JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

DEPARTMENT OF INDUSTRIAL PROMOTION,
MINISTRY OF INDUSTRY
THE KINGDOM OF THAILAND

THE STUDY
ON
INDUSTRIAL SECTOR DEVELOPMENT
SUPPORTING INDUSTRIES
IN
THE KINGDOM OF THAILAND

(SUMMARY)

MARCH 1995

UNICO INTERNATIONAL CORPORATION

TOKYO, JAPAN

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Introduction

1. Study Background

The Department of Industrial Promotion (DIP) of the Thai government requested Japanese government to make a master plan study for developing the parts industries which are formulated wide range of industrial supporting linkage of the automotive and the electrical/electronic industries. In response to the request, the Japan International Cooperation Agency (JICA) under the Japanese government discussed with the Thai government the scope of the study, as the implementation agency. As a result, JICA and DIP agreed and signed on the Scope of the Study for the Study on Industrial Sector Development – Supporting Industry – in the Kingdom of Thailand on 3rd June, 1993.

JICA entrusted UNICO International Corporation (UNICO) to carry out the Study. The surveys were begun in September 1993 on the basis of the Scope of the Study in Thailand and Japan, finally the Draft Final Report was completed in January, 1995.

2. Study Objectives

The objective of the Study is to examine and analyze the above two sub-sectors and their supporting industries, and to formulate a development and promotion plan from the policies and institutional aspects as well as the processing technology aspects.

Specifically the following two were designated as major objectives:

1) Import substitution of components & parts, and
2) Strengthening of industrial structure

3. Scope of the Study

"Supporting Industry" was an industry that supplies the components and parts and processing materials for automotive and electrical/electronic assembly.

The following product items were definitely studied.

(1) Automotive
Automotive means four-wheel vehicles including buses and trucks.

(2) Electrical and Electronic Appliances

1) Home Electrical Appliances
Washing machine, Refrigerator, Air-conditioner, Electric fan, Microwave oven

2) Home Electronic Appliances
VTR, TV, Audio equipment

3) Industrial Electronic Appliances
Telephone, Facsimile machine, Word Processor, Copy machine, Computer
Except heavy electric apparatus such as boilers and turbines.

4. Methodology and Schedule of the Study

The survey was carried out from 20th September, 1993 to 12th November, 1994 including fifth field surveys. The questionnaire surveys were also conducted to parts manufacturing enterprises in Thailand and Japan. The enterprises visited and the questionnaires collected are broken down as follows:

Visits to	No.
Assemblers	19
Parts manufactures (Primary)	41
Factory diagnosis	62
Institutions	41
Total	163

Questionnaire survey	No.
In Thailand (No. of interviews)	239
In Japan (No. of effective replies)	814

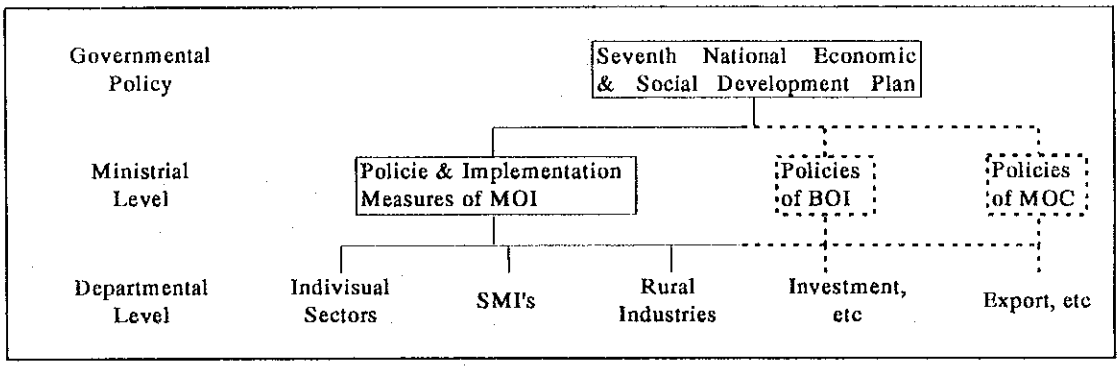
A seminar for the study was also held in Bangkok on February 1995.

I. Development Policies for Supporting Industries and Implementation System

I.1 Development policy for manufacturing industry by MOI

(1) System of Manufacturing Industry Development Policy in Thailand

The overall system of manufacturing industry development policies in Thailand can be depicted as shown Figure I-1. The Seventh National Economic and Social Development Plan (Seventh Plan) has formed the foundation of specific development measures and programs which are worked out at the levels of the ministries and departments.



Note: A solid line shows main stream and a doted line is supplemental function.

Figure I-1 POLICY MECHANISM FOR THAI INDUSTRIAL DEVELOPMENT (excluding policy for financial, human development and Science & Technology)

(2) Manufacturing Industry Development Policy by MOI

The specific policy direction for manufacturing industry development is expressed in "The Policy and Implementation Measures by Ministry of Industry" based on the Seventh Plan.

The following are a summary of MOI's major industrial development policies.

1) To promote sufficiently the following six industries (target industries).
   - Agro-industry
   - Textile & garment industry
   - Electronic industry
   - Petrochemical industry
   - Metal working industry
   - Iron & steel industry
2) To promote factory relocation to rural and industrial estate areas.
3) To develop and promote regional industries by utilization of materials and resources in the regions.
4) To develop and promote small and medium scale industries for further industrial linkage.
5) To promote energy saving and conservation at factories.
6) To improve quality and standard testing.
7) To encourage and maintain the mutual cooperation with foreign investors.

There are no directly relevant, specific development policies or the Act for the supporting industries to date. The issue of the promotion of the supporting industries has become an increasingly pressing problem over recent years as result of the evident insufficiency of "basic technology" and the inadequacy of basic industrial structures which have been highlighted by industrial development. "Basic technology" includes such sectors as forging, casting, metal pressing, powder metallurgy, plating, heat treatment, plastic processing, machine processing, etc. It is supposed that the majority of the firms engaged in the above activities are in fact small and medium scale industries. In this sense the promotion of supporting industries can form part of the overall process of policy-making for the promotion of the small and medium scale industries. MOI also put a heavy stress on that the country relies heavily on the import of raw materials and intermediate products from foreign countries due to lack of supporting industries in Thai manufacturing industry. MOI intends to develop the supporting industries through implementation of development policy for small and medium scale industries on the assumption that the supporting industries is mainly formed by small and medium scale industries. And in its policies, MOI emphasizes building up backward linkages or sub-contracting systems in the Thai manufacturing industry by encouraging the "manufacture" of machinery, components and parts.

