JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

MINISTRY OF INDUSTRIES, SCIENCE AND TECHNOLOGY
DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA

STUDY ON INDUSTRIAL SECTOR DEVELOPMENT

FINAL REPORT

VOLUME III

METALWORKING INDUSTRY

March 1993

NIPPON KOEI CO., LTD.

UNICO INTERNATIONAL CORP.

JAPAN EXTERNAL TRADE ORGANIZATION

SRI LANKA STUDY ON INDUSTRIAL SECTOR DEVELOPMENT FINAL REPORT Vol. 3 March 1993

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VOLUME III METALWORKING INDUSTRY

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ABBREVIATIONS

(Ministries)

MIST	: Ministry of Industry, Science and Technology
MHTI	: Ministry of Handlooms and Textile Industries
MTC	: Ministry of Trade and Commerce
MTRID	: Ministry of Tourism and Rural Industrial Development
MOF	: Ministry of Finance

(Governmental Organizations)

EDB	: Sri Lanka Export Development Board
BOI	: Board of Investment of Sri Lanka (formerly GCEC)
IDB	: Industrial Development Board
SLSI	: Sri Lanka Standard Institution
CISIR	: Ceylon Institute of Scientific and Industrial Research
CITC	: Clothing Industry Training Centre
TTSC	: Textile Training and Services Centre
NIBM	: National Institute of Business Management
SGC	: State Gem Corporation
RRI	: Rubber Research Institute
CEA	: Central Environmental Authority
SLR	: Sri Lanka Railways
FDSI	: Foundry Development Service Institute

(Industrial Associations)

SLANA	: Sri Lanka Anti-Narcotics Association (NGO)
SLGTA	: Sri Lanka Gem Traders Association
SLAMERP	: Sri Lanka Association of Manufacturers and Exporters of Rubber Products

VOLUME III METALWORKING INDUSTRY

The study team's field survey was conducted as part of the industrial development promotion plan to identify the current situation of the metalworking industry, with particular emphasis on the foundry industry. For this purpose, the study team visited government authorities related to promotion and regulation of the metalworking industry, as well as selected metalworking companies. Also, the study team conducted a questionnaire survey covering a number of metalworking enterprises. This section first describes the current situation of the metalworking industry, followed by a proposed promotion plan for the metalworking and foundry industries.

1. CURRENT SITUATION OF THE METALWORKING INDUSTRY

1.1 General

1.1.1 Historical background and development

A history of Sri Lanka's metalworking industry, foundry industry in particular for the survey, is briefly reviewed to help understand its current state and future outlook and to establish realistic promotional measures.

PHASE	KEY POLICY	STATE OF METALWORKING INDUSTRY
Colonial Period	Plantation farming	Developed by foreign capital to support plantation farming.
Independent/Mixed Economy/Agrarian Reform/Change of Government/Regional Conflict	Requisition of foreign companies	Ties with foreign technology and management declined.
	Priority investment on public enterprises	Establishment of large national metalworking plants for public works including transportation, communication, and construction.
	Promotion of import substitution Development of paddy farming	Many machinery products were locally produced under government protection. Production of agricultural machinery and food processing equipment, including those used for irrigation facilities.

PHASE	KEY POLICY	STATE OF METALWORKING INDUSTRY
Adoption of Market Economy	From import substitution to export promotion Establishment of export processing zone	Termination and increase in imports of production of non-competitive products including automobile assembly and tools. Increase in exports of tools and other metalwork products.
	Privatisation of public enterprises Privatisation of public enterprises including plantation farms and metalworking enterprises	Market changes due to privatisation of enterprises using metalwork products. - Idling of public and incorporation of large private metalwork companies. - Inauguration of private enterprises
	Investment promotion policy Promotion of foreign capital investment	Increase in investments to private enterprises

At present, in Sri Lanka regional conflict has not been entirely settled to discourage foreign investment, while limiting growth of the domestic market that is relatively small in terms of population and national income.

Privatisation of public enterprises has been proceeding under control of the Ministry of Industries, Science and Technology, as summarised in Tables 1 and 2. In the manufacturing sector, 8 public enterprises are scheduled for privatisation. Note that the table lists United Motors and Lanka Hardware as metalworking enterprises identified for privatisation, but they have already completed the process. Table-3 shows the privatisation programme announced by the Ministry of Finance.

At present, market economy is the current of the times, but it is not realistic to abruptly shift from previous import substitution policy to full liberalisation that would have unduly heavy impacts on private enterprises. Rather, the fostering of private enterprises through an effective promotion policy is desirable at this stage. In particular, the metalworking industry plays a supportive role for a wide range of industries, thus its growth contributes greatly to the development of other industries, not to mention creation of male worker employment and the earning of foreign currencies. Also, it is often the case in the metalworking industry that import substitution initiated by technological improvement serves as a precursor of industrial development, leading to export promotion in the later stage of industrialisation. This indicates that the fostering of the metalworking industry needs to be considered from the long-standing viewpoint and commitment.

1.1.2 Classification of metalworking enterprises by ownership type, and major characteristics

Reflecting the above historical background, metalworking enterprises in Sri Lanka are divided according to their type of ownership into public enterprises, private enterprises after privatisation, enterprises owned by domestic capital (medium- and small-scale enterprises), joint ventures with foreign investors, and export enterprises operating in the export processing zones.

According to 1990 statistics shown in Table-4, there are 85 private enterprises and 6 public enterprises manufacturing metalwork products other than machinery, while 31 private enterprises and 3 public enterprises are classified as the machinery industry excepting electrical machinery, 22 and none in the electrical machinery industry, and 34 and 4 in the transportation equipment industry, respectively. The ratio of private and public enterprises is changing according to ongoing privatisation initiatives. The fact that private enterprises after privatisation are relatively large in size dearly indicates that they will have a high share of the metalworking industry, and the effective use of their capacities holds the key to the development of the industry.

1) Public enterprises

Public metalworking enterprises are relatively large in size and have abundant and good equipment and manpower compared to private enterprises. Some of them are not classified as the manufacturing industry (Table-5). Furthermore, some enterprises are strictly controlled by the government with few management autonomy, while some public enterprises are relatively autonomous in distribution of net profit and other areas. Those with few management autonomy do not have clear incentives for improvement of their capacity utilisation rate or export promotion, failing to utilise existing facilities and equipment. As a result, their modernisation is heavily dependent upon foreign aids. The situation has been observed during the field survey covering 4 public metalworking enterprises and 1 public engineering enterprise. Tepid management of the public enterprises is also evident in the questionnaire survey, where 5 public metalworking enterprises respond that they have no experience in export and/or no plan in the future, while having no experience in subcontracting work. This shows also their inactivitiveness. One of the public metalworking enterprises responded that they were not ready to perform subcontract work under the present organisation. While a public enterprise stocked a pile of iron scraps, another enterprise stopped operation of its smelter to produce steel bar from scraps and now they are producing it

from imported billets. In contrast, private enterprises have been melting iron scraps by using arc furnaces since last year.

The above observation suggests that public metalworking industries endowed with resources - abundant and good equipment and manpower in particular - are capable of meeting domestic demand, if they are given of enough management autonomy to adjust themselves to market trends, as well as opportunity for exports.

2) Privatised public enterprises

4 private enterprises covered by the field survey have recently been privatised, and are considered to be in the transition period - still to be improved in various respects - but, being large in scale their advanced facilities and equipment as well as skilled manpower are expected to serve as a driving force for complete privatisation. A major management challenge for them at this stage is to empower individual production divisions in the large-scale enterprises in order to maximise their economy of scale as a whole. If successful, they, together with the public enterprises, will be able to substitute currently imported metalwork products and to start exports in the foreseeable future. In fact, the questionnaire survey which indicates that a privatised enterprise has already started exports, and all of responding enterprises, including those with no experience in exports, showed expectation for future exports.

3) Medium-scale private enterprises

The field survey covered a number of medium-scale private metalworking companies owned by domestic capital, largely foundry companies. Generally, they are willing to make investment for modernisation, with varying degree from one company to another. In fact, some of them have started or plan to start facility modernisation, such as introduction of electric furnaces. 21 of 24 medium- and large-scale enterprises which responded to the questionnaire survey (Table-6) had modernisation plans, and 16 specified the amount of investment. As for exports, 8 out of 26 enterprises have experience of export and 18 express expectation for future exports, as shown in Table-7. There are companies which export printed metal cans, bottle crowns, and razors to industrial countries in large quantities. A major issue facing these medium-scale enterprises is a shortage of competent engineers, with exception of the exporting companies. Importantly, introduction of new machinery alone is not sufficient for rationalisation or modernisation of production facilities or practices. Once appropriate technical support is provided, the medium-scale enterprises will increasingly satisfy domestic demand and look for export markets in future. Also they are expecting the government's favorable policy toward the direction.

4) Small-scale private enterprises

Privately owned small-scale metalworking enterprises covered by the field survey are serving a sizable market, such as the supply of repair parts to other manufacturing establishments, and many of them do not see any problem in their product quality. 19 out of 25 small-scale enterprises who responded the questionnaire survey had modernisation plans. On the other hand, none of them had experience of exports, and only 12 out of 23 respondents show expectation for exports in future, these figures are less compared to the medium-scale enterprises. Standardisation and other supportive measures seem to be needed.

5) Joint ventures

7 joint ventures responded to the questionnaire survey and 6 had investment plans. All of them showed expectation for future exports, while none of them had experience of exports.

6) Enterprises in the export processing zone

Metalworking enterprises operating in the export processing zone are listed in Tables 8 and 9. These enterprises were not covered by the questionnaire survey. Today, they are exporting tools, and bolts and nuts to industrial countries, while they are imported from China and other countries in large quantities for domestic use. Also, bicycle parts and other products other than machine parts, such as ornamental chains, are being exported. An enterprise introduced equipment for production of metal molds in an attempt to export them, but it is producing them only for captive consumption. Demand for metal molds-reportedly grows in Sri Lanka and volume imports as shown in Table-10 are reported. The enterprise is expected to play an important role in import substitution and technology transfer, if its existing production capacity is effectively utilised.

1.1.3 Domestic market for metalwork products

The market for metalwork products in Sri Lanka is relatively small partly due to small population and national income. For instance, there were automobile assembly companies during the period when the government encouraged import substitution, but they disappeared after adoption of market economy. Today, assembled passenger automobiles are mainly imported from Japan and commercial vehicles from India. In the construction equipment market, even concrete mixers are imported. As for the agricultural machinery market, attachments are locally produced while tractors are imported in a semi-knockdown form. Unless industries to assemble these machinery and equipment are fostered, the market

for parts for new machine is difficult to emerge, limiting the role of the metalworking industry to the manufacture of maintenance and repair parts.

Similarly, while small pumps for farming and valves are locally manufactured, but large one or special material used product and engines are all imported. Machinery for plantation farming is locally produced, but they are highly durable and do not form a significant market.

Overall, the domestic market for metalwork products is small.

Although most of machinery and equipment are imported, the study team feel that not all of them are excluded from local production by the small domestic market. It seems that the local market may have a little possibility to expand if their manufacturers upgrade their quality level to supply high quality products. For instance, the study team observes that many types of castings can be import substituted if foundry process technology is upgraded. Many enterprises which responded to the questionnaire survey (Table-11) expect market development as their request to the government. To achieve this, the government may consider to increase procurement from local sources in public works contracts, including those financed by international organisations or bi-lateral aid and awarded through international bidding. In particular, the government may give opportunities for domestic enterprises by taking into account their advantages and disadvantages, e.g., the intensive use of labor can offer lower prices while completion schedule may be extended.

1.1.4 Imports and exports of metalwork products

As pointed out in the previous section, Sri Lanka imports many types of machinery and equipment, as well as a wide range of products other than machinery such as tools, bolts and nuts, and sanitary metal products including faucets. In contrast, exports of metalwork products are very small and the country's trade balance in the area shows a large deficit (Table-12). Major import items are transportation equipment, industrial machinery, and electrical machinery.

Table-13 shows recent changes in exports of metalwork products. The value of exports reached 2,102 million Rs. in 1991, a fourfold increase from 1987. Table-14 summarises exported metalwork products by product and industry types. The total value of exports is 822 million Rs., 76% of which are exported by enterprises operating in the export processing zones (Table-15). Major export items from the zones, in terms of value, are screws, bolts and nuts, tools such as spanners, and bicycle parts. The largest item exported from areas other than the export processing zones are razors, accounting for 5.1% of total

metalwork product exports, followed by printed cans and bottle crowns that represent 4.6% of total. Other export items are simple machinery such as agricultural machinery, weighing machines, and sprays, and scraps.

As clearly identified in the questionnaire survey (Table-7), most of metalworking enterprises other than public enterprises have intention to export their products in the future. As shown in Table-16, they want to export simple machinery including agricultural machinery, metal furniture, and castings, and prospective markets are Asia and Africa. While many of then did not identify a desirable export route, the largest response was "through buyer", followed by "as subcontractor." As discussed earlier, public enterprises and privatised public enterprises have surplus facilities and equipment, so that they will be able to export some of products once they are given of management autonomy or each production department is activated. The study team feel that several products such as cutlery will become exportable in the near future. Thus, it may be the time to conduct a market study covering specific products (simple machinery and metalwork products other than machinery) and target countries (Africa, the Middle East and others). Another potential markets are ASEAN countries which may demand low-cost machine parts in future due to the increase in labor cost. This export market potential is expected to serve as good incentives for the upgrading of production techniques in existing metalworking enterprises. To explore both export and domestic markets with quality products seems to be a feasible strategy for metalworking enterprises other than those operating in the export processing district. From the export processing zones, tools, decorative chains, and bicycle parts are mostly exported to industrial countries. The district is expected to attract investment related to the manufacture of products for industrial countries on account of labor cost advantage and investment incentive.

1.1.5 Production sharing (use of subcontractor)

Most of metalworking enterprises employ self-sufficient managing so that they own all necessary special processes including casting and electroplating. This is confirmed in the questionnaire survey. The degree of dependency on subcontractors (the percentage of process or product ordered to subcontractors) is less than 10% for private enterprises, excepting assembly companies such as sewing machines and agricultural machinery (Table-17) The rate ranges between 31% and 50% for joint ventures, and 10% or less for public enterprises.

On the other hand, the rate of metalworking enterprises doing subcontract work for other manufacturers is shown in Table-18; 11 out of 54 private enterprises, 1 out of 7 joint ventures, and none of 5 public enterprises. Subcontracting offers several advantages including the securing of work for efficient capacity utilisation, and technical and/or financial support from manufacturers ordering subcontract work. However, the questionnaire survey

shows that less than 20% of respondents doing subcontract work receive technical support, and the same percentage receives financial support (including contractor furnished material). Respondents who have interest in subcontract work are 23 out of 30 private enterprises (no response from others), 4 out of 4 joint ventures, and 2 out 5 public enterprises. Some of the public enterprises state that "subcontract work is difficult under the present organisation." The results suggest that many enterprises expects development of the subcontracting system to enjoy its benefits. Specialisation of production is critical in modernisation of the country's metalworking industry and development of production techniques. In other words, the present low level of production technology prevents many of metalworking enterprises from enjoying benefits of subcontract work, thus delaying the progress of production sharing. This suggests the need for specific measures to promote production sharing, such as certification and registration of subcontractors, and technical support to improve their production techniques. This is particularly important for electroplating operations which are carried out on a small scale in many manufacturing plants, showing a high risk of environmental pollution.

1.1.6 Investment plan

In the metalworking industry, various investment projects are under way. A private enterprise to produce steel bar from scraps by using an arc furnace has recently been established, and some of medium-scale foundries have introduced electrical furnaces. In particular, the bicycle industry is boosting production of parts under protection of import duties. The results of the questionnaire survey also indicate that many private enterprises have capacity expansion plans (Table-6). Forty-three out of 52 private enterprises which responded to the survey have the future investment plan, and 33 specify the amount of investment. The average amount of investment is 79% of total assets of the private industries, while equity capital represents 40% of the average investment. Similarly, 6 out of 7 joint ventures have investment plans, and 4 specify the amount of investment. The average amount of investment is equivalent to 18% of their total assets, and equity capital accounts for 34% of the investment. Finally, 4 out of 5 public enterprises have future investment plans, and only 2 specify the amount. The average amount of investment is 3.64 times of total assets, and equity capital covers 29% of the investment.

Regarding the future plan for improvement of production techniques (Table-19), 37 out of 48 private enterprises consider "introduction of new machine", 33 "technical training", 17 "contracting of qualified technicians", and 3 "purchase of patent." All of 7 joint ventures choose "introduction of new machine" and "technical training", 4 "employment of qualified technicians", and 2 "purchase of patent." All of 5 public enterprises list "introduction of new machine" and "technical training."

Overall, many of the enterprises emphasise the introduction of new machine and technical training, followed by employment of qualified technicians.

Respondents stating "strong interest in new merchandise or technology of foreign company" (Table-20) are 42 out of 49 private enterprises, 6 out of 7 joint ventures, and 4 out of 5 public enterprises. These high levels of interest, observed in both public and private enterprises, demonstrate the importance of introducing appropriate technology on the basis of careful investigation to identify merchandise and technology to be introduced.

1.1.7 Government's industrial promotion policy

Today, the government of Sri Lanka is implementing a wide range of programs under the basic policy to introduce market economy, including privatisation of public enterprises, export promotion, investment promotion (including attraction of foreign capital), creation of employment opportunities, improvement of trade balance, and the raising of standards of living.

