.4	16.5	14.8	15.7
33	Wood and Wood Products	10.6	6.2	18.7	-
34	Paper, Paper Products, Printing and Publishing	22.2	-	20.8	15.7
35	Chemicals, Petroleum, Rubber and Plastic Products	45.4	42.8	59.4	25.5
36	Non metallic mineral products except petrol and coal	31.0	5.4	46.7	22.4
37	Basic Metal Industries	92.7	-	17.5	-
38	Fabricated Metal Products	30.3	11.0	15.0	30.1
39	Other Manufacturing Industries	16.3	17.4	-	-

\* Productivity is defined as value added divided by the number of employees

Source: As for table 9

lic corporations in the case of very small enterprises (with a fixed capital of less than Rs. one million and with one exception, work rolls of less than a hundred). However, it is greater than that of public corporations in the case of larger enterprises. This difference is especially marked in the case of enterprises with a fixed capital of over Rs. 75 million.

Comparing labour productivity in the private sector with that in GOBUs a slightly conflicting pattern emerges. Private sector labour productivity is less than that of GOBUs in the case of lowly capitalized undertakings (with a fixed capital of less than Rs.5 million) but greater than that of GOBUs in the case of lowly staffed undertakings (with work rolls of less than 50). It is greater than that of GOBUs in the case of highly capitalized undertakings (with a fixed capital of over Rs.25

Examining the State sector, it appears that over most size classes of fixed capital and employment, labour productivity in GOBUs was less than that in public corporations. This may reflect their inherent inefficiency and lack of financial viability which prompted nationalization with the purpose of maintaining employment.

In assessing the relative efficiency of different sectors, a classification by industry division is helpful. Table 11 shows labour productivity by ISIC industry division and sector.

The most striking feature of this table is the private sector's preponderant edge in labour productivity over public corporations and GOBUs in the food, beverages and tobacco division. Private sector labour productivity in this division is eleven times

coal). It is also less than that in GOBUs in the textile, wearing apparel and leather products division.

GCEC labour productivity exceeded that in other sectors in the textile, wearing apparel and leather products division. This probably reflected the fact that investment in this sector in the GCEC (which was one of the earliest to be made) was already showing returns in 1981, whereas that in other sectors in the GCEC had to wait until the mid 1980s or so before coming on stream. The GCEC's seemingly low labour productivity in some divisions must, as mentioned earlier, be seen in this context.

Examining the State Sector it appears that public corporations were substantially more productive than GOBUs in two divisions ((i) chemicals, petroleum, rubber and plastic products and (ii) non-metallic mineral products

except petrol and coal) and slightly more productive in another ((i) paper, paper products, printing and publishing). Public corporations were substantially less productive than GOBUs in the fabricated metal products division. They were slightly less productive than GOBUs in another two divisions ((i) food, beverages and tobacco and (ii) textiles, wearing apparel and leather products).

To sum up, there is no very clear cut pattern of productivity differentials. Although the private sector appears more efficient than the State sector over certain sizes of enterprises and industrial divisions, this is not by a preponderant margin except in the case of (i) food, beverages and tobacco and (ii) basic metal industries. Within the State sector, public corporations appear to be more productive than GOBUs, except in the notable case of the fabricated metal products division. The GCEC appears to be less productive than other sectors, but in this context (for reasons elaborated earlier), the 1981 figures on which this analysis is based, are probably unrepresentative of the true picture prevailing now.

### Conclusion

The available data suggests that in the post 1977 era the private sector (and especially the textile industry) was the chief generator of employment in manufacturing. The private sector provided more than 100,000 new jobs in manufacturing in the period 1977 to 1984 whereas the State sector stagnated. Nevertheless, in terms of solving the total unemployment problems, this still left much to be desired.

Moreover, in terms of labour productivity, the private sector has a significant edge over the State sector in only two ISIC industry divisions ((i) food, beverages and tobacco and (ii) basic metal industries), and in certain cases it actually trails the State Sector. Within the State sector, public corporations seem to be more productive than GOBUs. Using the latest 1981 data the GCEC seems to be the least productive sector, but more recent data may well show a different picture.

## FUTURE OPPORTUNITIES FOR CHEMICAL AND PROCESSING INDUSTRY IN DEVELOPING COUNTRIES WITH SPECIAL REFERENCE TO SRI LANKA.