(3) Related Development Program to Supporting Industries

1) Subcontracting Development Program (BUILD Scheme)

In 1992, BOI started up new investment services to promote the industrial subcontracting system in Thailand namely the BOI Unit for Industrial Linkage Development (BUILD) scheme. BUILD encourages the growth of supporting industries in Thailand by providing information on subcontracting opportunities as well as support to buyer firms seeking sourcing networks in Thailand. The Unit helps small and medium scale Thai parts manufacturers to achieve the standards required to enter into productive subcontracting arrangements.

Successful examples of the matching by this scheme include plastic parts, capacitor parts, plastic tubes, and coated power supply cases so far. The BUILD scheme is already entering its second stage, according to the unit in charge. The point of emphasis in the plans for promotion of supporting industries currently envisioned by the unit in charge is joint ventures with foreign capital.

2) National Supplier Development Program (NSDP)

National Supplier Development Program (NSDP) is joint program for developing supporting industry by BOI and MOI. NSDP aims at development of small and medium scale parts manufacturers in cooperate with private business groups and the government office concerned. The Permanent Secretary for Industry is appointed as the Chairman of the NSDP Steering Committee and the secretary office set up in BOI.

The first steering committee meeting was held on June 1994 and agreed that a concrete plan shall be discussed in the appointed working group of BOI and MOI in order to implement NSDP effectively. A theme which shall be discussed in each working group is stated in NSDP's briefing paper as follows:

Under the Board of Investment

1) Promotion
   a. Meeting "technology gaps"
   b. Seeking foreign investors
   c. Developing new entrepreneurs

2) Incentives
   a. To promote suppliers
   b. Principal supplier linkages
   c. Subsidize adoption of ISO 9000

Under the Ministry of Industry

1) Awareness Building
   a. Public/private cooperation
   b. Education on SME's role
   c. Promoting mutual understanding
   d. Lobby for key policy reforms

2) Capability Improvement
   a. Training for SME suppliers
   b. Promotion of ISO 9000
   c.i Technical assistance
   c.ii Marketing assistance
   c.iii Management assistance
   c.iv Finance assistance
   d. Continuous improvement

Based on the above themes, a concrete program shall be discussed and implemented from now on.

I.2 Export Promotion Policy

(1) Keynote of Policy in Export Promotion

The keynote of the policy in Thailand's trade and development is liberalization. This has as its aim the development of free trade in accordance with the General Agreement on Tariffs and Trade (GATT),

ASEAN Free Trade Area (AFTA), and other international trade agreements and regional economic cooperation agreements based on strengthening of the competitiveness of Thailand's industries and, at the same time, reduction of production costs and realization of even stronger international competitiveness through liberalization of imports.

Specific examples of the steps taken to liberalize imports include the reduction of duties on machinery in September 1990, followed by reduction of duties for production materials of autoparts in March 1992. In September 1992, major streamlining of the import duties was announced. Further, in February 1993, duties were lowered on 1474 ASEAN products as part of the CEPT measures taken for the creation of AFTA. This policy of liberalization of imports has made the business environment for domestic companies (especially parts suppliers) difficult due to the introduction of imports competing with domestic industries, but can be expected to result in stronger international competitiveness of export industries due to reduced costs and improved quality.

Export promotion in Thailand consists of the following items:

1) BOI's Incentives for export-oriented investment
2) Drawback of import duties by the Custom Department,
3) Export financing by the Bank of Thailand (transferred to Export-Import Bank starting February 1994),
4) Export processing zones of the Industrial Estate Authority of Thailand (IEAT) and bonded warehouses of the Custom Department,
5) Promotional activities by the Department of Export Promotion (DEP) of the Ministry of Commerce.

(2) Policy implications for export promotion and supporting industries

Among the incentives for promoting export industries, the abatement of duties by the BOI and the export credit refinancing by the Bank of Thailand both give assistance to exporting companies in the area of taxation and financing, but do not focus on any specific industries. Specific industries are targeted for assistance through the promotion plan of the DEP. The DEP is already engaged in a diversified program of promotion. The plan of

promotion of the DEP, however, is beneficial in assisting companies in marketing, product development, design, and other areas, but does not bring about any direct reduction of costs such as with tax and financial incentives.

Promotion of the supporting industries in Thailand can be said to mean promotion of import substitution industries in the sense of changing over from a reliance on imports of parts and intermediate goods to domestic production and supply. From this viewpoint, export promotion is considered a task for the future. One of the findings of the current field survey, however, was that the economy of scale is essential for promotion of supporting industries.

The users of the supporting industries, that is automotive industry and electrical and electronic industries, have grown tremendously since 1987. The domestic market, however, continues to be small. So that the ability to compete with imports from Asian NIEs requires that the supporting industries of Thailand be competitive in terms of price, quality and delivery, and the indispensable factor for this is large scale production. Accordingly export promotion is considered from the viewpoint of expansion of market for these products.

I.3 Foreign investment promotion policy

(1) Keynote of Policy in Foreign Investment Promotion

Thailand's policy toward foreign investment was first set in 1960 with the establishment of the Investment Promotion Act. The Act was completely overhauled three times (1962, 1972, and 1977) and was touched up numerous instances in between as well. The current Investment Promotion Act is based on the one established in 1977.

The investment incentives may be roughly classified into [1] fixed periods of abatement of corporate income taxes, import duties on machinery needed for facilities, and import taxes on materials and parts required for production, and other privileges accorded encouraged businesses and [2] special incentives devised by the BOI. The main measures taken for promotion of investment in the BOI and elsewhere since 1991 may be summarized from

this viewpoint as follows:

1) Reorganization of Office of Board of Investment (BOI)

The office was significantly reorganized in April 1992. The administrative processing for promotion of investment was arranged to flow according to the type of industry so as to improve services. After the reorganization, things are set up so that an investor need only access the division of the industry concerned and then can expect subsequent procedures to flow smoothly.