Privatisation of public enterprises for the metalworking industry includes privatisation of plantation farming and other industries which use metalwork products, and that of metalworking enterprises.

Privatisation of user enterprises for metalwork products accelerates the planning and implementation of modernisation projects and facilitates the purchase of materials, creating a wider choice of corporate management. Whether this change works in favor of domestic manufacturers of metalwork products needs to be watched in the future, but metalworking enterprises are required to improve their international competitiveness in terms of price and quality. At the same time, efforts will be expected on the government side to empower the privatised public enterprises to effectively use their ample resources.

In particular, BOI has made a successful attempt to attract export industries, resulting in exports of metalwork products. The study team feels that this policy should be maintained in the future, and that the strengthening of a functional linkage between export companies in the export processing zones and metalworking industries outside brings benefits for both of them.

Notably the government has been implementing the following programs to foster enterprises that are not registered in BOI.

First, as part of the government's export promotion policy, companies which export all of their products are exempted from import duties on production facilities, equipment and materials, and income taxes. Those with export ratio of less than 100% are eligible for tax reduction according to the actual percentage of exports.

Companies in the "pioneer status" can enjoy tax holiday for 5 years after the start of commercial operation. Those which supply import substitutive products are protected by reduced import tariffs on materials and increased import tariffs on competitive products. Note that import tariffs on products will be gradually reduced to protect the interest of users.

To protect domestic products from dumping by India and other countries, penalty is levied on products which are much cheaper from international market prices, equivalent to the difference between the imported price and the appropriate price, then import duties are levied on the appropriate price.

Responses regarding the request to the government (Table-11) are summarised as follows.

Twenty-six out of 47 private enterprises selected "technical support", 22 "market support", 24 "finance", 8 "financial support", and 7 "management consulting." Among those who selected "other", 11 enterprises listed "tax incentive", 6 "protection by import duty", 1 "anti-dumping measures", and 1 "labor law."

Of 6 joint ventures responded to the question, 5 enterprises cited "technical assistance", 3 "market", and 1 "management consulting." For "other", 4 cited "protection by import duty" and 2 "tax incentive."

Five governmental enterprises responded to the question. 4 cited "technical support", 2 "finance", and 1 "financial support". No entry was made in "other" column.

1.2 Current Situation of the Foundry Industry

1.2.1 Background

The foundry industry in Sri Lanka are classified into four groups: 1) government-controlled foundries, 2) large foundry recently privatised, 3) medium-scale foundries operated within private engineering enterprises, and 4) Small private foundries. As for 3) and 4), no accurate data have been available at the Ministry of Industries nor IDB. In a study conducted

by UNIDO/NIBM, 60 foundries were identified. Of total, 51 produced grey iron castings, 32 Al-base alloy castings, and 37 Cu-base alloy castings. Thus many of them produced two or more types of castings.

1) Government-controlled foundries

Ceylon Steel Corporation (to be privatised): Ceylon Steel Corporation produces 15 to 45 tons of steel castings and special alloy cast iron monthly by using arc furnaces. At present it is only one company to supply these products and has medium levels of equipment and technology. A major problem is a small amount of order which is not placed regularly.

Sri Lanka Railways: SLR has 2 large cupolas (2 sets of 3 tons/hour and 5 tons/hour each) and a wide range of equipment including a number of molding machines, but its foundry production amounts to only 45 tons out of monthly captive consumption of 100 tons. SLR states old production equipment for the reason. In addition, foundry process technology and production techniques used at their facilities are obsolete. SLR is expecting a rehabilitation program under Japanese grant-in-aid.

Government Factory: Eight years ago, the factory has received technical advice from a Japanese expert on a short-term basis. While it has the highest level of technology among foundries in Sri Lanka, and large facilities and equipment, it only produces 25 tons of castings monthly due to low levels of foundry process technology and production techniques. The study team feels that they just put blame on obsolete facilities and a small amount of order, without making own efforts to overcome the situation such as sales promotion - an attitude often observed in state enterprises in many countries. They are currently requesting Japan for addition and replacement of facilities and equipment to be a centre for training.

2) Privatised foundry

Lankaloha (Enderamulla Foundry): This was privatised from Ceylon State Hardware Corporation in 1991, and the effect of privatisation is still early to be evaluated. The company has large foundry process equipment, including a 5-ton low-frequency induction melting furnace, a 5-ton/hour hot blast cupola, a spin casting machine, and molding sand reclaiming and reconditioning unit. These were installed under a Germany's grant-in-aid project 20 years ago, and most of them have been deteriorated due to aging or are too large to be operated economically. The foundry's annual production peaked at 2,000 tons in 1980 and has been down to 600 tons today. The largest bottleneck is lack of demand that makes the largest and most advanced melting facility in the country operate well below its capacity.

The company is expecting introduction and development of new technology and equipment under collaboration of a Japanese company, and growth of demand for castings. However, the present situation cannot convince anyone that such collaboration would bring favorable results. Obviously, self-help efforts such as the reconditioning and utilisation of existing facilities and equipment are needed to improve profitability.

3) Medium-scale foundries operated in private engineering enterprises

These foundries have developed in engineering enterprises that manufacture and supply tea machinery and agricultural crop (rubber or coconut) processing equipment to domestic and overseas markets. At present, some of agricultural machinery are imported from China and India, but around 20 foundries are still maintaining their vigor by manufacturing these machinery, sewing machines, pumps, valves, and manhole covers, etc. Unfortunately, however, production techniques used at these foundries are 40 years old and obsolete, and some of basic craftmanship seems to have been inherited in a wrong way. Foundry process technology is very poor and there is no organisation and no experienced engineer to teach and assist them.

Nevertheless, several foundries are looking for improvement of production techniques. They have already installed or plan to install induction melting furnaces, shell molding machines and other modern equipment. It can be expected to achieve the fastest progress by them among foundries in Sri Lanka if appropriate advice and guidance are given. The first step is to raise foundry process technology to a level capable of handling the new equipment, otherwise investment would be wasted.

4) Small-scale private foundries

These foundries have been making castings used for repair and maintenance of agricultural and industrial machinery. They have competitive edges in low-cost products and quick delivery. Their major customers used to be governmental factories and are private enterprises in recent years. Also some of them manufacture rice polishing machines and similar machinery by using machine tools. Although their level of foundry process technology is low, they have no worry or concern about their own technology or quality. Rather, some of them want to improve production techniques and productivity but are not capable of doing so due to lack of financial and/or technical assistance. Thus it is difficult for these small foundries to raise productivity and quality from the present level, until quality concern emerges and diffuses in the upper echelon of the industry to bring impacts on their attitude.

1.2.2 Current Situation of Foundry Process Technology

Foundry process technology at private enterprises in Sri Lanka has shown little advancement since 40 years ago. The foundry industry in the country has originally developed under guidance of British people for the purposing of supplying plantation farming machinery. After they have left the country, the industry seems to have lost vital foundation; leaders in both management and technology, along with export markets and technical exchange with foreign companies. Meanwhile, original foundry process technology was inherited from one foundry worker to another, and in the process, wrong ideas and techniques were incorporated to impede technological advancement or lead it in a wrong direction.

Undoubtedly, shortage of leaders to teach foundry process technology is a major cause for hindering diffusion of modern technology. Educational institutions and research organisations specializing in foundry engineering are not developed well, and lack of technical exchange with foreign countries prevents input of latest information. It is no surprise that private foundries do not have access to even fundamental foundry process technology.

At small private foundries, foundry process technology exists as proprietary knowledge of individual foundry workers, who are often foundry owners. Medium-sized private foundries are employing foundry engineers who have graduated from engineering departments of universities or colleges in the country, or who have working experience at foundries in the UK or India. Their level of technological expertise is low, and they cannot be expected to upgrade thier foundry practice. Public foundries employ metallurgists graduated from local universities or colleges, but they are not likely to develop into leaders of foundry process technology, either. Some of them have received training in Japan and they have relatively a high level of technology, but absence of an adequate organisation, where engineers exchange their knowledges and opinions, has been confining them and their expertise to individual foundries.

The current level of foundry process technology in the country, observed by the study team, is summarised as follows:

1) Pattern making

(1) Most of foundries manufacture patterns by themselves. This is a practice peculiar to the country; necessary parts and services are provided within each foundry. Few jobs are subcontracted. Most of medium-sized foundries and public foundries have own pattern shop with woodworking machineries and employ specialised pattern workers.

(2) Dried wood materials are available without difficulties, teak and mahogany are also used. One exception is Government Factory that carries out lumbering and natural drying all by themselves. They manufacture wooden pattern in a part of a furniture shop.

(3) Instead of wood, aluminum patterns are widely used as patterns for volume products and repeat products. Aluminum patterns are often made provably without considering economical conditions at many foundries with machine shops.

(4) No mounted pattern is observed, with exception of wooden patterns for sewing machine stands.

(5) Match plates are reportedly manufactured at foundries having molding machines.

(6) Wooden pattern with no draft or with very small draft are seen in most foundries.

(7) Filletes radius are seldom seen on pattern, thus castings are without fillet radius or if exist they are of very small or irregular shape.

(8) Core boxes are lacking accuracy. Rough casting surface is observed at the portion of built-up core or in the area where sand flash is taken off.

(9) No inspection is carried out for wooden patterns. Even Port Authority Mechanica's foundry, which has a high level of technology for pattern making, states that inspection is not necessary as they manufacture wooden patterns according to full size setup drawings.

(10) No wooden pattern is painted. Sticking of mold sand is often observed in the molding process.

(11) For order of 2 to 3 pieces, such as repair parts, a wooden pattern is not produced and a product sample is used as a pattern.

2) Melting (cast iron)

(1) Most of foundries melt cast iron by using cupolas. A few foundries have rotary furnaces. Some foundries explain melting cost by rotary furnace is higher than that of cupola, while the other explains melting cost is nearly half of that of cupola.

(2) Most of cupolas at small- and medium-sized foundries have been manufactured in-house, and their design varies greatly. Capacity ranges between 0.5 and 2 tons/hour, and melting is done 4 to 8 times per month. The melting quantity per melt is small and not economical.

(3) The amount of bed coke and the coke ratio are not known. No weighing is done, including raw materials. All the operations are carried out on the basis of empirical judgment. Molten metal is directly received by a pouring ladle from a cupola, and the amounts of charge and tapping are adjusted according to the size of the ladle.

(4) Both public foundries and privatised foundries have large cupolas of 3 to 5 tons/hour. The cupola at the public foundry was installed during the colonial period and that at the privatised foundry was built 20 years ago under grant-in-aid of Germany.

(5) The public foundry operates cupolas 4 to 6 times per month and produces surprisingly a small volume of production compared to capacity.

(6) The privatised foundry has suspended operation of the 5-ton/hour cupola due to a small amount of job and has built a 1 ton/hour cupola which is operated 4 to 6 times per month to melt 12 to 15 tons of cast iron per each operation. The company also has a 5-ton low frequency induction furnace which is under suspension due to a small workload.

(7) No in-plant test before pouring, such as chill control test, is performed at any of the foundries.

(8) No inoculation is carried out. Fe-Si powder is put into ladles, but the amount to be put is not properly controlled. Some foundries reportedly charge Fe-Si powder and graphite particles through the cupola's charging door.

(9) Raw materials for charge is mostly scrap cast iron, while one foundry adds 5% of steel scrap.

(10) A slug former is dolomite, charged in an amount freely determined. Most of slags are black due to excess oxidisation. Spouts have no slag arrester and slags are removed after molten iron is received in a ladle. However, slag is not removed in the pouring process and is poured into a mold.

(11) Tapping temperature is relatively low at some 1,300°C. When the target tapping temperature is asked, responses ranges between 1,200 and 1,400°C.

No foundry has a pyrometer thus temperature measurements are not carried out. In particular, small foundries have no idea about appropriate tapping temperature and no means to control.

(12) There is only one induction furnace, at the privatised foundry; the 5-ton low frequency induction furnace which was built under grant-in-aid of Germany and which is currently under suspension. However, a medium-sized foundry has imported a second-hand 1-ton high frequency induction furnace and is currently building a new factory. In addition, some foundries of similar size intends to install a high frequency induction furnace and is looking for a second-hand unit from Japan.

(13) All the products of iron foundries are made of grey iron, except for Ceylon Steel Corporation that manufacture alloy cast iron balls for a cement plant by using an arc furnace.

3) Melting (non-ferrous)

(1) Non-ferrous melting is generally done by using a pit-type oil furnace and a graphite crucible. Graphite crucibles of less than 10kg are locally produced, but those of heavier than 10kg are not manufactured after unsuccessful attempts.

(2) Some foundries use in-house made iron pots to melt aluminum. However, none of these pots and pouring ladles are used without proper coating inside.

(3) Most of non-ferrous foundries use scraps, of which chemical compositions are unknown, as raw materials for melt. Colombo Dockyard imports Gun Metal ingots, and Colombo Commercial Co. uses Silmin ingots to manufacture casting fans for tea processing machinery.

(4) Any treatment of molten metal is not adopted such as using covering and degassing flux. And no modification is made to Silmin ingots.

(5) Charcoal or coke is also used to melt aluminum.

(6) Colombo Dockyard uses a 400kg tilting type oil furnace imported from the UK for quick manufacture of stern tube bearing and other parts for ship repairs. This type of furnace is observed in other foundries.

4) Sand preparation/molding

(1) Clay-bonded green sand is most widely used. It is called red sand produced in Puttalaue region, having a 16% clay content and iron oxide. On the other hand, foundries producing rather big castings such as machine beds, sugar rolls, and fan bosses, use dry sand mold.

(2) Some foundries use silica sand with bentonite. Silica sand is sold by Ceylon Glass Co. after separation and water washing. According to the company's analysis, it has 99.9% purity.

(3) Green sand is repeatedly used without any control, with clay being occasionally mixed. Sand test equipment is seen at a public foundry, but seldom used, and no standard is established. Neither foundries nor even training foundry of a university has standard of sand preparation.

(4) At small private foundries, sand is manually mixed on the floor after sieving. Manual mixing is also seen at some medium-sized foundries and a privatised large foundry where sand mixer is not working.

(5) Foundries producing both cast iron and non-ferrous castings use the same molding sand for both products. Facing sand is rarely used.

(6) The most widely used type of core sand is clay-bonded green sand which has been air-dried on a steel plate or skin-dried by lightly torching through the steel plate. Oil sand and CO_2 sand are used at some foundries, but an amount of water glass to be added is not properly controlled and poor collapsibility is pointed out.

(7) Floor molding is the most widely used method. Wooden or steel flasks are used for cope which is assembled using steel guide bars stabbing on the floor. No provision is made for degassing of the floor. Any gas vent system is not employed for floor molding.

(8) The mold box is not often used in manual molding. It is made of wood, steel plate or cast iron, manufactured by each foundry. No gas vent holes are provided. Dowel pins are not accurate, and clamps are not effective.

(9) Gating systems are manually made by foundry workers. The in-gate is not narrowed and relatively thick. Pouring is made where loose sand is observed around the pouring cup. Only one foundry provides gas vent holes by using sticks.

(10) Repairing is needed for many molds due to insufficient strength of sand, sticking to wood patterns, and insufficient pattern draft.

(11) The mold wash of graphite powder mixed in water is used by spraying. Brush is rarely used for coating. Some foundries add kaolin to graphite wash.

(12) Machine molding is widely used for mass products such as sewing machine spans and brake shoes for railway use.

(13) Metal molds are also used for non-ferrous castings. Al-alloy fan blade casting by a metal mold shows mis-run caused by lack of fluidity and oxidised film mixing on surface of blades. Neither mold coating on metal mold surface nor preheating is adopted.

5) Fettling/finishing of castings

(1) At small- and medium-sized foundries, fettling/finishing of castings is carried out by using a hammer, a pedestal grinder, and a wire brush. Some foundries are equipped or manufactured barrel type shot blast machines. However these machines are not used effectively.

(2) Large foundries also have shake out machines and/or shot blast machines, but many of them are not operational due to poor maintenance or lack of particles of shot or grit.

(3) Non-ferrous foundries use hack saws instead of hammers, but finishing process is principally same as that of iron casting.

(4) Cast surface conformed to mold is generally rough and poor in quality, and cast surface conformed to core is rougher and poorer in many products. Rough surface and sand penetration are often found on inside surface of scroll of pump casing, and they are left because of lack of proper finishing tools.

(5) No angle grinder is used. No pneumatic equipment is used for finishing cast surface.

(6) Cast iron is not subject to annealing. Annealing furnaces are installed at some foundries, but they are not operated. Heat treatment of Al-based alloy is not performed. Many foundries have interest in heat treatment technology for softening of iron casting that has poor machineability.

6) Testing/inspection

(1) Usually material tests are not conducted, except for the hardness test that is conducted by one foundry. Note that Colombo Dockyard only carry out necessary test and inspection according to the rules of shipping register.

(2) Only public foundries and Colombo Dockyard have chemical composition analysis equipment.

(3) Visual inspection is carried out at most of medium-sized or larger foundries. However, inspection standards do not exist and most of products are judged acceptable unless obvious defects are found. In particular, acceptance standards for cast surface seem to be very indulgent.

(4) Non-destructive inspection equipment such as radiography and magnetic particle inspection is available at Colombo Dockyard.

7) Quality of castings

(1) Most of castings do not conform to standard or specification.

(2) There are many kinds of casting defects of high rate of products. The rate of defective casting varies in each foundry but they are estimated by foundry engineers between 5 - 10%. Casting defects, however, are seen in machine shops where castings are delivered as accepted. The rate of defects should increase if they are judged by international quality level.