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Prediction of future opportunities for the Sri Lankan Chemical Industry will require an understanding of the future trends of the industry. The chemical industry in general is constituted of concerns with commercial interests. Therefore, its trends are governed by the trends of the world markets in addition to its reliance on national policies and national consumption patterns. In this paper Dr. W.J.N.Fernando outlines the past development of Chemical industries of Sri Lanka. The trends of the chemical industry globally, with special reference to the developed and the developing world are outlined. It can be seen that Sri Lanka has within its reach very good prospects to enter into the trade and manufacture of commodity items at the expense of their counterparts in the developed world who in turn are likely to divert their attention to manufacture and trade of speciality items, service trade and licensing. This paper also enlightens the necessity of training Chemical Engineers in Sri Lanka to meet the needs of the forthcoming changes.

One of the oldest processing industries of Sri Lanka is the tea industry. The tea industry of Sri Lanka was originated during late nineteenth Century (1867). During successive years, engineering developments of the tea industry have been noteworthy. Patents have been licenced for use of fluidised beds for drying of tea. Manufacture of instant teas, tea syrups carbonated drinks and tea wines are some processes for which patent rights have been granted. Inauguration of the Sri Lanka tyre Corporation in 1968 was a major breakthrough for the rubber industry. The tyre corporation has expanded appreciably since then. The plastics industry of Sri Lanka at present is mainly concerned on processing of imported raw materials.

The Paddy Marketing Board was set up in 1971 to handle transport, storage and milling of rice in Sri Lanka. The rice production in 1984 approximated to 2.42 million metric tonnes. It is reported that at present only 20 percent of the rice mills are modernized (1). The Paddy Marketing Board is reported to own 26 modern mills. The Rice Processing Research and Development Centre of Sri Lanka is presently engaged in research and providing technical knowhow on moderni-

zing of processing of rice and other wheats and their products. The National Milk Board of Sri Lanka was set up in 1954. The main processing factory at Narahenpita was later commenced in 1957. This factory produces pasturized and sterilized milk, butter, cheese, ice cream and yoghurt. Another factory was set up in 1974 at Ambewela to produce spray dried full cream milk powder. A condensed milk factory was also set up in 1968 at Tamankaduwa, Polonnaruwa. Lanka Milk Foods (CWE) Ltd., started a modern plant for re-packing milk powder at Welisara a few years back.

A fruit canning factory was set up in 1956 at Narahenpita. Another factory for canning was constructed later at Attanagalla. The factory was subsequently handed over to a joint stock company namely Lanka Canneries Ltd.(1).

Industrial units for meat processing in Sri Lanka inaugurated in 1958. Since then several firms have entered the trade of producing meat, sausages, bacon, ham and corned beef and other products.

In 1960 two sugar factories were set up in Sri Lanka at Kantale and Hingurana. Two more factories which

were completed recently at Sevanagala and Pelwatta have commenced production. A factory at Monaragala is scheduled to commence production in 1987.

A Beer industry has been in existence in Sri Lanka as far back as in 1960 (1). In 1964 brewery was set up with German Collaboration in Homagama. Large scale manufacture of potable ethanol from sugar cane molasses started in 1962. However, a distillery based on palm toddy has been in existence since 1924. At present about six private distilleries and two government distilleries (at Seeduwa and Dankotuwa) function producing alcohol..

Processing of Coconut products have been in existence in Sri Lanka since very early times. Many mills process raw coconut to copra, desiccated coconut and oil. Ceylon oils and Facts Corporation which was set up in 1950's is presently processing products such s soya, poultry feed and cattle feed in addition to coconut products.

The Petroleum Corporation which

is the largest Chemical Industry of Sri Lanka is a profitable state concern. The main activity of the corporation is to process crude oil to lighter fractions for local consumption and export. Nylon-6 plant which functions under the Ceylon Petroleum Corporation had been moving on a low pace. However indications are that this factory has recently gained momentum and shown signs of viability. The Urea Fertilizer Complex which was another giant chemical industry of Sri Lanka was shut down on a policy decision by the Government.

The National Salt Corporation and the Paranthan Chemical Corporation are two government organizations set up for manufacture of salt and chemicals respectively based on sea water. National Paper Corporation, Ceylon Ceramic Corporation, Ceylon Cement Corporation, GOBU of British Ceylon Corporation and GOBU of Ceylon Oxygen Ltd. are some of the processing and chemical industries of the governmental sector.

Out of the private sector organizations, Chemical Industries Colombo Ltd., Lever Brothers Ltd., Hayleys Ltd., their subsidiaries and Lankem Ltd., are some major chemical industries of importance.

Table 1 shows the values of industrial production of Sri Lanka for seven years from 1976 to 1985. Items 1,4,5, and 6 represent chemical and allied industries. It can be seen that approximately 76-81 percent of the gross industrial production of Sri Lanka has been derived from chemical and allied industries. This is even so at present.