2) Investment Incentives and Preferential Privileges for Regional Development

In recent years, the stress in the investment promotion policy has been on the promotion of export industries and also putting together requests for cooperation in provincial development. Specific measures toward this end were devised at the time of the amendment of the Investment Promotion Act in September 1987. The country has been divided into three zones and investment is being promoted in the lesser developed regions that is zone 3 by allocating priority in investment incentives, while the developed regions that is zone 1 is controlled new investment. This method has been reconsidered each year and has been revised several times. On January 28, 1993, three new zones, the present day ones, were designated and the subsectors to be promoted in each were clearly set down.

3) Policy Implications for Promotion of Investment and Supporting Industries

The series of BOI measures established in the 1990s show that the BOI has moved on from its conventional role as a regulating authority and is starting to stress intentionally investment promotion on the specific area as its main function. The BOI has started a series of schemes focusing on individual sectors. The list of promoted industries and industries for specific regions based on the TSIC, given in BOI Announcement No. 2/93, is one effort in this direction. The reduction of the minimum required investment amount from the past 2 million baht to 1 million baht may also be considered to have opened up further the chances for investments relating to the supporting industries, which include numerous small and medium scale

industries.

In October 1993, the following four industries were declared in a BOI Announcement as desirable industries for promoting supporting industry.

1) Die and Mould making
2) Jigs and Fixture
3) Forging
4) Foundry using induction furnace

BOI's incentives for investment of these desirable industries are as follows:

a) Corporate income tax holiday:
total exemption for 8 years for any zone

b) 50 percent tax exemption for import machinery:
according to factory location in zone 1 and 2.

c) Total tax exemption for import machinery:
according to factory location in zone 3.

In June 1994, another 10 industries were added as desirable industries for promoting supporting industry.

1) Tooling equipment
2) Grinding tools
3) Cutting tools
4) Sintered products
5) Surface treatment
6) Heat treatment
7) Machining center
8) Electronic connector
9) Ni-Cd and rechargeable batteries
10) Engineering plastics

Promotion effort for developing specific industries is still continuing in 1994. In April 1994, it was declared in a BOI Announcement that investments made in export oriented auto-assemble and located in Zones II or III would be provided higher incentives, and also encourage relocation of automotive assemble to the country area.

(2) Customs Duties

Reforms of the system of customs duties in Thailand are in progress as a result of the agreement accorded by the Thai government to the CEPT–AFTA program for setting up a free trade zone in the ASEAN area. This agreement was reached at the top level ASEAN Summit held in January, 1992 and as a result of the final agreement negotiations of the Uruguay round held at the end of 1993. The basic policy underlying reforms is the transition from protection to free trade. In concrete terms this will mean that the current tariff rates are to be reduced to levels between 0 and 30% over the next five years (with six tax rate categories of 0%, 1%, 5%, 10%, 20%, and 30%). According to the Fiscal and Tax Policy Division of the Ministry of Industry the overall policy to be implemented in exaction of taxes on manufactured products is that raw materials will be taxed at between 1–5%, intermediate processed goods at 10% and finished manufactured products at 20% levels.

Since the CEPT–AFTA Agreement gives a fifteen year preparatory period from January 1993 for reducing tax rates to a level of 0–5%, the policy of the Thai government can be seen as proceeding independently in the same general direction. Evaluation and implementation of tax reductions on individual items has already started, beginning with the reduction of customs duties exacted on 25 items of their on and steel sector to a uniform rate of 20% from the previous average of 35% since March 1992.

(3) Outline and Current Situation of the Brand to Brand Complementation (BBC) Scheme

The basic framework of the Brand to Brand Complementation Scheme was agreed upon among the ASEAN member countries in 1981 and since that date the Memorandum concerning this agreement was signed in 1988 which officially initiated a BBC scheme in the automotive industry. The agreement itself seeks to utilize the special characteristics of the ASEAN region and to do this by promoting the internal division of labor within the region so that member countries produce those parts which they are best adapted to make and trade these among themselves so that overall trade and economic prosperity is promoted.

In concrete terms the ASEAN member countries provide support through reduction of preferential tax and addition to local content items for the schemes of mutually complementing parts production which the various car manufacturers draw up for the ASEAN region as a whole. Since the system offers merits of market scale to the automotive manufacturers and production schedules exceeding the usual local content restrictions are made possible manufacturers are very active in applying the system. As of September, 1993 seven companies have received approvals for a total of 27 undertakings.

Although the approval of the countries concerned is necessary to the BBC scheme in actual practice approval largely depends on the enthusiasm and initiative of the manufacturer concerned. However, it is clear that in the meantime the BBC scheme will contribute and give impetus to the horizontal division of labor within the ASEAN region.

(4) Outline of Local Content Regulation

The restrictions in Thailand concerning the local content of automotive parts were established in 1973. On the other hand there are no such restrictions pertaining to electrical or electronics goods.

The local content restrictions can be said to have been effective so far as they widened and strengthened the base of supporting industries serving the automotive parts industries in Thailand. However, Assembly manufacturers obliged to use domestically manufactured parts to clear restriction requirements were sometimes dissatisfied with the quality and cost aspects of locally supplied parts. As a result many such firms are currently aiming at increasing their own in-house supply ratios or seek to parts manufacturers which they do regular business in home country to invest in Thailand.

According to the view of the Office of Industrial Economics of the MOI which is responsible for administering the local content regulations there is an increasing need to bring the policy of local content into line with GATT rulings and the trend will be to do away with such restrictions. Hereafter it will be necessary to review the local content percentages set for individual parts and promote industrial operations with a greater emphasis on the value

added of each part.