(3) Some of grey iron castings are too hard to be machinable, while others are of coarse grain on machined surface.

(4) Poor quality is notable for cast surface roughness. One foundry owner asked how smooth cast surface, which is observed at an automobile's engine block in scrap, can be made.

(5) Generally fillet radius on castings are very small or none. Ribs are irregular or deformed in shape probably due to repairing of the mold.

(6) Excess or uneven machining allowances are not defective, they considered, in machine shop they never be concerned about the amount of unbalance to be corrected by static balance test of ceiling fan cover castings. They do not have

the quality control concept to consider fluctuation of product quality as a defect.

Overall, castings produced in the country are considerably below international standards.

To penetrate the international market, the foundry industry must meet three requirements; (1) to achieve quality conforming to international standards, (2) to minimise casting defects, and (3) to improve productivity. Without modernisation and upgrading of foundry process technology, the industry will continue on the declining trend even if engineering and assembling industries grow in the future.

1.3 Current Situation of Metalworking Training Centres

In Sri Lanka, there are 6 major training centres teaching metalworking techniques:

1) IDB Foundry (Min. of Tourism and Rural Industry)
2) IDB Electro Plating Centre (Min. of tourism and Rural Industry)
3) Vocational Training Centre (Min. of Labour)
4) Automobile Engineering Training Institute (Min. of Youth Affair and Sport)
5) Ceylon German Technical Training Institute (Min. of Transportation)
6) Apprenticeship Training Institute (Min. of Youth Affair and Sport)

In addition, the following 5 organisations provide training as a part of activities:

7) Appropriate Technology & Development Centre (Min. of Tourism and Rural Industry)
8) Ceylon Institute of Scientific and Industrial Research (MIST)
9) Sri Lanka Standards Institute Laboratory and Training Centre (MIST)
10) University of Moratuwa (Min. of Education)
11) Government Factory (Min. of Construction and Housing)

In addition, there are National Engineering Research and Development Corporation and Tertial and Vocational Training Commission that was established in 1991 to co-ordinate activities of training centres.

Among metalworking processes, relatively advanced training for cutting, welding and assembly is provided at institutes 3), 4), 5), 6), and 11). One problem is that these training centres are scattered in many ministries and may not satisfy demand effectively. In this connection, Tertial and Vocational Training Commission established in 1991 is introducing a unified examination system to issue national licenses and certifications. In the future, the commission is expected to enable each training centre to function in the most effective manner to produce technicians and skilled workers in field and number according to changing demand.

On the other hand, foundry process training is offered at institutes 1), 3), 10) and 11). However, the quality of training in terms of process, equipment and operation is very poor in all processes of material management, melting, molding, and finishing. Thus it does not have any effect in improving foundry process technology. At present, the program to upgrade the technology is in progress under assistance of UNIDO, and Foundry Development Service Institute (FDSI) has been established as a private organisation to manage the program (See Annex I). FDSI has an office in IDB and appoints a manager for preparation of the project. However, UNIDO's program mainly concerns with the sending of experts and the furnishing of testing equipment to be installed at IDB. On-the-job training to use advanced equipment is not included. Thus the program does not serve the purpose of improving production techniques required for medium-sized private enterprises which plan modernisation. Establishment of a training centre equipped with an electrical furnace is needed to provide on-the-job training on new molding and finishing operations.

Training for electroplating is provided at facilities at 2) and 11). A training facility at Government Factory is very small and has a poor water treatment facility. On the other hand, IDB's training facility is old but is operated properly. It is desirable to completely renew IDB's facility in consideration of its obsoleteness and small capacity, but if renewal is not feasible, at least the modernisation plan proposed by the training centre (installation of plastic plating, Al anodizing and electro forming, and improvement of waste water treatment facilities) should be implemented.

The government is planning to establish a metal mold training centre in light of increased imports of metal molds. Today, most of factories manufacture own molds for metalwork products, as well as plastic molds for hangers and other relatively simple products. Some factories manufacture extruded dies and/or injection molds. Considering the fact that molds are highly customised products, while most of electrical household appliances and automobiles are imported, it is reasonable to expect small demand for metal molds that require advanced production techniques, such as precision plastic injection molds, press dies, and die

casting molds. Thus, the establishment of the molds and dies training centre seem to be premature. Instead, advanced molds and dies production facilities in the export processing zones, mostly idling at present, may be used to substitute for imported molds and dies. At the same time, it is desirable to develop the long-term strategy for the molds and dies industry.

There were two following plans on metalworking training centre in the county:

(1) The project planned to strengthen IDB by Ministry of Rural Industry and Tourism in May 10th, 1988.

(2) The project planned to convert government factory to a training centre (This was made by Ministry of Housing and Construction in August 19th, 1991).

2. FOSTERING OF METALWORKING INDUSTRY

Development of the metalworking industry will be strongly affected by the private enterprises after the most of public metalworking enterprises being privatised. Development of private sectors is based on their self efforts, however, it is well suggested by the economical growth for NIEs and ASEAN countries that governmental promotion policies urged in the development of private sectors. The government is recommended to take necessary measures for nurturing metalworking industry since it is so important for the national economy.

2.1 Need for Fostering the Metalworking Industry

As discussed in 1.1.1 "Historical background", the metalworking industry in Sri Lanka has been developing through the following phases:

1) Colonial period: Emergence and development of the metalworking industry to support plantation farming
2) After independence: Requisition of foreign companies, establishment of public enterprises, and incorporation of import substitutive private industries under protectionism
3) Introduction of market economy: Privatisation of public enterprises, failure of less competitive enterprises, the increase in import of metalwork products, Revitalisation and establishment of new private enterprises through incentive measures, and expansion of exports by foreign-affiliated enterprises in the export processing zone

Having gone through these development phases, the present metalworking industry in the country is structured as follows:

1) Public enterprises, who have abundant resources compared to private enterprises in terms of production equipment and manpower, but their facilities are not fully utilised due to lack of management autonomy.
2) Privatised public enterprises, who also have modern equipment and skilled workers but have yet to utilise their capacities, seemingly due to various problems associated with transition from public to private enterprises.

3) Locally-owned medium-sized enterprises, who are interested in technological advancement, investment, and exports, but lag behind in foundry process technology.
4) Locally-owned small enterprises, who does not recognise the need for technological advancement.
5) Joint ventures with foreign corporations
6) Foreign-affiliated enterprises operating in the export processing zones, who are mainly exporting non-machinery metalwork products to industrial countries.

After introduction of market economy, most of products manufactured locally under government protection have lost competitiveness and have been replaced with imported ones. These products are roughly divided into those which cannot be produced economically due to a small size of domestic market, and those which do not have international competitiveness in price and/or quality, regardless of the size of the domestic market. The former includes the automobile assembly industry, and the latter includes tools and sanitary fixtures (faucets, etc.).

As discussed in 1.1.7, the government of Sri Lanka has been implementing various programmes to foster export industries as well as pioneer industries, e.g., protection of domestic products through import duties, and exemption of income taxes. These measures have successfully stimulated private industries, and foreign enterprises operating in the export processing zones contribute greatly to the country's exports of metalwork products.

On the other hand, the metalworking industry has relatively a low level of technology, as discussed in 1.3.2, with exception to foreign enterprises operating in the export processing zones.

Under these circumstances, development of the metalworking industry in the country brings the following important benefits.

1) Supporting other industries

Metalwork products are divided into non-machinery products such as tools and machinery such as transportation includes it's parts. Metalwork products as a consuming goods are widely used in daily life to improve the standard of living, and metalwork capital products promote productivity of a variety of industries including agriculture, transportation, and construction to increase productivity. Thus, the metalworking industry plays a vital role of supporting social as well as industrial activities. If the country can produce metalwork products which are better than imported ones in terms of quality, price, and delivery time,

while meeting particular needs in the domestic market, it will serve as a prime mover for development of other industries.

2) Creating employment opportunities for male workers

Textile industry which account for a major output of the country's industrial output and constitute a major export item is important for the national economy but from the effect on the employment for male workers, the metalworking industry is more important.

3) Improving trade balance

Improvement of production techniques at private enterprises will be able to soon replace some of imported metalwork products (simple machinery and non-machinery metalwork products), which can be exported with further improvement of product quality. Both import substitution and exports in the industry will serve as a good start for improving the country's balance of trade.

4) Increasing national income and contributing to modernisation of the country and its industry

In any country, the machinery industry has been serving as an engine of economic modernisation. In Malaysia which population is close to that of Sri Lanka, the focus of foreign investment was shifted from original labor-intensive industries to capital-intensive industries since 1987, and very recently, was further shifted to production of high value added products. Growth of the machinery industry in the process has changed industrial and export structures of the country dramatically, and expectation is being heightened to join the ranks of industrial countries in the next 30 years.

2.2 Competitiveness of Sri Lanka's Metalworking Industry in the International Market

Open market policy regulated in 1977 brought about the shrinkage of domestic production and expansion of imports. Because, most of domestic metalworking industries under political protection were unable to compete with imports in both quality and price. Market restriction causes some products unable to be produced locally while some products have market competitiveness. It is evidenced from the fact that some metalworking enterprises in the EPZs export their products to the developed countries.

As metalworking industry including casting being labor intensive, their production base is from time to time shifting one country to another due to cheaper labour cost. Investment environment in terms of labor force in Sri Lanka is advantageous due to relatively cheap labour cost, high education level, hard working and English communication. Having locative advantage for Middle East, Southwest Asia and Southeast Asian market, it will be a good help for Sri Lanka's metalworking products to be exported if their quality is up-graded. Points and measures for strengthening market competitiveness will be come out by analysing import structure and export market of metalwork products excluding machinery for the time being.

2.3 System to Promote Metalworking Industry

As privatisation for public metalworking related public enterprises have been proceeding, the future development of the industry will fully depends on how private enterprises become active. It is obvious from history for economical success in NIEs and ASEAN countries that promotion policies urge the development of private enterprises. Besides, there is no doubt for private enterprises being the locomotive for economical development for the country.

First, the Government should strengthen the fostering of metalworking industry recognizing that they are important in the national economy.

Secondary, it is necessary for the Government to establish an division specialised for metalworking industry in the MIST. Through the division, the Government should implement the existing promotion policies, carry out mutual adjustment among ministries, and plan and implement considerable policies for promotion.

Table showing system on promotion policies for small and medium-scale enterprises in Japan is attached in ANNEX-II.

It is recommended to nurture private industrial association and to have a through communication with it for implementing promotion policies.

The general outline of the metalworking industry promotion plan in Sri Lanka is summarised as follows, by industry group excluding foreign-affiliated enterprises.

Item	Short-term	Medium and Long-term
1. Revitalisation of public enterprises (high levels of equipment and manpower, and lo capacity utilisation)	Financial assistance feasibility of import substitution and exports	Considering privatisation
2. Revitalisation of privatised public enterprises (high levels of equipment and manpower, and low capacity utilisation)	Finding subcontractors, serving domestic demand	Export expansion
3. Fostering of private enterprises	Quality improvement, rationalisation of production system, and import substitution	Development of export-oriented organisation, and export expansion
1) Government policy		
2) Improvement of production technology		
a) Training facilities and equipment Cutting, welding, sheet metal processing (existing facilities and equipment available)	Adjustment of training program	Continue
Casting, plating, waste water treatment (in-sufficient)	New installation, renovation, operation	Operation
Forging, heat treatment, mould (market undefined)		
b) On-site instruction (highly required)	Consultation by experts	Continue
c) Overseas training (highly required)	Training overseas	Continue
d) BOI corporate ties-up	Study on possibility	Promotion of tie-up
3) Expansion of domestic market (to replace imports)	Study on imported goods and Gov. procurement	Implementation
4) Promotion of subcontracting work (undeveloped)		
5) Export market for metalwork products other than machinery parts	Study on specific good's import	Promotion of export
6) Promotion of foreign investment (high damand)	Identify specific enterprises and commodities	To find foreign partner
7) Industrial estate for metal-working industry (demand exists)	Study on possibility by negotiating with enterprises	Promotion of relocation
8) Financial demand/supply (for modernisation and capacity expansion)	Study on required amount	To apply sector loan
9) Promotion of technical cooperation among developing countries	Study on possibility	Promotion of cooperation

Each of the above items is described in more detail as follows:

2.4 Revitalisation of Public Enterprises

As discussed in 1.1.2 1), public enterprises have higher levels of equipment and manpower than private enterprises, but they fail to utilise these resources in an effective manner, resulting in a very low capacity utilisation rate. A major reason for this is the lack of incentive for productive management. It is important to give public enterprises the freedom to use profit from increased productivity and exports for modernising facilities, equipment and for raising wages. This will motivate them to explore a market. In fact, Sri Lanka Railways, Locomotive Repair & Maintenance expects to receive financial assistance for modernisation, and diagnosis of many other public enterprises are under way. Likewise, to ensure that public metalworking enterprises have autonomy of management, it is important to conduct overall diagnosis and market survey for them by experts. The following examples may illustrate this point: (1) Ceylon Steel Corporation has only one facility in the country to produce cast steel and special cast iron, which produced merely 15 to 45 tons monthly as reported to the study team on visit. On the other hand, Colombo Dockyard imports 100 tons of cast steel annually, and sizable demand is expected from SLR and other companies, e.g., couplers of railcars. Similarly, while SLR has a large amount of scraps, Ceylon Steel Corporation does not operate its melting furnace on account of high electrical cost and produces steel bar from imported billets; and (2) Government Factory has the highest level of casting technology in the country and a large production capacity. Yet its monthly production is limited to only 25 tons. As discussed in 3.1, import substitution for cast iron is feasible if the market is developed effectively.

2.5 Revitalisation of Privatised Public Enterprises

Like other public enterprises, these enterprises have large production capacity and highly skilled workers. As they are completely autonomous in terms of management, they have potential to boost production for import substitution and to export surplus products if managed properly. A major issue facing them is its excess size that creates the need to motivate individual production units. The most feasible approach is to promote modernisation and market development by experts. Taking Lankaloha Hardware as an example, it is explained as follows:

1) Lankaloha Enderamulla Foundry has a 5-ton low frequency induction furnace, for which break-even point is estimated to be 200 tons monthly. However, its annual production is only 600 tons.

2) Lankaloha Yakkala plant produces agricultural machinery and such implements as kitchen utensils, brass valves, cocks and door metals. For instance, it supplies around 60% of all the hoes sold in the country, which price is 40% higher than those imported from China and Thailand to hold the remaining share. Its sizable production capacity for stainless steel knives and forks is also under utilised. Brass valves are not purchased by National Water Supply & Drainage Board because of poor quality, which imports them from Malaysia despite a high price - twice that of domestic products. Sanitary fixtures such faucets are mostly imported. If these products are improved in quality with lower production cost, they can replace imported products and may eventually be exported.

2.6 Fostering of Private Enterprises

2.6.1 Measures to nurture private enterprises

The government has been initiating a wide range of measures to foster private industries, such as tax relief, import control through protective tariff, and anti-dumping action. In fact, these measures have led to local production of bicycle components and safety pins. However manufacturers of these products are concerned about a possible decline in import tariffs due to the straightening up of the market economy-oriented policy, or point out that poor quality products are imported at a unfairly low price from India. Such reactions are supported by the questionnaire survey in which a number responding enterprises want government protection through tax relief and import duties. These opinions seem to reflect the fact that many companies feel that current government policies are inadequate or favorable promotional measures may not be taken in the future. It is expected to implement various promotion policies effectively and to assure continuity for these in future. Questionnaire survey suggests that manufacturers expect governmental assistance in market development and financing.

Notably, the metalworking industry in Sri Lanka has the following disadvantages compared to other countries. Thus, it is necessary to consider effective policies on the basis of these disadvantages:

1) Small domestic market
2) High dependency on foreign sources, together with relatively small consumption, makes most of metalwork materials highly costly.
3) The power rates is set unfavorably for large users due to the government's price policy.
4) Delay in infrastructure development
5) Low production technology levels due to restriction of industrial production under the previous policy to give priority to public enterprises, and delay in introduction of market economy and foreign capital
6) Continuation of regional conflict

While the shift to market economy is a rational policy option in the long run, the current situation points to the need for special measures to ameliorate the above disadvantages.

The first point to be considered is the effective implementation of the current policy to foster export and pioneer industries, while demonstrating continuation of such policy.

Secondly, major characteristics of the metalworking industry in the country need to be taken into consideration. For instance, stepwise promotional measures seem to be feasible and more appropriate for the industry, which start from import substitution of products for domestic markets in order to achieve quality improvement and price decline, followed by export promotion measures.

Thirdly, there is a need to provide special assistance for investment pollution control, e.g., promotion of collective relocation of factories and financial assistance in a concessional term.

2.6.2 Improvement of production technology

While most of engineers and technicians of public enterprises have received overseas training, those of private enterprises seem to have much less opportunity for formal training. As described in 1.2.2 "Foundry Process Technology", private metalworking enterprises have relatively a low level of production technology, although some of them have high interest in modernisation. To improve production techniques of the private enterprises, therefore, is essential in removing one of the disadvantages facing the industry. And effective measures to achieve the goal should combine the upgrading of training facilities, technical assistance to factories, and overseas training, each of which is described in detail as follows.

1) Upgrading of training facilities

As discussed in 1.3 "Current State of Metalworking Training Centres", some of professional training centres successfully conduct courses for various metalworking processes such as cutting, welding, and assembling. However, these centres are scattered over several ministries without much co-ordination, so that many of graduates cannot find appropriate job and go abroad for work. Currently the Tertial & Vocational Education Commission is conducting unified certification tests for trainees and is establishing communication with the chamber of commerce and other organisations to link graduates and employers.