Since the inception of the organised chemical and processing industry of Sri Lanka, there have been many ups and downfalls of the industry from time to time. Many downfalls had been due to adverse price effects. Also market trends of either raw materials and/or products in the international trade have been responsible. Some examples are the dominance of petroleum prices on the economics of pro-

TABLE 1  
VALUE OF INDUSTRIAL PRODUCTION (1976-1985)

Category	Rs.Mil-									
	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
1. Food, Beverages and Tobacco	1715	2295	2609	2856	3899	4496	5246	6998	8623	10497
2. Textile, wearing apparel and leather products	680	698	1008	1128	1923	3040	3863	5136	7565	9505
3. Wood and wood products (including furniture)		127	124	166	289	315	361	522	640	705
4. Paper and paper products	203	270	376	445	476	626	725	901	907	1187
5. Chemicals, petroleum, coal, rubber and plastic products	2336	2469	3279	4508	9416	12015	13099	11888	14328	13104
6. Non-metallic products (except petroleum and coal)	360	411	692	710	1156	1250	1370	1468	1829	1854
7. Basic metal products		132	219	349	478	428	262	302	199	123
8. Fabricated metal products, machinery and transport equipment	474	571	590	569	620	782	904	1129	1456	1592
9. Manufactured products	26	34	55	50	54	58	74	90	106	125
<b>Total</b>	<b>6061</b>	<b>7007</b>	<b>8852</b>	<b>10781</b>	<b>18311</b>	<b>23010</b>	<b>25904</b>	<b>28434</b>	<b>23653</b>	<b>38692</b>



duction of nearly all the other industries.

Variations of prices of raw materials of coconuts have affected the oils and fats industry. Variation of Urea and Naptha prices in the world markets determines the viability and sometimes even the closure of large fertilizer complexes. Similar situations have existed even in the developed world. When we looking at the chemical price index and profit vs time record for US chemical Industry during the period 1960 to 1975 and 1950 to 1975 respectively. The period 1965 to 1971 can be seen to indicate a downward trend and sharp recovering in 1971. The rise is seen to continue to this date.

It can be seen that an understanding of global environment, global trends and global future becomes important for successful planning of the chemical industry. This becomes more important for Sri Lanka in order to escape from isolation from the rest of the world in technology.

Global changes of the chemical industry have been witnessed by many of us over the several decades. The level of industrialisation which was once measured in terms of the extent of usage of sulphuric acid is now measured on a completely opposite scale of the extent of elimination of the use of sulphuric acid. The change has been as a result of continuous and rapid development of the global chemical industry to create new products with superior qualities and to change or modify processes which make products with greater efficiency. The 'oil crisis' which emerged in 1970's has led to significant changes of attitudes of chemical industry and the chemical engineer.

It is reported that a powerful economic change has taken place in 1840 as a result of the emergence of steam engine and related applications. In 1980 another powerful technological revolution occurred with the development of the gasoline engine and its applications to electricity. Develop-

ment of computers, petrochemicals, airlines and television was a noteworthy technological contribution in 1940. This trend continued and in 1946 the industry expanded to manufacture of synthetic fibres, films and thermoplastics. It is postulated by a well known economist Kookolai Kondratieff (2) that 50 year recurring economic cycles of boon and bust have been visible and a new era of drastic change is imminent in 1990's. As has been in previous periods too, the rise of the economy can be attributed to the technological development.

#### Current Position

Since 1940, the chemical industry worldwide expanded at a rate faster than almost all other sectors of the manufacturing industry (3). USA is the leading chemical producer of the world. Decisions of the chemical industry of the US can therefore be assumed to reasonably dominate the trends the chemical industry of the rest of the world. The value of shipments of chemicals from US in 1975 has been almost 20 times of that in 1939. During this period the growth of GNP of the USA has been only 10 times that in 1939. The chemical industry of US is made up of several hundreds of firms some quite large and others much smaller. In 1973, 84 billions of dollars worth of products of chemicals were sold by US firms. Of this only 44 percent were sold by 50 largest companies of US. This shows that the chemical industry of US was not dominated by the largest firms alone. This seems to be so even at present. US companies have now set up independent manufacturing facilities within European countries so that they can take advantage of inter-trade in these countries (specially within the European Common Market) without tariff barriers.

The extent of involvement of labour force of USA during the period 1870's to 1980's, in agricultural sector, services sector and manufacturing sector, it is interesting to note that the service industry has

started to overtake the manufacturing and agriculture industry of USA (4) in labour utilization.