I.4 Promotion Policies for Industrial Standards and Occupational Skill Standards

(1) Current Situation regarding Industrial Standards

In accordance with the Industrial Product Standards Act which was passed in 1968, the Thai Industrial Standards Institute (TISI) is responsible for setting, diffusing and testing Thai industrial standards. As of the end of 1992, items for which Thai Industrial Standards (TIS) have been set and are in force numbered 1,282 of which 56 items concern automotive related items and 79 concern electrical items. Products which meet with the MOI standards are assured of satisfactory product quality, reliability and safety, and there are 3 automotive items (to which one more item is scheduled to be added soon) and 10 electrical items which are required to obtain the mark of approval.

(2) Outline of National Trade Standard and Testing System

The first national skill standards were established for electric welders, turners and electric wirers in 1971. As of the end of 1993, the National Trade Standard and Testing System covered 31 trades.

In Thailand, the National Trade Standard and Testing System has been operated almost in the same way as in Japan and other countries, though it is not yet accepted largely in industries. There are several problems to further penetrate this system in industries.

The first problem is a small number of trades for testing. The number of trades is very small in production plants. The second problem is that the places of examination are limited to the Regional Institutes for Skill Development installed in 10 regions. To spread the significance of the System more largely, it is necessary to use more places of examination. The third problem is that there is no movement for elevating the economic and social status of technical workers.

I.5 Policy Implementation System

(1) Central Governmental Bodies

At present in Thailand the government is composed of the Prime Minister's Office and 14 ministerial offices. Under these there are 150 departments which carry out the actual implementation of policies. In Thailand there is no special governmental office for administration of the small and medium scale industries such as exists in some other countries. However, it is evident that the Ministry of Industry forms the central pillar of the system for administration of policies of industrial promotion. Other ministries support the activities of the MOI indirectly. Examples of such indirect support are the activities of the Ministry of Labor and the Ministry of Education in the nurture of personnel resources, the activities of the Ministry of Finance and the Central Bank in the field of state finance, money and banking, the activities of the Board of Investment placed under the Prime Minister's Office and the Ministry of Commerce regarding investment and trade, etc.

The functions of each department and division are summarized in table 1-1.

(2) Linkages between Government and the Private Sector

Nationwide organizations of the private sector include the Federation of Thai Industries (FTI), local Chambers of Commerce and the industrial associations of the individual industries. Among such private sector organizations the FTI is the most energetic in its lobbying activities towards the government. In many cases groups which are already members of a Chamber of Commerce or an industrial association also join the FTI. Internally the FTI is subdivided into clubs organized by industrial sector and clubs by region so that this organization can be justly described as a fully representative body of the private sector in Thailand.

More than 300 private sector representatives represent the interests of the FTI constituent members on joint working committees between government and the private sector. A representative example of such participation are the activities undertaken in the JPPCC (Joint Public and Private Consultative Committee), and the FTI sends members to act as representatives on both the

central and regional JPPCC. KORLOROR handles a wide range of topics and issues and the government has delegated it the role of evolving and developing the guidelines and groundwork for drafting governmental plans. However it is sometimes pointed out that few of proposals at KORLOROR are backed by sufficient data, and even in cases of proposals arising from the sites concerned, supporting data and information is inadequate or poor in the majority of cases and the government is consequently unable to make any concrete use of the proposals. The government has expressed its desire to see improvements on the part of the private sector in this regard.

Table I–1 ROLE AND FUNCTION OF KEY AGENCIES RELATED TO INDUSTRIAL DEVELPOMENT

Role \ Policy Targets	Investment	Rural Development	SMI's Development	Export	Human Resource	Tech. & Environ. Development	Industrial Estate Development
Policy Making	NESDB, BOI	NESDB, DIP, OIE	NESDB, DIP, OIE	NESDB, MOC	NESDB, MOI, MOE, DIP	NESDB, MOE, MSTE	NESDB, IEAT
Study & Research	– ditto –	– ditto –	– ditto –	– ditto –	– ditto –	– ditto –	– ditto –
Programe Implimentation Promotion (Key Agency)	BOI, IDD	MOI (DIP, OIE)	MOI (DIP, OIE)	DEP	MIL, MOE, MSTE, DIP	MOI, MSTE	IEAT
Financial Support	IFCT	IFCT, GSR	SIFC, IFCT			TTC, MTEC	
Fiscal & Tax Support	BOI, MOF	BOI, MOF	BOI, SICGC	BOT		BOI	
Information Supply	BOI, IDD, IFCT	MOI (DIP), BOI	MOI, DIP, BOI	DEP	MOL, MOE, DIP	IDD, TMDPC, MIDI, TISI, NSTDA, DSD	
Seminar & Training	BOI, IDD, IFCT	DIP, PIO	BOI, IFCT, DIP	DEP	IDD, TMDPC, MIDI, DSD, DOVE, ISD	TMDPC, MIDI, DSD, MTEC, TTC, DOVE, ISD	IEAT, BOI

I.6 Technical Institutional Setup for Promoting the Supporting Industries

(1) Actual Situation of Technical Support Institutions

Technical support activities for fostering Thai supporting industries can be roughly divided into the following 3 fields:

1) Supports for fostering human resources (Education/Training);
2) Supports for producing activities (inspections, production technology, and R & D); and
3) Information and management consulting services.

Table I-2 lists the main technical support institutions by field. The institutions marked with serial numbers 1 to 11 have facilities to provide services for private companies. Those marked with numbers 12 to 15 are institutions which provide technical supports indirectly to private companies in terms of administration.

(2) Problems in Public Technical Support Institutions

Public technical support institutions are now facing the common problems that personnel is inadequate in quality and quantity and that these institutions are located far from the center of Bangkok.