In contrast, foundry training facilities are very old with poor quality, far below expectation of private enterprises to improve production techniques. As described in 1.2.2, foundry process technology in the country is at a very low level and cannot satisfy domestic demand, making most of casting products dependent upon imports. As ductile iron manhole covers are increasingly used, no local company can produce them to further increase imports of metalwork products. Some of medium-sized private enterprises plan to make investment in facility modernisation, which is not enough to produce high quality products. The upgrading of foundry process technology, as discussed in 3.2, is essential. UNIDO is providing technical assistance to improve the foundry industry, and is primarily focus on provision of testing equipment and sending of experts. Technical assistance through on-the-job training will be more effective to promote current foundry process technology and to reinforce UNIDO's assistance. Our recommendation is to build a modern foundry process training centre having a high-frequency electric furnace.

As for electroplating, IDB Electro Plating Centre is operating an old and small training facility. The centre hopes to introduce plastic plating, Al anodizing, and electro forming techniques. Also, the existing waste water treatment facility is old and substandard to require some upgrading. While it is desirable to fully renovate the plating facility which is highly corroded and insufficient in size, the addition of the new equipment and the improvement of the waste water treatment facility are recommended as the minimum improvement. Moreover, as discussed in 1.1.5 "Production Sharing System", Sri Lanka has few specialised plating enterprises and the plating process is operated as part of each metalworking enterprise. As a result, each process is small in scale and its waste water treatment facility is not sufficient to fully remove hazardous contaminants from effluent, difficult to comply with more strict environmental standards. In this connection, the training centre is expected to serve as a source of diffusing waste water treatment techniques to nationwide plating facilities. In addition, it is desirable to develop the centre into a training facility for treatment of industrial effluents in order to introduce new waste water treatment

techniques to all manufacturing plants throughout the country, which will inevitably face the need to meet increasingly strict environmental regulations in the future.

Some enterprises hope a metal mould training centre to be established since large metal mould imports are cited. At present metal molds for metalworking, such as presses, are produced at each metalworking shop, so are metal molds for simple plastic products such as hangers. Some manufacturers produce extrusion molds and injection molds in own metalworking shop. On the other hand, small demand is expected for molds of complicated shapes, which are mainly used for metal and plastic components of electric products and automobiles, because most of automobiles, construction equipment and electric products are imported to the country as assembled products. An enterprise operating in the export processing zone have metal molds production facility, but they are used to manufacture metal molds for their own production. It is recommended to conduct a joint market study with the enterprise to identify domestic demand and to develop a market development plan.

2) Technical assistance (field instruction)

During the field survey on foundries and other metalworking plants, the study team received a number of questions on improvement of production techniques at many facilities. Obviously, on-site diagnosis and person-to-person instruction on technical issues facing each factory bring a high educational effect by teaching basic knowledge through the practical process. Thus technical assistance of this type is highly recommended for improvement of the existing processes and products.

3) Overseas training

Traditionally, engineers and technicians of public foundries have received overseas training, and only a few from private companies. Private foundries in the country did not have an opportunity to learn from foreign countries under the past socialistic policy, and today their level of production technology is far below that of neighboring countries. As the first step to promote the development of the foundry industry, it is important for owners and managers of private foundries who have high interest in modernisation to visit foundries in other countries. Even for a short period of visit, this will help them to understand the present level of foreign foundry industries and the difference from their own.

2.6.3 Promotion of subcontracting work

As discussed in 1.1.5 "Production Sharing System", in Sri Lanka, very few work is subcontracted to outside manufacturers except for some assembly industries. Of 34

companies which responded to the questionnaire survey, 22 cited poor quality as a reason for not considering subcontract work, 18 "delivery time", 9 "no information", 8 "price", and 3 "others." On the other hand, many respondents who do not subcontract work hope to do it in the future. IDB is reportedly implementing a programme to nurture subcontracting enterprises. In this connection, IDB is expected to make initiatives to minimise a risk of companies who require subcontractors, such as the reviewing and registration of potential subcontractors, and on-site technical assistance. It should be noted that to develop a network of subcontracting companies will help modernise and strengthen the entire industrial structure through improvement of production technology, the streamlining of production, and reduction of wasteful investment.

2.6.4 Expansion of export market

As discussed in 1.1.2 6), foreign enterprises operating in the export processing zones are exports metalwork products other than machine components, including tools, bolts and nuts, to industrial countries. Metalworking enterprises outside the export processing zones are exporting simple machinery such as tea processing machines, and non-machinery products such as razors and printed metal cans. The small domestic market necessitates the metalworking industry to explore foreign markets as a source of growth, which is also in line with the national policy. Public metalworking enterprises have sufficient facilities and equipment and are capable of exporting their products if they are given of management autonomy. Similarly, privatised public enterprises have potential for exports, as judged from their present capacity. On the other hand, private enterprises should start from production of import substitutive products, and once they become internationally competitive in terms of quality and price, they will be able to export products by taking advantage of the country's strategic location. In fact, the results of the questionnaire survey (Table-6) indicate many enterprises show high interest in exporting their products. In the interview survey, several enterprises responded that foreign market survey would take a large amount of cost which could not be borne by a single company. A realistic approach is to make the export market study for the identified potential markets for non-machinery metalwork products where the country has locational advantage, e.g., exports of cutlery to the Middle East (see U.N. Statistics in Annex-II).

2.6.5 Promotion of foreign investment

As discussed in 1.1.6 "Investment Plan" of Chapter 1 and 2.4.1 "Industrial Promotion Policy", many metalworking enterprises, both public and private, have future investment plans and expect to export their products in the future. In particular, many of them have high interest in introducing new technology and machinery from foreign countries,

though the questionnaire survey has not asked as to how new technology will be introduced. Alliance with foreign companies can take various forms, ranging from equity investment to technical ties and to subcontracting. Considering that consumer confidence in domestic products is very low in Sri Lanka, the use of an established brand name alone can have a positive impact on their marketability.

For this purpose, it is important to focus on specific products (e.g. water pump) and makers which have potential competitiveness, rather than general promotional activity to attract investment of foreign companies. Approaching selected foreign companies with detailed information on makers and products would bring constructive results, and clarifying problems. A preliminary study prior to the start of the approach is also effective and recommended.

2.6.6 Industrial estate for metalworking industry

Today, many metalworking shops in Sri Lanka are located within residential areas. This makes expansion of their operation difficult, and more important, they will not be able to operate at present location if environmental pollution becomes major public concern. The questionnaire survey shows that 23 out of 50 private enterprises are interested in moving to industrial estates.

As seen in Table-21, many of them manufacture relatively simple machinery including metal furniture, agricultural processing machinery, woodworking machinery, and non-machinery metalwork products. Of the 23 enterprises who have an interest in moving to industrial estate, 20 answered to the question about export and 19 out of 20 showed interest in future exports. This suggests that industrial estates accommodating metalworking enterprises need to be in strategic location advantageous to exports. Although not indicated in the questionnaire survey, faucets and other sanitary metalwork products are mostly imported but can be replaced with domestic products and can be exported if quality is improved. In addition, valves and pumps can meet domestic demand and can be exported if production techniques are improved. One possible solution is to accommodate metalworking enterprises in an industrial estate.

In the Japanese foundry industry, several foundries share one electrical furnace in an effort to minimise melting cost and to improve product quality. Also, many plating shops jointly operate waste water treatment facilities to remove contaminants effectively from their effluents. Of 23 companies showing interest in industrial estate, 6 companies have the foundry processes and 3 the plating process. These companies may share a melting facility and/or a water treatment facility to promote themselves.

Also, to operate the industrial estate specially designed for the metalworking industry, other advantages such as joint purchasing of materials and joint use of testing facility and equipment should be offered.

Today, several metalworking shops are operated in IDB's industrial estates, but they are located separately and mainly serve domestic demand.

Most of plating shops in the country do not have sufficient waste water treatment facilities. While it is desirable to have a centralised treatment facility for different plating shops, they are scattered throughout the country and efforts are needed to devise the most economical and effective method.

2.6.7 Investment requirements

As discussed in 1.1.6 "Investment Plan", many metalworking enterprises including private, joint venture, and public, have future investment plans (Table-6). However, it is difficult to estimate actual capital requirements from the questionnaire survey because of relatively a small sample size, because a small number of companies reported both the value of fixed assets and the amount of future investment; 33 private companies, 4 joint ventures, and 2 government-owned enterprises. Instead, by using total assets listed in the Annual Survey of Industries 1990 and planned investment responded in the questionnaire survey, total investment requirements for the metalworking industry are estimated at 1,200 million Rs. for private enterprises and 315 million Rs. for public enterprises.

ASSETS OF THE METALWORKING
INDUSTRY BASED ON INDUSTRIAL STATISTICS

(Unit: 1,000 Rs.)

	Total	Public	Private
381 Fabricated Metal Product	411,469	34,843	376,626
382 Manufacture of Machinery	102,879	13,566	89,314
383 Electrical Machinery	174,952	0	174,952
384 Transport Equipment	1,304,411	38,125	1,265,986
Total	1,993,411	86,534	1,906,878

Source: Annual Survey of Industries 1990

RESULT OF QUESTIONNAIRE SURVEY

	1 Asset	2 Total Investment	2/1	Total Asset	Total Investment
Private Company	501.49	393.75	0.79		
Joint Venture	175.35	31.00	0.18		
Sub-total	676.84	424.75	0.63	1,906,878	1,201,333
Governmental	110.00	400.00	3.64	86,534	314,983

2.6.8 Promotion of technical co-operation with developing countries

The field survey covered Appropriate Technology & Development Centre and National Engineering Research & Development Corporation's laboratory. The former conducted research projects on agricultural implements and saws locally used, and the latter worked on fermentation-based gas production facilities using paddy husk, etc., a window mill, and low-cost housing. These technologies are not available in industrial countries and seem to be useful in Southeast and Southwest Asia which have common background in natural environment and other aspects. Clearly, development of these "indigenous" technologies has high potential in contributing to higher standards of living and industrial development in the country as well as neighboring countries. From this viewpoint, it is recommended to explore an opportunity for joint development and mutual use of technologies within the region.

2.7 Action Programme

On the basis of all the problems discussed, the government of Sri Lanka is recommended to take necessary measures as below:

Action Programme 1: Establishing a firm policy to promote the metalworking industry

Clearly, development of the metalworking industry, an integral part of the secondary industry, has been playing a critical role in economic development of any countries. The metalworking industry serves as a foundation of various industries and contributes to the rise in standard of living by supplying a wide range of consumer products and their vital components. More important, the metalworking industry contains a variety of sub-sectors, which are labour intensive in nature and show a varying degree of cost advantage and competitiveness according to a particular stage of industrial development. This

is evidenced in the fact that many sub-sectors of the industry migrate from one country to another for lower labour cost. The foundry industry, a major focus of the present study, is a leading example of such sub-sector; Japan is facing increasing difficulty to attract young workers to the foundry industry in recent years. On the other hand, Sri Lanka offers a major cost advantage for at least some sub-sectors of the metalworking industry, as seen in foreign enterprises operating in the export processing zones, who are exporting metalwork products to industrialised nations. While automobile and household appliance assembly industries left the country in 1977 due to the relatively small domestic market, leaving scant production of maintenance and repair parts, the country is importing other metalwork products in large quantities. It is therefore a rational choice for the country to focus on local production of these currently imported metalwork products, other than machinery, to serve domestic demand at first and to look for an export opportunity in the later stage.

Another general advantage of the metalworking industry is to create employment opportunities for male workers. In Sri Lanka, the food processing and textile industries hold predominantly high percentages of employment in the manufacturing sector, and they generally employ female workers. In contrast, the metalworking industry mostly requires male employees, and its fostering will contribute to correction of female-dominated employment structure in manufacturing industries.

As pointed out earlier, costly capital goods such as motor vehicles and processing machinery are not suitable for local production in Sri Lanka because of a small domestic market. On the other hand, non-machinery metalwork products including consumer goods can substitute present imports if local products are improved in quality with lower prices. Furthermore, they may be able to find export markets as foreign enterprises in the export processing district are doing now.

On the basis of this understanding, Action Programme 1 recommends the following:

1) To select the metalworking industry as a strategic industry with high priority for government assistance

Given high potential of some sub-sectors of the metalworking industry to become internationally competitive, subject to technological up-grading, and considering their positive impacts on employment of male workers as well as

on the balance of payments, it is recommended that the government of Sri Lanka will select the industry as a strategic industry to be fostered as a national priority.

2) To create an organisation specialising in assistance of the metalworking industry within the Ministry of Industry

As shown in Annex 4, the Japanese government has been implementing a number of assistance programmes to nurture small and medium-scale enterprises, and the policy has contributed significantly to development of industrial foundation in the country. Other Asian countries have initiated similar industrial promotion policies with some successful results. The government of Sri Lanka has been promotion export enterprises and pioneer industries in the form of infrastructure development and tax incentives. However, the current policy has still to be reinforced in many areas, including information service, financial assistance, and market exploration.

Notably, existing programmes to foster private enterprises are implemented through many organisations that are supervised by different ministries and agencies. Efficiency in the use of limited resources can be improved by co-ordinating efforts of the responsible organisations and ministries. For this purpose, it is recommended to establish an ad-hoc organisation within the Ministry of Industry. The first task of the proposed organisation is to organise metalworking enterprises for effective promotion of assistance programmes to be realigned.

Today, there are various trade organisations, such as Foundry Development Service Institute (FDSI) and Association of Manufacturers of Automobile and Agricultural Spare Parts, but they do not have enough membership and are not very active. The proposed organisation under the Ministry of Industry should take leadership in developing effective promotion programmes (including implementation of the following action programmes) and establishing implementation plans, in consultation with the existing trade organisations. In the process, the organisation can also use foreign experts to ensure maximum attainable results.

Action Programme 2: Modernisation of public and privatised metalworking enterprises

In Sri Lanka, privatisation of public enterprises is under way and is expected to be mostly completed by the end of 1993, while there are several public

enterprises that are not slated for privatisation today, such as the Government Factory specialising in metalworking operation. Privatised metalworking enterprises have large capacities and a number of competent engineers and seem to be capable of supplying products that are not only suitable for import substitution, but for export markets with high-grade quality. This can be accomplished by modernisation of management, including the establishment of a marketing department and expansion of autonomy for production departments.

Privatisation of public enterprises should not be an end in itself. Rather it should be considered as a starting point in the country's industrialisation strategy. Again, foreign experts should be called in to analyse the current situation before the preparation of modernisation plans.

Action Programme 3: Improvement of metalworking technology

The present study on the metalworking industry has principally covered the foundry industry. The results reveal that foundry products are generally poor in quality and are not competitive enough in international markets. As a result, many metalwork products are imported. At the same time, the study results reveal that many metalworking enterprises, particularly medium-scaled ones, have a strong desire to invest in modernisation of facilities and equipment.

Improvement of metalworking technology can only be accomplished through promotional measures, including diagnosis of corporations, introduction of foreign technology, expansion of training centres, and dissemination of technical information. Today, Sri Lanka is successfully operating several metalworking training centres, but they emphasise cutting, welding, and assembly. Thus it is desirable to establish a metalworking training centres having sufficient training equipment and courses in the area of foundry and electro-plating. In the implementation of the metalworking training center, the role of MIST for the consolidation of metalworking industry should be recognized, and MIST should take initiative in coordination with the existing training center of other ministries. Equipment required at the proposed training centres, and related information are presented in Appendix-IV.

At the same time, overseas training and analysis of existing enterprises and their operations should be conducted under participation of outside experts, including foreign consultants.

Action Programme 4: Expansion of the domestic market

One issue facing the metalworking industry in Sri Lanka is a small domestic market that has delayed the up-grading of technical levels.

The small domestic market has prevented growth of assembly industries, including automobiles and household appliances, which would otherwise spur development of the metalworking industry. One possible approach is to develop an industrial base to foster assembly industries, including local production of machine elements and that are currently imported, which would in turn stimulate demand for a variety of metalwork products.

However, the fostering of assembly industries requires long-term viewpoint and is obviously out of scope here. We should instead devise an alternative approach which brings an immediate or short-term effect. The first step in market expansion is to analyse and identify the existing and potential domestic market for metalwork products. The need for market study is evident from the questionnaire survey conducted concurrently with this study, in which many respondents listed "provision of domestic market information" as to what the metalworking industry expects the government to do for them. The market study should focus on evaluation and comparison of imported products with domestic products in quality aspects. Then, it should search for the way to foster the domestic industry by using public demand for metalwork products, including government procurement. In this connection, it is desirable to assign the existing trade organisations to the market study as part of their promotion measures.

Action Programme 5: Promotion of subcontracting

Many metalworking enterprises in Sri Lanka have all production processes within their own facilities, with few jobs contracted out to outside sources. This structure brings about considerable diseconomies for the industry as well as the country as a whole, partly because it fails to stimulate technical development at each process, and partly because scarce resources are wasted due to duplicated investment and low capacity utilisation rate. To promote the division of labour through subcontracting is therefore recommended to remove the above bottlenecks.

The result of the questionnaire survey indicates that a number of metalworking enterprises are ready to go in that direction, as they responded, "Not many

subcontracted jobs at present, but plan to increases them in the future." Annex 5 summarises promotion of subcontracting conducted in Japan.