Dupont, one of the major chemical producers of USA is reported to be moving from low technology to high technology products and from production of commodity chemicals to specially chemicals. Dow chemicals of USA have shifted their emphasis on routine domestic markets to overseas markets and concentrate on speciality chemicals in comparison with commodities. Monsanto of USA has already entered the area of biotechnology products. Union Carbide is reported to have shifted its priority to engineering services and technology licencing.

ICI, one of the biggest chemical manufacturers of Britain has reorganized its petrochemical and plastic division with the aim of emphasising on the manufacture of biotechnology products and speciality chemicals, in addition to enlarging on overseas markets. It is reported that Messers Dow Europe of Spain have cancelled a 450 m \$ petrochemical plant and has reorganised its plant to concentrate more on the manufacture of speciality chemicals.

Rhone Poulenc of France and Montedison of Italy have changed their emphasis to manufacture fine chemicals in preference to commodity chemicals. Montedison of Italy has increased its share in speciality chemicals from 20% to 70%. Hoechst a \$ 14 billion West German chemical manufacturing firm is entering the area of bio-technology. It is reported that BASF of Germany has not expanded its commodity plastics manufacturing program since 1973, but is giving emphasis to high technology products.

Japan is reported to be investing more than 200 million dollars annually for biotechnology products research. Japan is the second in the world in developing the high technology industry.

Middle East chemical companies are to emphasis on commodity petrochemical products. Mexico, Venezuela, Columbia, Brazil and Argentina can be regarded as significant chemical manu-

facturing countries of the South America. It is predicted that the South America could become the oil field of 1990's with emphasis given to petrochemicals and plastics products.

The chemical industry of Taiwan, South Korea, China, Phillipines and Malaysia are labour intensive. Taiwan plans to enter the technologically intensive manufacture. Many chemical industries of Asian Countries other than Japan are mainly concerns of manufacture of commodity chemicals. Chemical industry of Sri Lanka too is following the same pattern as those of the latter group. Non profit-making industries of the public or state ownership are viewed with concern by the Government. Re-organization or closure of such industrial concerns is very probabale in time to come. The Urea Fertilizer manufacturing complex has been closed down. Considerations are being given at present to set up chemical industries with value added products. Rural based small and medium scale chemical industries are given encouragement by the Industrial Development Board and the Ministry of Rural Industrial Development.

### Future Trends

The US industry seems to be approaching maturity in overall manufacturing. The Middle East is likely to grow its participation in commodity manufacture. Venezula, Mexico, South Korea and Taiwan are entering the scene of production of commodity chemicals.

The overall trend of the developed world seems to penetrate into markets of value added specially chemicals including biotechnology products. This could occur at the expense of manufacture of commodity chemicals. Also chemical manufactures of these countries are shifting their emphasis towards application of high technology, on overseas markets, and Engineering Services and Technology Licensing. Production of speciality chemicals could be aimed for value added products for pharmaceuticals, plastics,

foods and many other products. Speciality chemical plants will require dynamic control systems and batch system optimisation instead of steady state control systems used in conventional plants. A hierachy of control systems will be added for all plants on top of local unit systems. Real time optimisation of the entire plant will be carried out by precise adjustment of raw material and product inventories. Robots, automated vehicles and advanced technologies will be deployed. Preventive maintenance of the day is likely to be replaced by on line predictive maintenance by employing delicate sensors and data bases containing prior experience records. Even though risks of entering the production of speciality chemicals are high, once well planned; could yield substantial profits compared with production of commodity chemicals. Production units for speciality chemicals will require good research strengths.

It is very improbable that the developing countries will have strength of resources and capital to embark on production of speciality chemicals and high technology applications in the foreseeable future. Curtailment or deceleration of production of commodity chemicals by the traditional countries in the developed world will force commodity prices to rise to appreciable levels. As a result of this, countries of the developing world will be compelled to enlarge or expand production of commodity chemicals. It is likely that the business of commodity chemicals will become the trade of developing and less developed countries. These countries will have to be penetrate into overseas markets in addition to local markets.

Sri Lanka will also be subjected to the above technological environmental changes. Production areas of commodity chemicals will inevitably be enlarged. It is likely that production of instant teas, coconut products, activated carbon, rubber products, essential oils, extracts and tinctures, soaps, sugar, fertilizer, titanium products, fertilizer, chlorine, caustic soda and magne-

sium salts will be increased. This may mean setting up of additional units of production in addition to expansion of existing units.