Table I-2 TECHNICAL ASSISTANCE FOR SUPPORTING INDUSTRIES PROVIDED BY MAJOR ORGANIZATION

Ser. No.	Name of Organization	Authorities Concerned or Status of Organization	Location	Sub-sectors Served or Major Functions	Education/ Training		Technical Assistance						Others		
					1	2	3	4	5	6	7	8	9	10	11
					Seminar/Workshop (Technology, QC, etc.)	Vocational Training	Extension Services	Technical Consultation	Research & Development	Inspection, Testing	Calibration	Industrial Standardization	Consultation for Invest/Management	Technical Information	Credit
Technical Institution															
1	MIDI	MOI/DIP	Bangkok	Technical institution for metal work and machinery industries	○		○	○	○	○				○	
2	TMDPC	MOI/DIP	Bangkok	Improving of productivity and management development in manufacturing industry	○		○						○	○	
3	(R)IPC	MOI/DIP	Chonburi and other 4 cities	Promotion and advisory center for small scale and regional industries	○		○	○					○	○	○
4	ISTTC	MOI/TISI	Bangpoo, Bang Yi Kan	Industrial standardization, testing and training center	○					○		○		○	
5	MTC	MOSTE/ TISTR	Bangpoo	Testing center for industrial products, metrology and measurement system				○		○	○	○			
6	NISD (R)ISD	MLSW/DSD	Bangkok and 23 institutes	Coordinating vocational training	○	○								○	
7	TPA	NGO	Bangkok	Industrial technological supporting association	○	○					○			○	
8	KMITNB	MOUA	Bangkok	Providing formal and non-formal vocational education	○	○		○	○	○	○				
9	ATTC	MOUA/ KMITNB	Ayutthaya	Providing formal and non-formal vocational education	○	○		○						○	
10	CTTC	MOE/RIT	Nakhon-ratchasima	Providing formal and non-formal vocational education		○		○							
11	KMITL	MOUA	Bangkok	Providing formal and non-formal vocational education		○				○					
Administrative & Information															
12	DOVE	MOE	Bangkok and other 240 institute	Formal vocational training program	○	○								○	
13	IDD	MOI/DIP	Bangkok	Industrial promotion for small and medium industries in the target provinces	○		○	○					○	○	
14	MTEC	MOSTE/ NSTDA	Bangkok	Promoting research development in the field of industrial materials					○					○	
15	TTC	MOSTE/ OPS	Bangkok	Core organization in coordinating the international technology transfer	○			○					○	○	○

(Note) ○: Services available for SIs.

I.7 Financial Institutes concerned in Promotion of the Supporting Industries

(1) The Financial Market and Government Policies

The financial market in Thailand under the general influence of financial policies issued from the Ministry of Finance is composed of the Bank of Thailand (an independent public body), 15 commercial banks and 14 foreign banks, five special government banks and more than 100 finance companies under the general tutelage of the Bank of Thailand.

Recent policies in this sector can be summarized as deregulation and liberalization. In line with the activation of economic activity domestically the Foreign Exchange Control laws were relaxed in 1990 and inflow of foreign capital was made free. On the other hand the stability of financial institutes was emphasized and strict control of easy overdraft access increasingly adopted.

The role of finance in promoting industrial development and supporting the small and medium scale industries has been given more emphasis than ever before. To secure such support the government has taken new measures to strengthen and reinforce systematized finance. For example, the Small Industrial Finance Office (SIFO) was started to offer low interest financial support to the small industries. Also the government extended the traditional activities of the Government Savings Banks, to permit these to add financing schemes to promote provincial industry to their activities.

At present, the financial institutions and government bodies listed below are all involved in institutional financing of industrial development.

Special Banks

The Industrial Finance Corporation of Thailand (IFCT)
The Small Industry Finance Corporation (SIFC)
The Government Saving Bank (GSB)
The Small Industry Credit Guarantee Corporation (SICGC)
The Export – Import Bank of Thailand (EIBT)

Government Institutions dealing with Low interest Financing

The Industrial Promotion Centre (IPC)

The Technology Transfer Centre (TTC)

(2) Problems Relating to Financing of Small and Medium Scale Industries

The following summarizes the problems in relation to financing of small and medium scale industries which were mentioned at hearings held with the financial institutions handling the credit services outlined above.

1) Insufficient awareness of market realities

The small and medium scale industries which are eligible for credit financing are not able to give concrete explanation of the potentiality and specific nature of the product markets of undertakings.

2) Overly optimistic forecasts of capital raising ability

Explanations to financial institutions regarding how companies will raise their equity of capital funding for the undertaking envisaged are vague and overly optimistic. A large number of cases have a very high uncertainty.

3) Poor Collateral

The value of collateral (buildings, land, machinery, etc.) offered when applying for credit is low.

4) Half-heartedness about disclosing business activities

This is especially the case in family run firms, and in such cases it is very difficult for financial institutions to get a clear picture of undertakings.

In addition to the above problems, financial institutions also point to the lack of appropriate personnel to support management activities.

II. Outline of the Automotive and the Electrical/Electronic Industries in Thailand

II.1 Thai Economy and the Eutomotive and the Electrical/Electronic Industries

The shares of the automotive and electrical/electronic industries in the total Thai economy is summarized as follows (Note that employment is estimated):

(Unit: Share in %)

	Automotive industry	Electrical/electronic industry	Total
GDP (1992)	1.8%	2.7%	4.5%
Exports (1993)	0.6%	20.2%	20.8%
Imports (1993)	7.1%	20.8%	27.9%
Employment (1990)	0.3%	0.7%	1.0%

Both the automotive and electrical/electronic industries have their broad industrial base, i.e., these industries are supported by a wide range of industries including service industries such as sales and maintenance in addition to related parts manufacturing industries. If all the industries related to the both sectors are put together, their weight in the Thai economy is much more than that measured by the above figures.

II.2 Structural Difference between Automotive Industry and Electrical/ Electronic Industry in Thailand

Characteristics of supporting industries are largely affected by assembly industries. Before discussions going to the supporting industry, it is needed to clarify the structural difference of the automotive industry and electrical/electronic industry.

Figure II-1 conceptually illustrates characteristics of two industries. Based on this, main differences between them are described below.

(1) Export ratio of Finished Goods and Components and Parts

Exports of automotives (finished goods) account for less than 1% of domestic automotive production on a value basis. On the other hand, around 70% of

electrical/electronic equipment (finished goods) produced in the country are exported. Components and parts seem to reach the similar level if indirect exports (incorporated into finished goods) are included. While the automotive industry limits its activity to the domestic market, the electrical/electronic industry is characterized by many production facilities specialized in export, both finished goods and components and parts. Thus, market orientation is a major difference between the two industries.