Promotion of subcontracting requires a wide range of efforts to establish long-standing relationships between ordering companies and subcontractors, i.e., registration of potential users and subcontractors, and consultation service to improve production techniques and management practices of potential subcontractors in order to reduce concern of ordering companies. The first set of activities required in Sri Lanka is to create an organisation to promote subcontracts and to secure budget required for promotional activities.

Action Programme 6: Exploration of the export market

Another way to overcome disadvantages related to the small domestic market is exploration of an export market for metalwork products. At present, Sri Lanka mainly exports metalwork products other than complex machinery, as well as simple agricultural machinery. Foreign enterprises operating in the export processing district are also following this practice.

Based on currently available technical levels of the metalworking industry in the country, the study team has identified various potential export products, including metal fittings and fixture for construction work and household metalwork products for the Middle East market (See Annex 2, which presents U.N. Statistics). Therefore, the study team recommend a reconnaissance study to be conducted for the Middle East market. Once candidate products and markets are identified, a formal market study is recommended.

Action Programme 7: Capital requirement survey

The results of the questionnaire survey indicate that many enterprises have modernisation plans. Based on capital requirements specified in the survey, the total capital requirement for modernisation of the entire private metalworking industry is estimated at 1.2 billion Rs.

Clearly, financial assistance is a key element of promotional measures for the metalworking industry, and introduction of sector loans may be required to meet actual capital requirement. If this is the case, an accurate estimate of capital requirements need to be made in order to support the application. Again, the study may be assigned to the trade organisations to encourage their participation in promotional activities.

Action Programme 8: Promotion of cooperation with foreign corporations

In the questionnaire survey, most of respondents expressed high expectations for collaboration and alliance with foreign corporations, particularly in the form of technical assistance, subcontracting, and equity participation. However, the survey did not reveal the degree of cooperation expected by Sri Lanka's enterprises.

In light of the fact that domestic products fail to obtain consumer confidence, cooperation with foreign corporations is expected to serve as an effective way of promoting modernisation of the metalworking industry. To find foreign partners who can bring maximum benefits, particular needs and wants of local enterprises, including types of industries and products, and the scope and level of cooperation, should be identified through a formal survey.

Action Programme 9: Development of an industrial estate specialising in metalworking

This is not limited to the development of new industrial estate which accommodates metalworking enterprises, but also to attract several metalworking enterprises to a portion of an industrial estate or within the existing factory site. Induced concentration of metalworking enterprises is believed to be an important step toward modernisation of the industry.

In the questionnaire survey, a significant number of metalworking enterprises expressed their interest in moving to the industrial estate, and some of them have foundry and plating processes.

In particular, there are a few areas could benefit much from local concentration. First of all, the small domestic market does not justify that a few foundries operate their own electrical furnaces, which would otherwise lead to oversupply. Secondly, plating shops often discharge their effluent without proper treatment because of relatively a high cost required for an individual treatment facility. Thus, a group of foundries sharing an electrical furnace and a group of plating shops having a common waste treatment facility are considered as feasible types of industrial estates specialising in metalworking. Such industrial estate should be equipped with other common facilities, such as a testing laboratory. Development of the specialised industrial estate should start from preparation of a conceptual plan which will be presented to related industries so as to sound their interest. If a sufficient number of potential users is found, a formal plan should be developed.

At present, a project to relocate tanneries to an industrial estate is under way, with a common effluent treatment facility being constructed under UNIDO's fund. Similarly, effluent from plating shops is likely to present a serious environmental problem, justifying the plan for the industrial estate accommodating metalworking enterprises.

Action Programme 10: Promotion of technological exchange with other developing countries

During the field survey, the study team had an opportunity to visit the Ceylon Institute of Scientific and Industrial Research, which was actively involved in development of technologies suitable for the country's needs, as well as physical and chemical testing equipment for metals. Such indigenous technologies include low-cost housing construction, gas generator fermenting straws, wind power generation. Also, Appropriate Technology and Development Centre is developing agricultural machinery and implements suitable for local conditions. Some of these technologies are expected to be adaptable in Southeast and Southwest Asian countries, and can serve as a basis of technological exchange to upgrade levels of production techniques as a general.

It is therefore recommended to make proper arrangement with the above organisations so as to develop opportunities and methods of planning and implementing technological exchange.

3. FOUNDRY INDUSTRY PROMOTION

3.1 Foundry Production and Demand Outlook

Sri Lanka produces estimated 8,000 tons of castings annually, of which 2,000 tons are manufactured by public sector foundries and privatised foundries, and remaining 6,000 tons by medium-sized foundries operated as part of private engineering enterprises, and privately owned small foundries. The UNIDO/NIBM survey conducted in 1988 predicts that demand for private foundries will increase by 100% in the ensuing 5 years to reach 12,000 tons in 1993. Even if this growth is realised, annual production will amount to 14,000 tons, equivalent to 0.8 kg per capita if the country's population in the same year is assumed to be approximately 17 million. In fact, Sri Lanka is one of four countries - others are Bangladesh, Indonesia, and Nepal - which per capita casting production in 1990 is less than 1.0 kg (See Table-23). As this data is considered to be one of indices to show the level of industrialisation of a particular country, it is reasonable to assume that casting demand will increase significantly with future industrial development to meet the role of the supporting industry to supply materials to a wide range of industries.

3.1.1 Import substitution

Import substitution is a primary source of spurring demand for castings. From current imports of machinery parts and other metalwork products, imported casting product is estimated at 4,000 tons/year. To replace imported products, domestic foundries have to become competitive in terms of quality and price. Based on limited data collected during the field survey, the following are possible import substitutive products:

1) Sewing machine arms and beds (cast iron): 400 tons (84,000 units x 5 kg) are imported from Taiwan annually as complete set.

   These products can be produced locally if improvements are made on machine molding, molding sand, and characteristics of molten metal.

2) Molds for glass production: 9 tons are imported from the U.K. annually. Although quantity is small, unit price is 10 million Rs. Users are expanding their production lines to twice the present level, and mold demand is expected to grow accordingly. These molds can be produced locally by using heat-resistant alloyed cast iron and by utilising chemical analyzing equipment and a high-frequency induction furnace.

3) Manhole covers: Currently manufactured locally by using grey cast iron, increasing demand for ductile casting products is met by imports (6,000 units were imported from Japan between 1987 and 1991 under the OECF loan project). Pipes and fittings are in a similar situation, but their demand is dependent upon development projects and is not known. These products can be manufactured through the use of induction melting furnaces, improvement of molding sand, and the use of imported chemical additives.

4) Pumps: According to the Irrigation Department's survey, 2 inches or smaller pumps are produced locally and 3" or larger ones are imported because of price competitiveness. According to 1990 trade statistics, 1,986 units of 3" or smaller centrifugal pumps, with the total value of 25,263,829 Rs., were imported. This suggests possibility of low-cost domestic production. Pumps use both cast iron and copper alloy castings, and the increase in domestic production will lead to higher casting demand.

   Present production techniques and equipment are applicable with minor adjustment to manufacture larger components.

5) Grinding media (liners and balls) for cement production: Ceylon Steel Corporation is manufacturing anti-wearing alloyed cast iron products for stone crushing machines and similar machinery, but a sizable amount is still imported. These special alloy products are recycled and reproduced in many countries. A high-frequency melting furnace and analytical equipment are required for production of grinding media locally.

6) Hull steel castings for shipbuilding: Colombo Dockyard imports as much as 100 tons of steel castings annually. Equity participation by Japan's Onomichi Shipbuilding is expected to boost new shipbuilding contracts, further increasing steel casting demand. As hull steel castings for shipbuilding need to be tested and inspected by a surveyor of a shipping register, some of which requires factory approval, testing and inspection facilities and equipment need to be upgraded for this purpose.

7) Steel castings for national railway (SLR): Special rails (curves and joints) and couplers are imported according to trade statistics. These products can be produced by Ceylon Steel Corp.

8) Copper castings including taps, cocks, valves, and fittings: These are imported in large quantities according to trade statistics (62,531 units, valued at 13,341,586 Rs., in 1990).

For import substitution, cost reduction through mass production is needed by using raw materials of standard quality and molding/pouring production lines. Also, machining and electroplating are important elements.

9) According to the National Water Supply and Drainage Board, large copper alloy casting valves have been switched from domestic sources to imports due to poor quality. In order to substitute imports, the use of raw materials of standard quality and the learning of proper casting method are important. Radiographic inspection equipment at Colombo Dockyard can be used if necessary.

3.1.2 Market expansion

The second step to boost casting demand is to regain demand which has been replaced with welded structural members and plastic products. This again requires castings to become competitive with substitutive materials in quality and price.

1) Shipbuilding materials: Colombo Dockyard use weld fabricated steel plate components for hose pipes and other parts which are usually made of steel castings, because steel castings are not locally available and imported castings do not have sufficient quality (see 3.1.1 6)).

2) PVC pipes: Water pipes have previously been made of cast iron and are now replaced with PVC, because of lightweight for ease of transport, good workability, and price. According to engineers in Japan, PVC pipes are popular at construction sites but cast iron pipes are also used because of strength.

3) As for other machinery, foundries are expected to make efforts to expand applications of castings for products which are of steel plate construction due to poor confidence in castings. They should communicate with designers and assure them that they will supply standard products.

3.1.3 Exports

Generally, the order form for castings specifies quality standards in addition to price, quantity, delivery time, and drawings. Quality standards include inspection methods to check kind of material, dimensional tolerance, and soundness of castings, and evaluation criteria. Some of these items are indicated in the form of standards of a certain country or organisation, which can be understood by both the buyer and the manufacturer. However, acceptance standards for both surface and internal soundness of casting are difficult to be developed, often resulting in high inspection cost and casting price. To ensure quality assurance under these circumstances, the manufacturer's quality control system and mutual trust on the basis of long-standing relationship are essential.

It is difficult to export castings except for those as part of machined castings, assembled units, or machinery. In this connection, medium-scale foundries in private engineering enterprises are expected to play an important role.

Japan produces 8.2 million tons of castings annually, and only 85,000 tons - 1% of production - are imported (exports amount to 60,000 tons) (see Table-24). Given shortage of foundry workers and high land prices, Japan's imports of castings will be increased. Japan has imported castings from Korea, Taiwan, and China, but recent price increases in products from Korea and Taiwan are increasingly shifting import sources to China and Thailand. Also, Vietnam is considered as a promising base of casting production.

For most of Japanese foundries and users of castings, Sri Lanka is relatively unknown and remote. Nevertheless educated and abundant labor force can offer a number of advantages. Starting from small business or information exchange, continuous relationship between foundry and concerned industries in the two countries may develop into collaboration in technology and marketing, then direct investment.

3.2 Improvement of Foundry Process Technology

From the field survey on foundries and factories of user companies, various technical issues and recommended improvement measures are identified in Table-25.

In the past, Japan proposed various technical assistance programmes for Sri Lanka such as dispatching of foundry experts, the consultancy of rehabilitation programme for public foundries, and the establishment of a plan of a metalworking centre, but only the dispatching of foundry experts were implemented. Appropriate Technology & Development Centre and

Automobile Engineering Training Centre, established under assistance of Japan, do not offer any courses for foundry process technology.

Sri Lanka's foundry industry is currently at a very low level in terms of production technology and skills. Most of foundries do not have equipment related to quality control or have very old equipment. While the foundry industry is about to change from labor-intensive to capital-intensive in many countries, labor-intensive is still major process. Thus, training designed to improve production techniques and skills is most critical on the job training. Foundry managers also need to identify problems and possible improvements from field operation. At the same time, they have to learn technical issues facing their facilities, possible solutions, and future improvement plans from advanced technology and productivity. In reality, however, there is no adequate place of training nor foundry serving as a model case.

Although there are training facilities related to foundry process technology, including IDB Foundry, Government Factory, and Moratuwa University, all of them have insufficient facilities and equipment. National Apprenticeship Industrial Training Authority (NAITA) is only relying skill training for foundry practices on Government Factory and IDB.

Last year, Foundry Development Service Institute (FDSI) was established located in IDB under assistance of UNIDO (see Annex-I). FDSI is a service organisation to assist private foundries and their users, under financial assistance of IDB and UNIDO. Under its original plan, FDSI conducts the following service programmes:

a) Diagnosis of foundries and advice on improvement
b) In-plant tests, such as testing of molding sand and scraps
c) Skill training for foundry practices, and arrangement to other training organisations
d) Pattern making
e) Chemical analysis, micrographic testing of castings and metalwork products, and hardness test
f) Stress relief annealing, and heat treatment
g) Assistance in production cost analysis and product research and development
h) Preparation of casting plan including computer-aided solidification analysis
i) Preparation of Computer aided designing of casting parts, patterns, and match plates
j) Promotion of new technologies including special manufacturing methods
k) Consultation and advice on casting standards and design

l) Advice on energy saving and pollution control measures

At present, half a year has passed in the 3-year project period, but actual service has still to be started due to shortage of UNIDO's budget to supply equipment and materials, an insufficient number of members (insufficient membership fee), a low level or shortage of engineers to provide consultation service, poor levels of equipment and skills at IDB's foundry which will be used as a training centre. This prevents FDSI from earning revenues as scheduled.

The UNIDO's original plan to supply equipment and materials is being reconsidered, and the following services are planned to start one or two years later:

a) Testing and inspection services including analysis and material testing
b) Advice services related to cupola design and operation
c) Consultation service on short-term overseas training of engineers and technicians
d) Collective imports and sales of raw materials and sub-materials

The largest problem facing FDSI is the absence of a foundry which has a sufficient facility and equipment to train engineers and technicians, and the lack of training instructors; UNIDO's experts are assigned on a short-term basis. Together with the lack of training facility except for some testing facilities, FDSI's training programme will not have much impact on the foundry industry as a whole. If the situation continues, FDSI may lose its reason for existnace.

1) Foundry process technology training centre

A training centre most suitable for the foundry industry in Sri Lanka should consist of an integrated foundry covering pattern making, sand preparation, molding, melting, pouring, finishing, testing and inspection to provide on-the-job training for engineers and technicians, while educating foundry owners and managers. Also, the training centre is useful for engineers and technicians of public foundries and privatised public enterprises to learn latest technology.

The model foundry as the foundry process technology training centre requires facilities and equipment listed in Table-26. (Refer also to Appendix-IV)

In addition to training, the model foundry should actually manufacture and sell ductile iron and alloyed cast iron; local users are forced to use imports because of unadvanced

local technology, to earn operation and management costs as well as to cover the further purchasing of equipment. On-the-job training serves as an opportunity to learn the cost accounting system in a day-to-day production environment, including impacts of productivity, material yield, and defect ratio on production cost, as well as other aspects of foundry operation and management.

Equally important is overseas training for engineers and technicians, who can learn what is needed to develop the country's foundry industry into the world class industry through lectures and practical training in foreign countries.

3.3 Upgrading of Existing Foundry Management

1) Ceylon Steel Corporation

To overcome the most serious problem - small and unstable production, the company should make efforts to develop its potential market. For instance, SLR appears to have sizable demand for steel castings including couplers of railcars. Colombo Dockyard imports more than 100 tons of steel castings annually, and potential demand seems to be much larger as judging from the fact that they use weld fabricated components due to the shortage of steel castings. In particular, the dockyard intends to expand new shipbuilding contracts under equity participation of Onomichi Shipbuilding Co. of Japan, which would create new steel casting demand. Production of hull steel castings for shipbuilding requires inspection by a surveyor of the shipping register as well as factory approval by a certain register, which would require additional investment and improvement of quality control and inspection techniques. But the increase in demand by 200 tons would pay off such additional investment (As the foundry dockyard is not related to the rolling mill factory, independence and privatisation of foundry will serve as an impetus for market exploration and expansion.).

2) Government Factory

The factory has a role to supply its products at cost and is not allowed to make profit nor use profit for capital investment or an incentive wages. While its products have to be sold to government organisations, which in turn may procure from any sources including private factories.

Another problem facing the factory is that its product range is too large to be controlled effectively, ranging from a foundry to lumbering and furniture factory, a hospital bed factory, a signboard factory, and factory of smallest products such as police emblem.

3) Lankaloha Enderamulla Foundry

A major problem is that capacity of its melting facility far exceeds present workload. The break even point for the foundry's 5-ton low-frequency electrical furnace is reported to be 200 tons monthly. Based on current monthly production of 50 tons and assuming that casting yield is 60%, normal melting demand is only 80 tons. To reach the break even point, production needs to be tripled. The foundry recorded the highest production level of 2,030 tons in 1980. At that time major products were water pipes that are now replaced with PVC pipes. Thus, the foundry needs to regain the peak demand of the water pipes, etc. by lowering its production cost.

In 1987 - when the latest sales data are available, the foundry supplied 475 tons of brake shoes to SLR, 226 tons of earth pipes to Ceylon Electric Board, and 300 tons of manhole covers, which are being replaced with imported ductile iron products. As the foundry is capable of producing ductile iron manhole covers by using its electrical furnace, agitating ladle and C.E. meter, it should make efforts to manufacture ductile iron manhole cover by negotiating with the customers.

The foundry's large production capacity - the largest in the country - needs to be supported by large demand, and it might be useful to study the problem together with the problem of Government Factory and SLR.

4) Private foundries

Some of private foundries surveyed are very enthusiastic about technical improvement, including the purchasing of equipment and imports of raw materials and supplemental materials. As example, Edna Engineering Co. has already purchased a high-frequency induction furnace and is building a new factory.