Manufacture of synthetic pharmaceuticals and pharmaceuticals from natural products could be envisaged. There are strong possibilities of emergence of many industries that manufacture value added products based on imported raw materials.

Past practices of government subsidies for un-economic state run businesses seem to fade away. Managers and Engineers will be required to be profit concious. Energy and resources saving technique are likely to enter into the loeal industry. Small and medium scale industries are likely to be given additional support in terms of special concessions and facilities by the government. Export oriented industries are likely to find substantial tax and other benefits. High degree of quality control will be required as a result of export orientation. As a result many processes are likely to become automated. Computers will find way into Sri Lankan Chemical Factories and may find dominate in certain areas of production, optimisation, economic designs, control and safety.

Chemical Industry of Sri Lanka, unlike in the developed countries is not vast enough to employ large numbers of chemical engineers and technologists. However, moderate numbers of chemical engineers find employment in Sri Lankan chemical, agricultural and processing industry annually. Many research organizations recruit chemical engineers in specific research areas. There are indications that chemical engineers are now finding employment in non traditonal areas of employment. These include fields of management and computer applications too.

As a result of developments of future global chemical industry and their effect on Sri Lankan Chemical and allied industry, the future chemical Engineer of Sri Lanka should be trained sufficiently wide and yet subs-

tantial in content in order to capture devise range of opportunities open to them.

In the wake of these opportunities, it is likely that the chemical engineer will face competition by other disciplines. Chemical Engineer entering the industry of processing and beneficiation of areas will find graduates in mining conversant with relevant techniques competing with him. In biochemical area, microbiologists and biochemists may compete with him. The Chemical Engineer will have to compete even with Civil Engineers in building materials, water and sewerage treatment areas. In advanced engineering materials industry he will face competition with material scientists chemists, physicists and even metallurgists.

It can therefore pointed out that the future chemical engineer will have to secure a foothold by being more competent in his fields than those of competing disciplines.

As a result of the strong-tendency of commodity chemicals industry finding an important place in Sri Lanka, the Sri Lankan chemical engineer will be required to be competent of maintenance, operation and in economic awareness of processes in which he is in charge of. The conventional practices of design of chemical plants will generally be confined to one or few engineers or process plant contractors who will resort to ready made packages in their design. Use of computer packages and databases and applications of automation, computer control for quality and safety, optimisation and economic studies of processes and biochemical engineering and techno-

logy are some fields the Sri Lankan Chemical Engineer should be trained of. Chemical Engineer entering the speciality chemicals manufacturing trade elsewhere will be required not only to learn of their production technologies but also their applications at the clients end.

### Conclusion

It can therefore be seen that the global chemical industry will be facing a highly competitive, fast changing and challenging world. The advancements of technology will govern the attitudes of the future industrialist in quest for economy and increased value added products. Developed countries are likely curtail or reduce their production of commodity chemicals in preference to speciality chemicals. This in turn is likely to open opportunities for the developing countries to embark or expand manufacture of commodity chemicals. Sri Lanka also will get the opportunity of expanding or enlarging the manufacture of commodity items which could generously contribute to its economy. Training of chemical engineers should be carried out to satisfy the needs of the future industry and to keep pace with global developments. Such training should be wide enough in scope and substantial enough in depth.

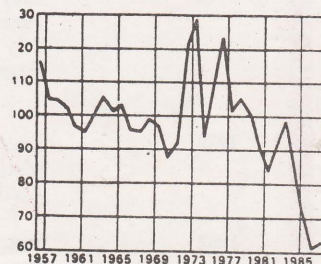
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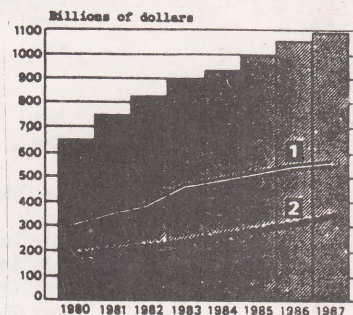
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## The debt trap



Source: IMF

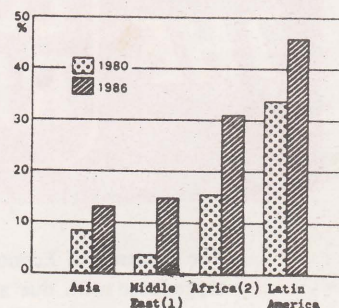
### Commodity price fluctuations



(1) Debt incurred from private sources  
(2) Debt incurred from public sources

Source: World Bank

### Mounting debt



(1) Egypt and Libya included  
(2) Egypt and Libya not included

Source: IMF

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