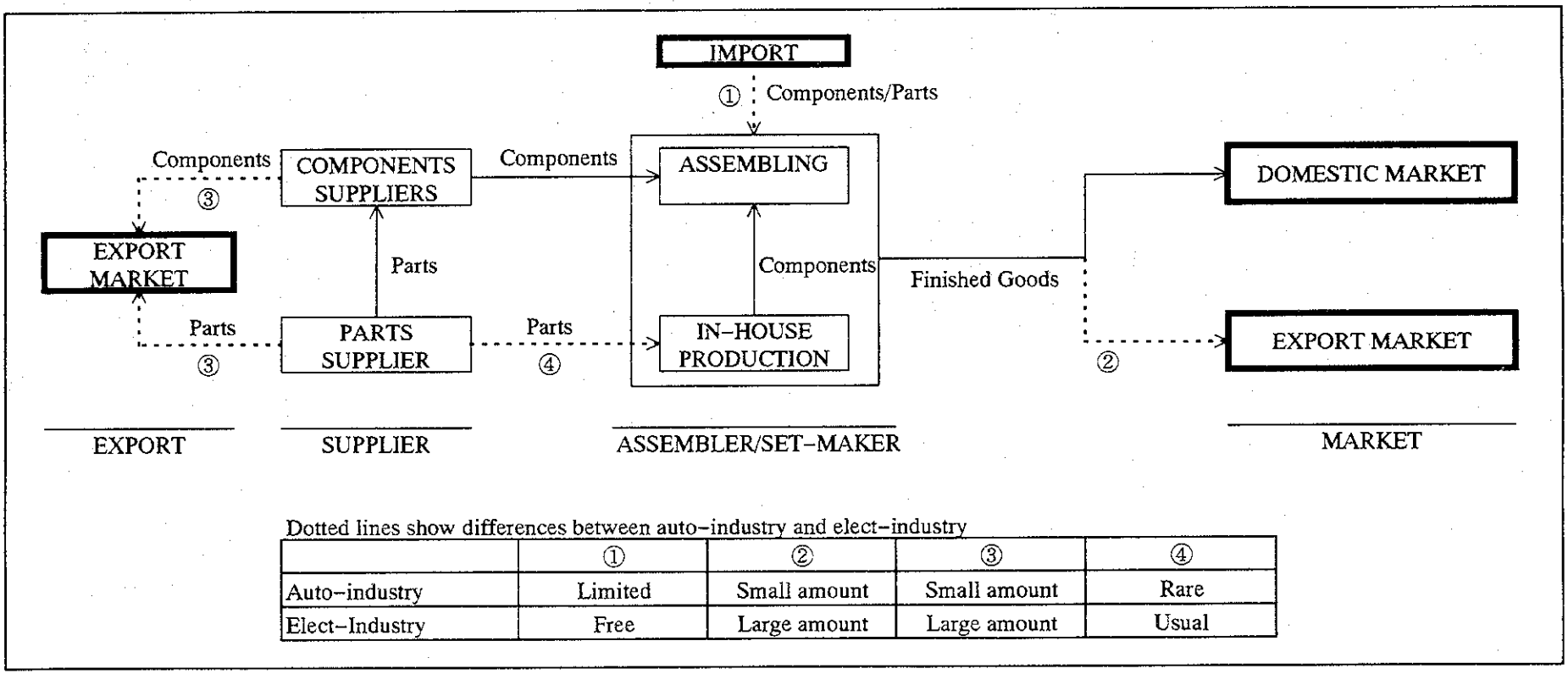
(2) Restriction on Import of Parts

The automotive industry can import a limited variety of components and parts under the local content regulation. The BBC scheme has been introduced to reduce the undue impacts of the local content regulation on the automotive industry. On the other hand, the electrical/electronic industry, without any local content regulation, can import any components and parts so far as import duties are paid.

Indirect restriction on imports of electrical/electronic components and parts does exist, including CRTs for TVs, compressors for air-conditioners, compressors and evaporators for refrigerators. To encourage and protect local production of these components, tax incentives are granted to designated enterprises. Nevertheless, these measures are not aimed at the import ban like the local content regulation for the automotive industry, and the above components can be imported if import duties are paid. Thus, the electrical/electronic industry enjoys a higher degree of freedom in import of components and parts than the automotive industry.

(3) International Competitiveness

The electrical/electronic industry in Thailand consists of various companies who have invested in the country with a clear intention to establish export bases from the beginning. These export-oriented enterprises have volume production capabilities and international competitiveness. In fact, they have successfully gained international competitiveness as a result of the government policy to give incentives to export industries, with reduced restriction on foreign ownerships.



Dotted lines show differences between auto-industry and elect-industry

	①	②	③	④
Auto-industry	Limited	Small amount	Small amount	Rare
Elect-Industry	Free	Large amount	Large amount	Usual

Figure II-1 COMPARISON OF GOODS-FLOW AND STRUCTURE BETWEEN AUTO-INDUSTRY & ELECT-INDUSTRY

On the other hand, the automotive industry clearly lacks international competitiveness in both finished cars and components and parts due to 1) production of many models for the limited domestic market prevents them from volume production, 2) the use of heavy equipment and large components, compared to the electrical/electronic industry, require larger amounts of investment in parts production facilities and equipment, and 3) automotives use less common components and parts than the electrical/electronic industry.

(4) Variety of Products and Requirements for Technology

The automotive industry produces a single product, that is a car, while the electrical/electronic industry supplies numerous types of products, which are sometimes regarded as components or finished products, e.g., printers, HDDs, and FDDs. Secondly, automotive production is characterized by high safety requirements that preclude the use of low-cost, low-end components and parts, making it difficult to foster local suppliers.

On the other hand, some of electrical/electronic products can be produced by small enterprises with their own technology, while clearing the minimum requirements for function, quality and durability. In fact, many small companies in Thailand manufacture and a variety of consumer products, such as air-conditioners, electric fans, and rice cookers, to the domestic market. The electrical/electronic industry seems to warrant the ease of penetration for local enterprises due to availability of common components and parts for assembly.