Unfortunately, there is no consultant or instructor to teach foundry managers basic knowledge and information related to foundry operation and management.

One of the most important information not known to foundries is the fact that new equipment alone does not lead to the improvement of production technology. Rather it sometimes causes deterioration of quality. For instance, high tapping temperature from a

high-frequency induction furnace, decreases cold shut or mis-run but increases casting defects caused by molding sand unless amending its poor character.

Another concern is that, if many companies rush to capital investment, the small domestic market may be glutted to result in intensive price competition.

What the foundry industry needs now is to work toward structural improvement, hopefully led by FDSI, e.g., rationalization through integration of foundries, and balanced investment and market development. Or they can start from a more realistic approach in that a group of foundries share various facilities and equipment, such as a melting facility and a sand preparation facility, in an industrial estate. This is one solution to minimise the capital cost which is relatively expensive due to the small domestic market.

3.4 Government Support

The new industrial policy of the government sets forth the following objectives to promote accelerated industrialisation of Sri Lanka:

To transform the market from domestic to export-oriented.
To provide greater employment for a growing population.
To improve economic structure and to strengthen trade balance.
To ensure more equitable distribution of income and wealth, thereby to improve the quality of living.

While the foundry industry contributes greatly to creation of employment opportunities and improvement of balance of payments through import substitution, its primary role lies in support of machinery and other industries. Yet, foundry production per capita shown in Table-22, indicates that Sri Lanka lags behind other Asian countries in the level of industrialisation.

In addition to improvement of foundry production technology which has been discussed repeatedly, another challenge for the foundry industry in the country is market expansion. The predicted growth of production from present 8,000 tons to 14,000 tons does not provide enough incentive for foundry owners to make new investment. Additional demand needs to be developed through concerted efforts of the government, the engineering industry, and the foundry industry. They can tap on successful strategies in low- and medium-income developing countries, including the guaranteed ordering of castings for public works for a certain period of time, temporary protection for import substitution, the fostering

of the engineering industry which is a major user of castings, and the planned boosting of the localization rate from KD production of machinery.

The government also needs to provide a wide range of assistance including financial assistance, reduction of import duties on equipment, raw materials, and supplemental materials, and incentives for import substitution, in addition to promotion of investment by foundries.

Finally, as the above efforts lead to the increase in the number of foundries which can manufacture castings in compliance with industrial standards at a high yield, a factory certification system can be considered as an additional promotional measure.

Tables

Table-1 Ministry of Industries, Science and Technology Status
Report on Public Enterprises Identified for Peoplisation
- Non-Mining and Non-Mineral Sector -

(1) Name of SOE	(2) Convert to Company	(3) Government Decision to Privatise	(4) Appoint-ment of Committee Tender Board	(5) Valuation Obtained from C.V.	(6) Profile of Company Prepared	(7) Sale of Majority Share		(8) Report Sent to Cabinet	(9) Cabinet Approval Obtained	(10) Negotia-tion of MOU Commences	(11) Signing of MOU	(12) Transfer of Share to Corporate Investor	(13) Transfer of 10% Shares to Employees	(14) Public Share Issue to Commence	(15) Public Share Issue Closed	(16) Target Date	(17) Perfor-mence	(18) Delays & Comment
						Date of Advert-isement	Closing Date for Offers											
1. United Motors	v	v	v	v	v	5.7.89	25.8.89	v	v	v	v	v	v	v	v		Highly Improved	
2. Ceylon Oxygen	v	v	v	v	v	29.5.90	15.6.90	v	v	v	v	v	v	v	v		- do -	
3. Ceylon Leather Product	v	v	v	v	v	15.7.90	29.8.90	v	v	v	v	v	*1				- do -	
4. Kelani Tyres	v	v	v	v	v	15.7.90	29.8.90	v	v	v	v							
5. Lanka Loha Hardware	v	v	v	v	v	15.7.90	29.8.90	v	v	v	v	v	*1					
6. Lanka Plywood Products	v	v	v	v	*2	9.8.91	17.9.91											
7. National Paper	*3																	
8. Paranthan Chemicals	v			*4														

Notes:

1. Arrangements are being made to transfer the shares to employees.
2. Committee evaluating offers.
3. Will be commercialised when the rationalisation of cadres is finalised. Meanwhile technical and other consultancies completed. Total viability study to commence.
4. Government valuer unable to complete valuation due to security situation.

Table-2 Status Report on Public Enterprises Identified for Peoplisation
- Mining and Non-Mineral Sector -

(1) Name of SOE	(2) Convert to Company	(3) Government Decision to Privatise	(4) Appoint-ment of Committee Tender Board	(5) Valuation Obtained from C.V.	(6) Profile of Company Prepared	(7) Sale of Majority Share		(8) Report Sent to Cabinet	(9) Cabinet Approval Obtained	(10) Negotia-tion of MOU Commences	(11) Signing of MOU	(12) Transfer of Share to Corporate Investor	(13) Transfer of 10% Shares to Employees	(14) Public Share Issue to Commence	(15) Public Share Issue Closed	(16) Target Date	(17) Perfor-mence	(18) Delays & Comment
						Date of Advert-isement	Closing Date for Offers											
1. Lanka Ceramic	v	v	*1															
2. Lanka Porcelain	v	v		v	v	*2												
3. Lanka Salt	v	*3																
4. Bogala Graphite	v	v	v	v	v	*4												
5. Kahatagaha Graphite	v		v	v		24.9.91	29.11.91	*5										
6. Lanka Phosphate				*6														
7. Ceylon Mineral Sands				*7														

Notes:

1. Cabinet approved public share issue of 40% of shares and appointed a committee to work-out the modalities of handling the public share issue. Subsequently the Cabinet approved on the 16th of October 1991 committee recommendations.
   (a) to sell 15% of the shares to Noritake at a price determined by the Government Valuer, who hsa already done so and
   (b) 25% to be issued to the Public. Action is being taken to select a Registrar for the public share issue.
2. This is a subsidiary of Lanka Ceramic Ltd. with Noritake Company of Japan holding 40% equity. The balance is held by LCL. The proposal approved by Cabinet is to increase the Noritake share holding to 51%. The question of the valuation is being gone into.
3. Development strategy has been completed and has been submitted to IDA.
4. Cabinet approved public share issue of 40%. Registrars to share issue have been selected. Application to the Stock Exchange has been submitted on the 3rd January, opening of subscription list is likely to be in the second week of February.
5. Being prepared.
6. Will be commercialised once the land is vested with the Corporation. The Commissioner of Lands has already garetted the notice of objections for which 14.1.92 is the last date.
7. Government Valuer cannot visit for valuation purposes due to current security situation. Commercialisation will take place shortly. All studies for people-isation being done to be inreadiness when security situation improves.

Table-3 Commercialisation Division Ministry of Finance

Peoplisation of State Enterprises

(1/3)

Name of SOE	Nature of Business	Convert to Company	Government Decision to People-ise
1. United Motors Ltd.	Motor Car Agency	09.05.89	10.08.88
2. Thulhiriya Textile Mills Ltd.		13.09.89	28.06.90
3. Pugoda Textile Mills Ltd.		03.04.90	14.03.90
4. Hotel de Buhari	Restaurant	10.10.89	14.02.90
5. Ceylon Oxygen Ltd.	Manf. of Oxygen	05.12.89	25.04.90
6. Dankotuwa Porcelain	Porcelain Dinnerware	Co.	25.04.90
7. Hunas Falls Hotel	29 Room Hotel	17.10.89	04.07.90
8. Veyangoda Textile Mills Ltd.		21.12.89	18.04.90
9. Mattegawa Textile Mills		13.09.89	18.04.90
10. Distilleries Company of Sri Lanka Ltd.	Manf. of Arrack	17.11.89	10.08.88
11. Oils & Fats Company	Animal Feed & Provender	19.10.89	20.06.90
12. Acland Insuarance Services Ltd.	Insuarance Agency	18.10.89	14.11.90
13. Ceylon Manufacturers & Merchands Ltd.	Trade	18.10.89	14.11.90
14. Hevyquip Ltd. & CCC (Engineering) Ltd.	Trade Manf. of Tea Machinery	21.11.89	14.11.90
15. CCC (Teas) Ltd.	Tea Export	17.01.89	14.11.90
16. CCC (Fertiliser) Ltd.	Trade	18.10.89	14.11.90
17. MILCO Ltd.	Milk Products	Co.	26.06.90
18. Sathosa Motors Co.	Motor Car Agency	Co.	29.08.90
19. Sathosa Computers Co.	Computer Services	Co.	29.08.90
20. Sathosa Printers Co.	Printing	Co.	29.08.90
21. Lanka Milk Foods Ltd.	Powderred Milk	Q.P.Co.	29.08.90
22. Asian Hotels Corporation	5 Star Hotel	Q.P.Co.	04.07.90
23. Trans Asia Hotels Ltd.	5 Star Hotel	Q.P.Co.	12.12.90

Table-3 Commercialisation Division Ministry of Finance

Peoplisation of State Enterprises

(2/3)

Name of SOE	Nature of Business	Convert to Company	Government Decision to People-ise
24. Ceylon Fertilise Corp. (5)	Trading		
a. Ceylon Fertilizer Co.Ltd.		08.09.92	28.01.91
b. Wayamba Agro-Fertilizer Co.Ltd.		07.09.92	28.01.91
c. Rjarata Agro-Fertilizer Co.		14.09.92	28.01.91
c. Thmankaduwa Agro-Fertilizer Co.		07.09.92	28.01.91
e. Ruhunu Agro-Fertilizer Co. Ltd.		08.09.92	28.01.91
25. State Trading (Tractor) Corp.		30.09.91	13.03.91
26. Nylon 6 Plant of the Ceylon Petroleum Corporation	Manufacture of Nylon Net	30.07.91	07.11.90
27. Building Materials Corp.	Trading	16.09.92	03.04.91
28. Building Materials Manufacturing Corp.	Bricks, Tiles etc.		03.04.91
29. Ceylon Steel Corporation	Import of bilets to manf. quality steel		13.02.91
30. Sri Lanka Cement Corp.			
a. Ruhunu Cement Works		13.04.92	13.02.91
b. Kankesanturai Cement Works			13.02.91
c. Puttlan Cement Works			13.02.91
31. Mahaweli Marine Cement Co.Ltd.	Bagging of Cement		17.12.91
32. State Trading (Textile) Corp. (Salu Sala)	Trade in Textile & Garments	30.09.91	03.04.91
33. Lubricant Plant of Ceylon Petroleum Corp.	Petroleum Byproducts		07.11.90
34. Sevanagala Sugar Co.Ltd.	Growing & processing Cane	21.01.91	28.08.91
35. Hingurana Sugar Co.Ltd.	Growing & processing Cane	21.01.91	28.08.91
36. Kantale Sugar Co.Ltd.	Growing & processing Cane	21.01.91	28.08.91
37. Sri Lanka State Trading (General) Corp.	Trade	10.08.92	18.06.91
38. Consolidated Exports & Trading Co. Ltd.	Export of Tea & Spices	14.09.89	18.06.91
39. Lanka Canneries Ltd.	Fruit Canning		18.06.91
40. Ceylon Shipping Lines Ltd.	Shipping & Container Agency		14.08.91
41. Cey-Nor Foundation Ltd.	Manufacture of Nets & Fishing Boats	17.01.90	21.08.91

Table-3 Commercialisation Division Ministry of Finance

Peoplisation of State Enterprises

(3/3)

Name of SOE	Nature of Business	Convert to Company	Government Decision to People-ise
42. Janatha Fertilizer Enterprises Ltd.	Fertilizer Plant	08.01.91	16.10.91
43. Sri Lanka Cashew Corporation	Growing & Processing of Cashew		16.10.91
44. B.C.C. Lanka Ltd.	Manf. Soap & Coconut Oil	21.10.88	16.10.91
45. Sri Lanka (Cey) Rubber Manufacturing Co. Ltd.		Co.	16.10.91
46. Tea Smallholder Factories Ltd.	Processing of Tea Leaves	12.11.91	16.01.91
47. People's Merchant Bank Ltd.	Merchant Banking		20.11.91
48. Lanka Machine Leasers Ltd.			04.03.92
49. Hotel Services (Ceylon) Ltd.	5 star hotel	Q.P. Co.	11.08.92
50. Colombo International School			11.08.92
51. Colombo Gas Co. Ltd.		14.09.92	02.09.92
52. Silk & Allied Products Development Authority			21.10.92
53. Ceylon Plywood Corporation		09.01.91	23.01.91
54. Kelani Tyres Ltd.	Tyre Manufacture	04.10.90	21.08.91
55. Ceylon Leather Products Ltd.		28.09.90	28.09.90
56. Lanka-Loha Hardware Ltd.	Light Engeering	05.11.90	27.05.91
57. Kahatagaha Graphite Lanka Ltd.	Mining & Processing	11.03.91	04.09.91
58. Lanka Ceramic Ltd.	Ceramic Tableware	19.01.90	16.10.91
59. Lanka Porcelain Ltd.	Porcelain Tableware	Co.	11.09.91
60. Bogala Graphite Lanka Ltd.	Mining & Processing	11.03.91	04.09.91
61. Lanka Phosphate Ltd.	Mining & Processing	10.07.92	04.09.91

Table-4 Establishments Classified by Type of Ownership and Industry Manufacturing Establishments

TYPE OF INDUSTRY	PUBLIC			TOTAL	PRIVATE		TOTAL
	DEPT	CORPORATION	GOBU	PUBLIC	PRIVATE	GCEC	PRIVATE
353 PETROLEUM REFINERIES	0	2	0	2	0	0	0
3530 PETROLEUM REFINERIES	0	2	0	2	0	0	0
355 RUBBER PRODUCTS	0	87	0	87	75	2	77
3551 TYRE & TUBE INDUSTRIES	0	1	0	1	8	1	9
3559 RUBBER PRODUCTS NEC	0	86	0	86	67	1	68
356 PLASTIC PRODUCTS NEC	0	0	0	0	17	1	18
3560 PLASTIC PRODUCTS NEC	0	0	0	0	17	1	18
361 POTTERY, CHINA & EARTHENWARE	7	3	2	12	24	1	25
3610 POTTERY, CHINA & EARTHENWARE	7	3	2	12	24	1	25
362 GLASS & GLASS PRODUCTS	0	0	0	0	7	0	7
3620 GLASS & GLASS PRODUCTS	0	0	0	0	7	0	7
369 OTHER NON-METALLIC PRODUCTS	1	16	1	18	174	2	176
3691 STRUCTURAL CLAY PRODUCTS	0	11	0	11	137	0	137
3692 CEMENT, LIME & PLASTER	0	4	1	5	19	0	19
3699 NON-METALIC MINERAL PRODUCTS NEC	1	1	0	2	18	2	20
371 IRON & STEEL BASIC INDUSTRIES	0	1	0	1	3	0	3
3710 IRON & STEEL BASIC INDUSTRIES	0	1	0	1	3	0	3
372 NON-FERROUS METAL BASIC INDUSTRIES	1	0	0	1	3	0	3
3720 NON-FERROUS METAL BASIC INDUSTRIES	1	0	0	1	3	0	3
381 FABRICATED METAL PRODUCTS	3	1	2	6	81	4	85
3811 CUTLERY & GENERAL HARDWARE	0	1	0	1	13	0	13
3812 METAL FURNITURE & FIXTURE	0	0	0	0	8	0	8
3813 STRUCTURAL METAL PRODUCTS	0	0	0	0	12	0	12
3819 FABRICATED METAL PRODUCTS NEC	3	0	2	5	48	4	52
382 MACHINERY EXCEPT ELECTRICAL	1	0	2	3	30	1	31
3821 ENGINES & TURBINES	1	0	0	1	2	0	2
3822 AGRICULTURAL MACHINERY & EQUIPMENT	0	0	2	2	20	0	20
3823 METAL & WOOD WORKING MACHINERY	0	0	0	0	4	0	4
3824 INDUSTRIAL MACHINERY & EQUIPMENT	0	0	0	0	1	0	1
3825 COMPUTING & ACCOUNTING MACHINERY	0	0	0	0	1	1	2
3829 MACHINERY & EQUIPMENT NEC	0	0	0	0	2	0	2
383 ELECTRICAL MACHINERY & SUPPLIES	0	0	0	0	19	3	22
3831 ELECTRICAL INDUSTRIAL MACHINERY	0	0	0	0	7	3	10
3832 RADIO, TV & COMMUNICATION EQUIPMENT	0	0	0	0	3	0	3
3833 ELECT. APPLIANCES & HOUSEWARES	0	0	0	0	4	0	4
3839 ELECT. APPARATUS & SUPPLIES NEC	0	0	0	0	5	0	5
384 TRANSPORT EQUIPMENT	1	2	1	4	33	1	34
3841 SHIP BUILDING & REPAIRING	0	0	1	1	3	1	4
3842 RAILROAD EQUIPMENT	1	0	0	1	0	0	0
3843 MOTOR VEHICLES	0	2	0	2	22	0	22
3844 MOTORCYCLES & BICYCLES	0	0	0	0	6	0	6
3849 TRANSPORT EQUIPMENT NEC	0	0	0	0	2	0	2
385 PROFESSIONAL EQUIPMENT	0	0	0	0	7	0	7
3851 PROFESSIONAL EQUIPMENT NEC	0	0	0	0	1	0	1
3852 PHOTOGRAPHIC & OPTICAL GOODS	0	0	0	0	5	0	5
3853 WATCHES & CLOCKS	0	0	0	0	1	0	1
390 OTHER MANUFACTURING INDUSTRIES	4	4	0	8	35	10	45
3901 JEWELLERY & RELATED ARTICLES	0	3	0	3	13	3	16
3902 MUSICAL INSTRUMENTS	0	0	0	0	2	0	2
3903 SPORTING & ATHLETIC GOODS	0	0	0	0	1	2	3
3909 INDUSTRIES NEC	4	1	0	5	19	5	24
TOTAL	187	464	29	680	2022	77	2099

INDIVIDUAL FACTORIES OR PROCESSING SITES OF CORPORATION HAVE BEEN TREATED AS SEPARATE ESTABLISHMENTS.