(5) Difference in Variety of In-house Components and Parts

In the automotive industry, components and parts produced by assembly makers at their own facilities are limited to critical ones such as engines, transmissions, large press parts, and plastic products. Since primary responsibility of automakers lies in design and assembly operations, they do not have technical expertise and know how in design and production of individual components and parts. In contrast, electrical/electronic set makers often design and produce most of components, and even small parts. In effect, they serve as components and parts makers. It is a normal practice for

set makers to supply their components and parts to other makers.

II.3 Industrial Structure and Supporting Industries

(1) Automotive Industry

Fig. II-2 shows a conceptual view of relationships between assembly makers and suppliers by using examples of Japanese company A and U.S. company B. The figure also shows the comparable structure of the Thai automotive industry, in which the number of suppliers represents that in the country as a whole.

In general, assembly makers in Europe and the U.S. operate a procurement system different from that of Japanese and Korean makers, under which they directly purchase most of parts from suppliers, even though fabricating simpler parts. As a result, they deal with a large number of suppliers. On the other hand, in Japan, suppliers are organized into a multilayered structure led by primary suppliers, so that assembly makers deal with a limited number of suppliers. Furthermore, suppliers are classified as to which assembly maker they supply their products, i.e., each supplier is captive to a particular automaker and few of them deal with more than two makers.

Company A (of Japan) has 230 primary suppliers and 2,000 - 3,000 secondary suppliers. Company B (of the U.S.) has 8,500 suppliers. If subcontractors serving primary and secondary suppliers are added, the both companies have more than 10,000 suppliers each, which are considered to be supporting industries providing a wide range of products and services. In contrast, there are 7 assembly makers (which were contacted by the Mission) in Thailand, which are estimated to have 148 primary suppliers and 124 secondary and lower suppliers all together. If manufacturers of repair parts and motor cycle parts are added to the sum of 273 suppliers, the supporting industries in Thailand totals about 500 companies. Naturally it is difficult to compare the figures directly with those of the hypothetical Japanese and U.S. companies which production is 10 times as much as total production in Thailand. The important point, however, is that the number of suppliers is not proportional to the number of vehicles produced.

Clearly, Thai autoparts industry has not been well developed in terms of the number of parts suppliers especially for the secondary or more down-stream suppliers.

(2) Electrical/Electronic Industry

The electrical/electronic industry generally show a higher in-house production rate than the automotive industry. However, the industry manufactures many types of products in larger quantities, it inevitably has much more suppliers. In Thailand, there are approximately 400 enterprises which are known to manufacture electrical/electronic parts, and 2,000 enterprises (with 4 or more employees) classified in the electrical machinery and device manufacturing industry listed in official industrial statistics. Besides, the Study Team has estimated 175 primary suppliers and 126 secondary or more down-stream suppliers totaling 301 OEM parts suppliers under 70 set makers in the target grout of the Study.

In Japan, there are 632 enterprises who are official members of related trade associations, and 42,000 enterprises listed in the industrial statistics. Again, there is a sizable difference between the two countries. As seen in the automotive industry, the electrical/electronics industry requires a wide range of products and services which form significant market opportunities.

In conclusion, the parts industries for automotive and electrical/electronic products in Thailand are very small in size, which limits availability of locally procured parts for assembly manufacturers. Even if these parts are produced locally, their costs become relatively high due to the lack of economy of scale and are not competitive against imported parts. In other words, the continuously high import dependence ratio reflects the lack of industrial infrastructure, namely supporting industries capable of producing machinery and other capital goods and industrial materials, metal molds, and jig and tools for parts production.

According to rough estimates, if imports of automotive parts and electrical/electronic components in Thailand are reduced by half, the import dependence ratio will decrease 10% on a 1993 basis. The ratio can further decrease as local availability of machinery and industrial materials increases.