Table-5 Annual Output State Industries (1/3)

Corporation	Product	Unit	1986	1987	1988	1989	1990
1 National Milk Board	Milk processed	'000 Litres	-(1)	-(1)	-(1)	-(1)	-(1)
2 Condensed Milk Factory	Condensed milk	'000 Cans	-(1)	-(1)	-(1)	-(1)	-(1)
	Powdered milk	'000 kg.	-(1)	-(1)	-(1)	-(1)	-(1)
3 Eastern Paper Mills-Ind Manufacturing	Paper (5)	Metric tons	26,533	27,041	24,993	18,059	18,883
	Exercise books	'000 Number	19	-(3)	3,849	6,481	2,859
4 Ceylon Ceramics-Ind Piliyandala and Negombo	Ceramicware	Metric tons	3,475	3,038	3,382	3,359	4,139
	Sanitaryware	Metric tons	901	841	1,060	859	1,287
	Wall tiles	Metric tons	-	-	-	-	-
Kaolin Refinery	Kaolin	Metric tons	6,263	6,768	7,100	7,733	7,735
	Bricks and Tiles	Value Rs. '000	71,559	65,472	58,144	19,152	19,421
	Electrical appaatus	Metric tons	240	319	308	348	352
5 Ceylon Oils and Fats- Oil Mil	Coconut oil (2)	Metric tons	391	41	164	318	..
Provender Plant	Animal foods	Metric tons	43,461	85,236	52,897	50,134	..
Fatty Acid Plant	Fatty acid	Metric tons	-	-	-	-	..
	Glycerine	Metric tons	-	-	-	-	..
6 Ceylon Plywood Corporation-Ind Plywood (3 ply equivalent)		'000 Sq. metre	1,895	1,865	1,208	453	415
Tea Chests (Full)		'000 Sets	706	679	595	178.3	203.3
Tea Chests (Half)		'000 Sets	245	250	109	59.4	31.4
3 plywood Board		'000 Sq. metre	175	133	88	7.9	43.3
Doors		'000 Number	15	8	10	1.8	0.4
Block-Boards		'000 Number	60	66	21	0.02	0.02
Office Tables		Number	1,522	1,500	1,141	430	176
Ping-pong Tables		Number	17	15	14	-	-
Office Trays		Number	1,300	27	56	-	11
Chip-board veneered		Sq. metre	803	-	-	-	-
Chip-board unveneered		Cu. metre	-	-	654	300	229
Sawn Timber		Cu. metre	716	2,546	749	300	310
Carpentry Division: Furniture		Value Rs. '000	13,484	11,954	14,392	4,713	861
7 Ceylon Leather Products Ind	Chrome	'000 Sq. metre	2,487	2,449	2,040	1,902	1,560
	Shoes	'000 Pairs	359	355	328	269	299
	Bark	'000 kgs.	68	91	69	61	62
8 Paranthan Chemicals Ind	Caustic Soda	Metric tons	-(3)	-(3)	-(3)	-(3)	-(1)
	Chlorine	Metric tons	-(3)	-(3)	-(3)	-(3)	-(1)
	Table salt	Metric tons	-(3)	-(3)	-(3)	-(3)	-(1)
	Hydrochliric Acid	Metric tons	-(3)	-(3)	-(3)	-(3)	-(1)

Table-5 Annual Output State Industries (2/3)

Corporation	Product	Unit	1986	1987	1988	1989	1990
9 Sri Lanka Sugar-							
Kantalai Factory	Sugar	Metric tons	7,172	2,928	1,435	2,305	..
	Molasses	Metric tons	4,563	2,232	1,926	2,085	..
	Spirits (Rectified)	Proof Lt. (000's)	1,019	809	1,557	1,091	..
	Spirits (Methylated)	Bulk Lt. (000's)	65	24	25	25	..
Hingurana Factory	Sugar	Metric tons	7,963	8,698	11,086	14,256	..
	Molasses	Metric tons	6,284	6,802	8,603	9,897	..
	Spirits (Rectified)	Proof Lt. (000's)	2,561	2,678	2,190	3,213	..
	Spirits (Methylated)	Bulk Lt. (000's)	437	426	350	422	..
Bottling Plant (Colombo)-							
	Dry Gin	Bulk Lt.	7,472	3,994	4,797	10,507	..
	Orange Gin	Bulk Lt.	-	-	-	-	..
	Lemon Gin	Bulk Lt.	1,786	-	2,839	2,822	..
	Beehive Brandy	Bulk Lt.	23,476	27,026	40,279	46,438	..
	Arrack	Bulk Lt.	5,714	7,540	9,509	31,467	..
	Rum	Bulk Lt.	10,743	9,362	9,892	16,614	..
	Vodka	Bulk Lt.	1,153	676	2,192	2,601	..
Sevenagala							
Factory (4)	Sugar	Metric tons	6,533	4,868	11,124	9,078	..
	Molasses	Metric tons	3,572	2,722	6,934	6,230	..
	Spirits (Rectified)	Proof Lt. (000's)	939	2,894	3,382	3,363	..
	Spirits (Methylated)	Bulk Lt. (000's)	14	240	244	207	..
10 Ceylon Cement-							
KKS Factory	Cement	Metric tons	60,758	9,732	97,444	113,147	55,446
Galle Factory	Cement	Metric tons	116,026	180,056	151,851	173,543	125,194
Puttalam Factory	Cement	Metric tons	380,435	429,690	383,570	308,920	398,220
11 Ceylon Mineral							
Ind Sands	Ilmenite	Metric tons	133,873	128,490	74,305	97,284	66,413
	Rutile	Metric tons	8,443	7,238	5,255	6,061	5,460
	Hi-Titanium Ilmenite	Metric tons	-	3,938	3,702	3,556	3,448
12 National Salt							
Ind	Salt	Metric tons	102,321	115,274	105,686	148,589	64,638
13 National Textiles	Yarn	'000 kgs	9,812	9,700	8,812	8,434	3,190
	Textiles	'000 Metres	45,930	45,240	38,733	35,575	12,511
14 Ceylon Steel	Rolled Iron	Metric tons	7,866	30,656	37,154	32,480	33,442
	Wire Products	Metric tons	1,079	1,455	1,514	1,562	2,179
15 Ceylon Tyre	Tyres	No.	305,876	342,583	343,378	339,041	382,274
Ind	Tubes	No.	160,728	189,091	200,820	176,266	187,018
	Flaps	No.	36,200	43,646	45,274	60,688	64,994
16 State Hardware	Hardware Items	'000 Units	2,023	1,617	1,003	1,029	1,052
Ind	Cast Iron Factory Castings	Metric tons	1,235	659	290	-	107

Table-5 Annual Output State Industries (3/3)

Corporation	Product	Unit	1986	1987	1988	1989	1990
17 Ceylon Fisheries	Fish Caught	Metric tons	25	6.8	22	4.44	..
	Fish Purchased	Metric tons	1,472	1,380	1,412	1,569	..
	Cured Fish	Metric tons	12	8	37	5	..
	Fish Meal	Metric tons	8	37	23	11	..
	Liver Oil	Litres	-	-	-	-	..
	Medicinal Shark						
	Liver Oil	Litres	-	-	-	-	..
	Veterinary Shark						
	Liver Oil	Litres	-	-	-	-	..
	Ice	Metric tons	5,073	3,660	2,580	4,834	..
18 State Flour Milling	Flour	Metric tons	-(1)	-(1)	-(1)	-(1)	-(1)
	By-Products	Metric tons	-(1)	-(1)	-(1)	-(1)	-(1)
19 State Timber	Sawn Timber	Cu. metres	19,384	24,388	15,219	8,766	9,862
20 State Mining and Mineral Ind	Plumbago	Metric tons	7,453	6,718	6,394	4,226	5,655
21 Sri Lanka Petroleum	Gasoline	Metric tons	123,086	131,259	158,861	118,466	179,281
	Kerosene	Metric tons	153,628	152,747	162,851	124,097	171,097
	Chemical Naptha	Metric tons	133,756	119,894	96,094	57,673	23,291
	Diesel	Metric tons	467,614	495,026	497,307	289,015	516,027
	Asphalt	Metric tons	47,111	33,160	27,480	26,139	26,211
	Fuel Oil	Metric tons	559,497	595,598	621,811	445,811	..
	Blending Plant						
	Lubricating Oil	Metric tons	19,751	20,416	18,750	21,698	..
22 Ayurvedic Drugs		Value Rs. '000	9,305	11,061	13,028	-	..

Source: State Corporations.

(1) Has been handed over to the private sector.
(2) For Industrial use only.
(3) No production during the year.
(4) Commenced commercial production in June 1986.
(5) Including paperboards.

Not industry only for government
Sri Lanka Railways work shop
Government Factory
Port Authority Mechanical Work
Colombo Dockyard
Colombo Commercial Co.
Construction State Engineering Corporation

Table-6 Future Plan Investment (Item No. J102)

1 Number of companies studied
2 Number of companies who answered to the question on the future plan
3 Number of companies who have the future plan
4 Number of companies who mentioned the estimated investment amount
5 Number of companies who mentioned amount of asset and investment
6 Investment amount
8 Investment amount of companies who mentioned the self-financing amount
9 Self-financing amount

(million Rs.)

	1	2	3	4	5	6	7	8	9	10
	Total	Sub-total	Future Plan	Mentioned Investment	ASSI	Total Investment	6/5	Own Capital and Total	Own Capital	9/8
Small	25	25	19	15	188.25	64.45	0.34	41.95	13.32	0.32
Medium	13	13	11	11	133.94	167.30	1.25	133.00	46.00	0.35
Large	13	11	10	5	90.00	127.00	1.41	122.00	50.00	0.41
Privatized	3	3	3	2	89.30	35.00	0.39	35.00	22.00	0.63
Sub-total	54	52	43	33	501.49	393.75	0.79	331.95	131.32	0.40
Joint Venture	7	7	6	4	175.35	31.00	0.18	61.00	21.00	0.34
Governmental	5	5	4	2	110.00	400.00	3.64	200.00	20.00	0.10
Total	66	64	53	39	786.84	824.75	1.05	592.95	172.32	0.29

Table-7 Export (Item No. J112)

1 Number of companies to be studied
2 Number of companies who answered to the question on export
3 Number of companies who answered as they have no plan of export
4 Number of companies who answered as they have plan of export
5 Number of companies who have the experience of export

	1	2	3	4	5	6	7	8
	Total	Sub-total	No	Yes	Client	3/2	4/2	5/2
Small	25	23	11	12	0	0.48	0.52	0.00
Medium	13	10	1	9	5	0.10	0.90	0.50
Large	13	11	2	9	3	0.18	0.82	0.27
Privatized	3	3	0	3	1	0.00	1.00	0.33
Sub-total	54	47	14	33	9	0.30	0.70	0.19
Joint Venture	7	7	0	7	1	0.00	1.00	0.14
Governmental	5	5	5	0	0	1.00	0.00	0.00
Total	66	59	19	40	10	0.32	0.68	0.17

Table-8 Industrial Estate Project where Agreements are in Force, Classified by Product Manufactured as at 92/05/31

NAME OF THE ENTERPRISE	SOURCE OF INVESTMENT	OPERATIONAL STATUS	LOCATION	PRODUCT MANF.	DATE; AGR	DATE; COM
PRODUCT GROUP: FABRICATED MENTAL						
1. EL STEEL LTD	DENMARK	COMMERCIAL OPERATION	KEPZ	STEEL ENCLOSURES	81/03/18	82/12/16
2. FAREAST ENGINEERING CO PVT LTD.	GERMANY	COMMERCIAL OPERATION	BEPZ	WINCHES & CRANES	85/02/26	87/03/30
3. T.K. FASTENER LANKA (PVT) LTD.	SINGAPORE	COMMERCIAL OPERATION	KEPZ	STEEL FASTENERS	86/04/11	87/01/22
4. NIHON SEIKI LANKA COMPANY LTD.	JAPAN	COMMERCIAL OPERATION	KEPZ	PRECISION MOULDS	87/10/08	90/01/23
5. T.K. PRECISION INDUSTRIES LTD.	SINGAPORE	COMMERCIAL OPERATION	KEPZ	STEEL MOULD & DIES	90/07/17	91/01/28
6. LANKA MULTI MOULDS (PVT) LTD.	NETHERLAND SRI LANKA	IN TRIAL PRIDUCTION	KEPZ	MOULDS	90/03/21	/ /
7. COLOMBO SCRAP METAL CO. P. LTD.	AUSTRALIA	COMMERCIAL OPERATION	OUTSIDE	SCRAP METALS	91/11/22	92/01/07
8. ALLOY FABRICATORS LTD.	UK, NORWAY, SRI LANKA	COMMERCIAL OPERATION	OUTSIDE	PIPING SYSTEMS	84/08/31	87/05/07
9. SADHA HARITHA LANKA PVT. LTD.	JAPAN, SRI LANKA	COMMERCIAL OPERATION	OUTSIDE	DOOR LOCKS & COMPON.	91/02/13	92/05/04
10. LANKA METAL						
11. TROPICAL METAL						

Table-9 Import and Export of Mould

Import of Moulds for years 1990 & 1991

H.S.CODE	DESCRIPTION OF ITEM	YEAR - 1990		YEAR - 1991	
		NOS.	C.I.F. VALUE INRUPEES	NOS.	C.I.F. VALUE INRUPEES
8480.10	Moulding Boxes for Metal Foundry	1,860	8,394,514	4,279	6,915,249
8480.20	Moulding Bases	185	2,398,452	244	2,317,850
8480.30	Moulding Patterns	2,166	11,459,380	1,692	11,145,984
	Moulds for Metals or Metal Carbides --				
8480.41	-- Injection or Compression Types	64	1,190,448	53	899,782
8480.49	-- Other	4,569	16,387,243	10,520	14,374,977
8480.50	Moulds for Glass	3,478	7,097,553	2,152	4,700,601
8480.60	Moulds for Mineral Materials	128	1,933,896	196	5,761,664
	Moulds for Rubber or Plastic --				
8480.71	-- Injection or Compression Types	105	5,866,769	245	9,771,561
8480.79	-- Other	156,509	34,171,522	65,528	90,809,031
8480.xx	Total	169,064	88,899,777	84,909	146,696,699

Table-10 Estimated Investment, Exports and Employment of the Industrial Estate
Projects where Agreements are in Force classified by Product Manufactured

AS AT 92/05/31 (Values in Rs. Mn)

NAME OF THE ENTERPRISE	FOR : INV	LGC : INV	TOT : INV	EXPORT : CAP	EMP : CAP (No)	LAND : ALLOCATION (A:P:R)
PRODUCT GROUP; FABRICATED MENTAL						
1. EL STEEL LTD	25.326	-	25.326	59.418	191	01 00 00
2. FAREAST ENGINEERING CO PVT LTD.	20.341	-	20.341	67.174	96	01 00 00
3. T.K. FASTENER LANKA (PVT) LTD.	100.700	-	100.700	117.000	460	08 03 29
4. NIHON SEIKI LANKA COMPANY LTD.	67.902	-	67.902	41.677	95	01 02 14
5. T.K. PRECISION INDUSTRIES LTD.	137.830	-	137.830	685.853	925	00 03 23
6. LANKA MULTI MOULDS (PVT) LTD.	47.750	2.250	50.000	128.000	101	
7. COLOMBO SCRAP METAL CO. P. LTD.	10.930	3.570	14.500	125.700	286	
8. ALLOY FABRICATORS LTD.	12.315	7.374	19.689	36.000	102	
9. SADHA HARITHA LANKA PVT. LTD.	29.484	4.000	33.484	36.950	39	
** SUB TOTAL **	452.578	17.194	469.772	1297.772	2295	

Table-11 Government Assistant (What Assistance Do You Expect from Government?)
(Item No. J110)

Total : Number of companies to be studied
Sub-total : Number of companies who answered to the question on government support
1 Loan
2 Other financial support, specify
3 Technical assistance
4 Management consultant
5 Marketing suport
6 Offers, specify

	Total	Sub-total	1	2	3	4	5	6	Others				Total
									Tax Incentive	Imported Duty	Anti-Dumping	Labour Law	
Small	25	23	10	6	13	5	9	4					
Medium	13	12	9	4	6	2	6	1					
Large	13	10	3	3	5	1	5	2					
Privatized	3	2	2	0	2	0	2	0					
Sub-total	54	47	24	13	26	8	22	7	11	6	1	1	119
Joint Venture	7	6	0	3	5	1	3	0	2	4	0	0	18
Governmental	5	5	2	2	4	0	1	0	0	0	0	0	9
Total	66	58	26	18	35	9	26	7	13	10	1	1	146

Table-12 Trade Balance of Metalworked Products

(Unit: Rs. M)

	Import	Export
82. TOOLS IMPLEMENTS, CUTRELY, SPOON & FORKS	488.1	243.3
83. MISCELLANEOUS ARTICLES	331.4	8.3
84. BOILER, MACHINERY, MECHANICAL APP.	7062.3	453.4
85. ELECTRICAL MACHINE	8407.8	432.8
86. RAILWAY OR TRAMSWAY	544.2	2.9
87. VEHICLE	6830.9	161.2
88. AIRCRAFT	405.7	404.2
89. SHIP	9.4	17.0

Source: Trade Statistics

Table-13 Exports 1978 - 1987

(Rs. MN.)

Item	1978	1980	1982	1983	1984	1985	1986	1987	1991
Iron & Steel Products (Steel Scrap, Ship Breaking)	3.19	6.35	11.56	29.70	47.80	82.80	199.10	223.90 Articles →	183.60 394.70
Copper Products (Copper wire, Sheets and Strips)	0.82	0.62	5.04	30.70	28.30	32.70	36.80	33.20	96.30
Aluminium Products (Wire, Cable, Sheets and Strips)	0.80	6.18	3.31	3.10	12.30	3.00	2.80	5.00	19.30
Lead Products (Plates, Waste and Scrap, Sheets)	-	8.85	4.86	0.80	0.80	0.50	-	-	0.30
Tools & Equipment (Hand tools, Knives)	0.01	0.71	0.94	2.50	3.00	3.60	10.50	2.70	308.40
Agricultural Machinery, Machinery & Appliances (Steam Boilers, Sprayers, Pumps Weighing Machines)	17.30	30.32	48.56	53.70	98.30	139.50	169.50	132.70	726.90
Electrical Machinery & Equipment (Motors, Batteries, Appliance)	2.20	9.84	44.86	73.50	35.80	31.50	42.70	57.10	749.70
Ships & Boats (High Sea Vessels, Tugs etc.)	3.08	18.60	10.80	8.30	21.00	7.90	24.20	10.00	17.40
Other (mainly Toys & Sports Equipment)	1.70	4.20	2.44	71.80	45.50	29.90	36.30	58.70	
Total	29.18	85.65	132.37	274.10	282.70	331.40	522.10	523.30	2101.90

Source: National Export Dev. Plan '90 - '94

Table-14 Exports Products (1/8)

HS NO : 720421 TOTAL QUANTITY : 15,000
PRODUCT : IRON AND STEEL
FERROUS WASTE AND SCRAP; REMELTING SCRAP INGOTS OF IRON OR STEEL.
-- OF STAINLESS STEEL

NO	EXPORTER	QUANTITY	VALUE (Rs.)
1	COLOMBO SCRAP METAL CO. PVT LTD.	15,000	535,755.00

HS NO : 720924 TOTAL QUANTITY : 741,744
PRODUCT : IRON AND STEEL
FLAT ROLLED PRODUCTS OF IRON OR NON ALLOY STEEL, OF A WIDTH OF 600 MM OR MORE, COLOD-ROLLED (COLD-R
-- OF A THICKNESS OF LESS THAN 0.5 MM

1	AMICO INDUSTRIES LTD.	167,175	6,607,144.00
2	METAL PACKING LTD.	574,569	28,530,293.00

HS NO : 731816 TOTAL QUANTITY : 3,712,064
PRODUCT : ARTICLE OF IRON OR STEEL
SCREWS, BOLTS, NUTS, COACH-SCREWS, SCREWS HOOKS, RIVETS, COTTERS, COTTER-PINS, WASHERS (INCLUDING S
-- NUTS

1	ELSTEET LTD.	38	621.00
2	OUR COMPANY (PVT) LTD.	0	214.00
3	SHIN NIPPON AIR CONDITIONING ENGINEERING CO. LTD.	0	8,404.00
4	T K FASTWER LANKA PVT LTD.	3,676,509	321,129,594.00
5	T F PRECISION INDUSTRIES LANKA PTE LTD.	0	2,297,318.00
6	THREE STARS TRAVEL SERVICES	17,061	845,456.00
7	TRANCE COTTON PVT LTD.	18,456	2,812,578.00

Table-14 Exports Products (2/8)

HS NO	:	732090	TOTAL QUANTITY :	4
PRODUCT	:	ARTICLES OF IRON OR STEEL SPRINGS AND LEAVES FOR SPRINGS, IF IRON OR STEEL -- OTHER		
1		NON REGULAR EXPORTER	0	2,075.00
2		COLOMBO GAS & WATER CO. LTD.	4	81,955.00
3		ORCHID EXPORTS	0	205.00
HS NO	:	740400	TOTAL QUANTITY :	555,500
PRODUCT	:	COPPER AND ARTICLES THEREOF REFINING COPPER AND COPPER ALLOYS, UNWROUGHT COPPER WASTE AND SCRAP		
1		A C L CABLES LTD.	20,000	1,667,493.00
2		ASGER BROTHERS	100,000	7,527,520.00
3		CEYLON & OVERSEAS TRADERS	198,000	18,303,450.00
4		COLOMBO SCRAP METAL CO. PVT LTD.	20,000	1,627,750.00
5		INTERNATIONAL EXPORTS (PVT) LTD.	119,000	10,200,643.00
6		KAPILA AGR MERCHANTS PVT LTD.	38,500	3,570,160.00
7		UNITED STEEL COMPANY	60,000	5,383,680.00
HS NO	:	741910	TOTAL QUANTITY :	4,602
PRODUCT	:	COPPER AND ARTICLES THEREOF OTHER ARTICLES OF COPPER - CHAIN AND PARTS THEREOF		
1		LANKA HANDICRAFTS	0	20,859.00
2		LANKA METAL INDUSTRIES LTD.	4,514	33,574,614.00
3		PARA XPO PRODUCTS	0	16,000.00
4		RUN GARMENTS	0	51,251.00
5		SRI LANKA HANDICRAFT BOARD	88	79,409.00
6		TROPICAL FINDING PVT LTD.	0	1,706,648.00

Table-14 Exports Products (3/8)

HS NO : 741999 TOTAL QUANTITY : 872
PRODUCT : COPPER AND ARTICLES THEREOF
OTHER ARTICLES OF COPPER
- OTHERS

1	NON REGULAR EXPORTER	50	21,237.00
2	PRIVATE INDIVIDUAL	98	109,965.00
3	AMBEGODA HANDICRAFTS	0	646,784.00
4	ARTEXPORT APPAREL PVT LTD.	0	7,520.00
5	ASSOCIATED CARGO (PVT) LTD.	19	8,580.00
6	CITY TRADE CENTER	272	127,516.00
7	CROSSWORLD TRADING PVT LTD.	0	1,665.00
8	DAKAYANTHI ENTERPRISES & EXPORTERS	25	7,203.00
9	DEPARTMENT OF SMALL INDUSTRIES	0	45,102.00
10	DEPT OF SMALL INDUSTRIES	22	58,632.00
11	DON CAROLIS & SONS LTD. H	0	24,546.00
12	SSWARAN BROS	22	14,981.00
13	BURO SCAN EXPORTS PVT LTD.	0	3,832.00
14	FELDSTAR JEWELLERS	44	209,460.00
15	FLEXPORT PVT LIMITED	152	321,905.00
16	KALKJ IMPEX PVT LIMITED	0	217,229.00
17	LANKA HANDICRAFTS	0	24,621.00
18	LANKA JATHIKA SARVODAVA SHRAMADANA SANGAMAYA		
19	LANKA METAL INDUSTRIES LTD.	0	40,065.00
20	MINISTRY OF FOREIGN AFFAIRS	0	7,878,541.00
21	NIDRO SUPPLY PVT LTD.	0	2,983.00
22	RUN GARMENTS	0	6,697.00
23	SHAPMAN & CO.	0	15,924.00
24	SRI LANKA HANDICRAFT BOARD	48	18,529.00
25	TROPICAL FINDING PVT LTD.	75	151,717.00
26	USUI LANKA (PVT) LTD.	45	363,041.00
		0	66,174.00

Table-14 Exports Products (4/8)

HS NO	:	760720	TOTAL QUANTITY :	36,086
PRODUCT	:	ALUMINIUM AND ARTICLES THEREOF ALUMINIUM FOIL (WHETHER OR NOT PRINTED BACKED WITH PAPER, PAPERBOARD, PLASTICS OR SIMILAR BACKING -- BACKED:		
1		ACME ALUMINIUM CO. LTD.	36,086	5,045,835.00
2		NIDRO SUPPY PVT LTD.	0	995.00
HS NO	:	800700	TOTAL QUANTITY :	44,997
PRODUCT	:	TIN AND ARTICLES THEREOF TIN FOIL (WHETHER OF NOT PRINTED OR BACKED WITH PA PER, PAPERBOARD, PLASTICS OR SIMILAR BACKING MAT OTHER ARTICLES OF TIN		
1		AMICO INDUSTRIES LTD.	44,937	3,032,765.00
2		FORBEE & WALKER LTD.	60	11,113.00
3		RAVI LANKA LTD.	0	14,857.00
HS NO	:	820420	TOTAL QUANTITY :	3,791,865
PRODUCT	:	HAND OPERATED SPANNERS AND WRENCHES (INCLUDING TOR QUE METER WRENCHES BUT NOT INCLUDING TAP WRENCHE - INTERCHANGEABLE SPANNER SOCKETS WITH OR WITHOUR HANDLES		
1		DIESEL & MOTOR ENGINEERING CO. LTD.	19	287,597.00
2		PRECISION LANKA	30,930	3,991,625.00
3		T K PASTNER LANKA PVT LTD.	404,935	48,212,045.00
4		T K PRECISION INDUSTRIES LANKA PTE LTD.	3,355,981	195,483,359.00

Table-14 Exports Products (5/8)

HS NO	:	821220	TOTAL QUANTITY :	56,002,064
PRODUCT	:	RAZORS AND RAZOR BLADES (INCLUDING RAZOR BLADE BLANKS IN STRIPS) - SAFETY RAZOR BLADES, INCULDING RAZOR BLADE BLANKS IN STRIPS:		
1		ALLIED INDUSTRIES	53,782,064	39,345,187.00
2		ARUNA GEMS	2,220,000	2,194,532.00
HS NO	:	830249	TOTAL QUANTITY :	162,050
PRODUCT	:	MISCELLANEOUS ARTICLES OF BASE METAL BASE METAL MOUTINGS, FITTINGS AND SIMILAR ARTICLES SUITABLE FOR FURNITURE, DOORS, STAIRCASES, WIN - OTHER		
1		M M ENTERPRISES	0	1,489.00
2		TIVOLI LANKA LTD.	162,050	8,416,901.00
HS NO	:	841590	TOTAL QUANTITY :	33,116
PRODUCT	:	NUCLEAR REACTORS, BOILERS, MACHINERY AND MECHANICAL APPLIANCES; PARTS THEREOF AIR CONDITIONING MACHINES, COMPRISING A MOTOR DRIVEN FAN AND ELEMENTS FOR CHANGING THE TEMPERATURE - PARTS		
1		ORCHID EXPORTS	420	50,401.00
2		SEWON LANKA PVT LTD.	30,320	4,014,046.00
3		TIVOLI ENGINEERING PVT LTD.	2,376	1,002,773.00

Table-14 Exports Products (6/8)

HS NO : 842619 TOTAL QUANTITY : 3
PRODUCT : NUCLEAR PREACTORS, BOILERS, MACHINERY AND MECHANICAL APPALIANCES; PARTS THEREOF
DERRICKS; CRANES, INCLUDING CABLE CRANES; MOBILE LIFTING FRAMES, STRADDLE CARRIERS AND WORKS TRUCK
- OTHER

1	ASEA BROWN BOVELI A G	2	4,687,174.00
2	LANKA MULTI MOULDS	1	397,100.00

HS NO : 843890 TOTAL QUANTITY : 165
PRODUCT : NUCLEAR REACTORS, BOILERS, MACHINERY AND MECHANICAL APPALIANCES; PARTS THEREOF
MACHINERY, NOT SPECIFIED OR INCLUDED ELESEWHERE IN THIS CHAPTER, FOR THE INDUSTRIAL PREPARATION OR
- PARTS

1	PRIVATE INDIVIDUAL	3	15,378.00
2	COLOMBO COMMERCIAL CO ENGINEERS LTD	2	2,350,765.00
3	EASTERN TRADING & AGENCY CO.	0	485,898.00
4	WALDER & SONS CO. LTD.	160	54,539.00

HS NO : 846299 TOTAL QUANTITY : 64
PRODUCT : NUCLEAR REACTORS, BOILERS, MACHINERY AND MECHANICAL APPLIANCES; PARTS THEREOF
MACHINE TOOLS (INCLUDING PRESSES) FOR WORKING METAL BY FORGING MANNERING OR DIE-STAMPING; MACHINE

1	CRUICKSHANK & PARTNERS CEYLON LTD.	64	10,666.00

Table-14 Exports Products (7/8)

HS NO	:	850431	TOTAL QUANTITY :	794,828
PRODUCT	:	ELECTRICAL MACHINERY AND EQUIPMENT AND PARTS THERE OF; SOUND RECORDERS AND REPRODUCERS, TELEVISION ELECTRICAL, TRANSFORMERS, STATIC COVERTERS (FOR EXAMPLE, RECTIFIERS) AN INDUCTORS. -- HAVING POWER HANDLING CAPACITY NOT EXCEEDING 1 KVA		
1		NIPPON MARUCHI (LANKA) PVT LTD.	745,290	9,080,593.00
2		T K FASTWER LANKA PVT LTD.	400	133,527.00
3		TOROIDS INTERNATIONAL (PVT) LTD.	42,673	16,609,529.00
4		TOROIDS INTERNATIONAL PVT LTD.	5,265	1,977,809.00
HS NO	:	850489	TOTAL QUANTITY :	
PRODUCT	:	ELECTRICAL MACHINERY AND EQUIPMENT AND PARTS THERE OF; SOUND RECORDERS AND REPRODUCERS, TELEVISION ELECTIRAL TRANSFORMERS, STATIC CONVERTERS (FOR EXAMPLE, RECTIFIER) AND INDUCTORS - PARTS		
1		COMMERCIAL REPORT COMPANY	4	28,687.00
2		LANKA HIQU LIMITED	28,746	769,623.00
3		MITSUI CONSTRUCTION CO. LTD.	0	42,686.00
4		NIPPON MACUCHI (LANKA) PVT LTD.	62,848	373,199.00
HS NO	:	850710	TOTAL QUANTITY :	0
PRODUCT	:	ELECTRICAL MACHINERY AND EQUIPMENT AND PARTS THERE OF; SOUND RECORDERS AND REPRODUCTERS, TELEVISION OR, WHETHER OR NOT RECTANGULAR (INCLUDING SQUARE - LEAD-ACID, OF A KIND USED FOR STARTING PISTON ENGINES:		
1		UNITED STEEL COMPANY	0	1,943,123.00

Table-14 Exports Products (8/8)

HS NO	:	850880	TOTAL QUANTITY :	82
PRODUCT	:	ELECTRICAL MACHINERY AND EQUIPMENT AND PARTS THERE OF; SOUND RECORDERS AND REPRODUCERS, TELEVISION ELECTRO-MECHANICAL TOOLS FOR WORKING IN THE HAND. WITH SELF-CONTAINED ELECTRIC MOTOR. - OTHER TOOLS		
1		CEYLON MANUFACTURERS AND MERCHANTS LTD.	82	190,040.00
2		JAPAN INTERNATIONAL CO-OP	0	2,270,979.00
HS NO	:	871491	TOTAL QUANTITY :	476,740
PRODUCT	:	VEHICLES OTHER THAN RAILWAY OR TRAMWAY ROLLING-STOCK AND PARTS AND ACCESSORIES THEREOF PARTS AND ACCESSORIES OF VEHICLES OF HEADING NOS. 87.11 TO 87.13 -- FRAMES AND FORKS, AND PARTS THEREOF:		
1		COMMERCIAL IMPORT COMPANY	20	31,261.00
2		NIHON SEIKI LANKA PVT LTD.	476,720	10,993,790.00
HS NO	:	940190	TOTAL QUANTITY :	7,895
PRODUCT	:	MISCELLANEOUS MANUFACTURED ARTICLES WHETHER OR NO CONVERTIBLE INTO BEDS AND PARTS THERE - PARTS		
1		TOTO CUBMION LANKA PVT LTD.	7,895	1,590,406.00

Source: SRI LANKA DEVELOPMENT BOARD

Table-15 Classification of Export Products

(1,000 Rs.)

		Total	GCEC	Packing	Others	Trader	Razor
720421	SCRAP: Rewelting scrap ingot	536	536				
720924	Flat rolled product			35,137			
731816	Screw, bolt, nut, etc.		323,595		3,667		
732090	Springs, leaves				84		
740400	Refining copper, waste, scrap		1,628		18,149	28,504	
741910	Copper chain and part		35,281		168		
741999	Copper others		8,242		2,152		
760720	Aluminium foil				5,047		
800700	Tin foil			3,033	26		
820420	Spanners, wrenches		243,695		4,279		
821220	Razor						41,540
830249	Base metal, miscel laneous				8,418		
841590	Reactor, boiler				5,067		
842619	Derricks, crane		397		4,687		
843890	Machinery				2,907		
846299	Machinenery tool				11		
850431	Electrical machinery		134		11,058	16,610	
850490	Recorders, TV				1,214		
850710	Others				1,949		
850880	Other tools				196	2,271	
871491	Vehicles		10,994		31		
940190	Miscel laneous				1,590		
		822,391	624,602	38,170	70,694	47,385	41,540
		100	75.9	4.6	8.6	5.8	5.1