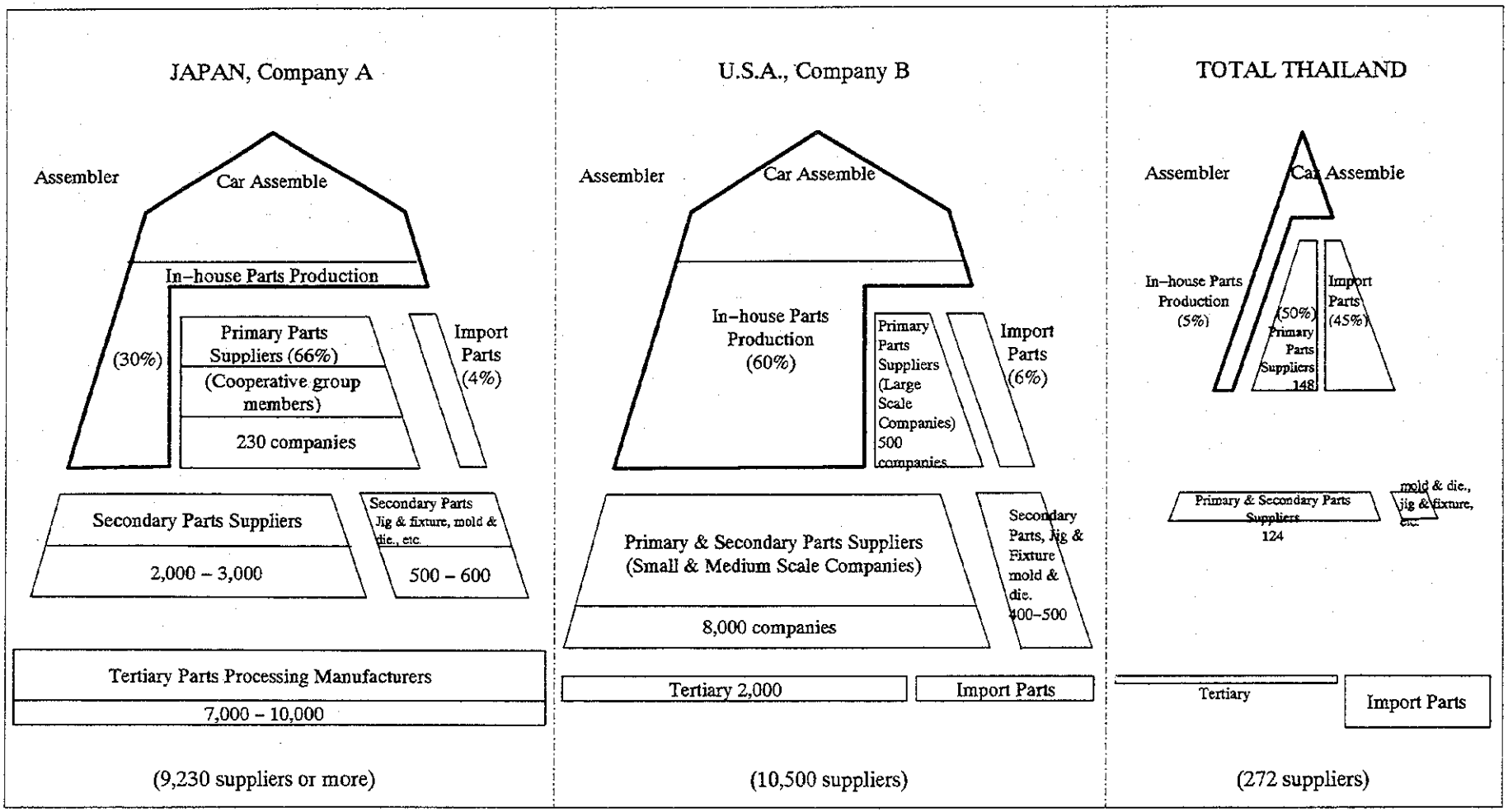


Figure II-2 INTERNATIONAL COMPARISON OF CAR ASSEMBLING
(Conceptional Drawing)

Thus, fostering supporting industries should be viewed as a strategic tool for improving the country's trade balance significantly, in addition to the strengthening of the industrial structure as a whole.

II.4 Outline of Thai Automotive Industry

(1) Domestic Production and Demand for Automotive

There are 12 major automotive assemblers operating in Thailand, of which 7 are Japanese and the rest 5 are European, US and so on as shown in Table II-1. Other than the above, smaller-scale fitting-out factories exist. The table shows the brands and type of vehicles being assembled by each assembler as well as their distributors. Some assemblers assemble two or more brands on consignment contract.

Table II-2 gives the car sales in number of cars for 1984 to 1993. It is a characteristic of the Thailand market that the share of commercial vehicles has exceeded 70% after 1991. In 1992 and 1993, however, the share declined. In view of the ongoing improvement of the standard of living and change in the Thailand lifestyle, despite the expected peaking out in 1994 of "special" demand for taxis caused by the introduction of "taxi-meter" system in 1992 and 1993, all the car assemblers predict that the commercial vehicles' share is likely to decline.

(2) Forecast of the Direction of the Automotive Industry

1) Domestic Demand

Domestic demand for automotives will be likely to rise from 460,000 units in 1993 nearly to 800 thousands to a million units in six years up to 2000. This is a remarkable increase of about 2.0- to 2.5-fold. The high growth is expected for passenger cars. Their share will increase from 38% in 1993 to nearly 60% in 2000.

2) Production

More than 70% of the companies now producing vehicles in Thailand are

planning to expand their capacity to meet this increasing demand. Basically, they have now regarded Thailand as a base for their production activities in the ASEAN and Asian region.

3) Exports

Exports of CBU vehicles are also expected to increase. They will be mainly directed to the Asian region where production capacity will be small relative to demand, and to the EC and North American markets. But for the time being emphasis will be laid on the domestic market so that about 10% of total production in Thailand will be an aim for exports so far.

4) Imports

Imports of higher-price or luxury vehicles which are not being procured in the country may increase in line with reduction of import duties.

5) Tariffs and Local Content Regulations

With the policy of the liberalization of economy in Thailand and the agreements of GATT and AFTA, the tariffs on CBU vehicles, CKD parts and materials will be gradually reduced. It will force the regulations of local content to be gradually eased for cost competition in the world market. The ASEAN region, and Indochina countries are entering on a borderless age and it will be increasingly difficult for any country to remain a protectionist.

6) Regional Dispersion

Almost all assemblers will choose the BOI's Zone II as new plant sites for expansion. Accordingly parts makers tend to move to the Zone II too. Dispersion of industry from Zone I to Zone II is proceeding gradually.

Table II-1 MAJOR AUTOMOTIVE ASSEMBLERS, THEIR PRODUCTION AND DISTRIBUTORS

Assemblers	Type of Vehicle Assembled			Brands Assembled	Distributors
	Passenger car	Pick-up	Truck/Bus		
1. TOYOTA MOTOR (THAILAND) CO., LTD.	○	○		TOYOTA	TOYOTA MOTOR (THAILAND) CO., LTD.
2. ISUZU MOTORS CO., (THAILAND) LTD.		○	○	ISUZU	TRI PETCH ISUZU SALES CO., LTD.
3. MMC SITTIPOL CO., LTD.	○	○	○	MITSUBISHI	MMC SITTIPOL CO., LTD.
4. SIAM NISSAN AOUTOMOBILE CO., LTD.		○	○	NISSAN NISSAN DIESEL	SIAM MOTORS CO., LTD. NISSAN DIESEL CO., LTD.
5. SIAM MOTORS AND NISSAN CO., LTD.	○			NISSAN SUZUKI	SIAM MOTORS CO., LTD. SIAM INTERNATIONAL CORPORATION CO., LTD.
6. SUKOSOL AND MAZDA MOTOR INDUSTRY CO., LTD.	○	○		MAZDA FORD	KIJKAMOL SUKOSOL CO.,LTD/SUKOSOL MAZDA CO.,LTD. MEW ERA CO., LTD.
7. HONDA CARS MANUFACTURING (THAILAND) CO., LTD.	○			HONDA	HONDA CARS (THAILAND) CO., LTD.
8. THAI HINO INDUSTRY CO., LTD.			○	HINO TOYOTA	THAI HINO MOTOR SALES CO., LTD. TOYOTA MOTOR (THAILAND) CO., LTD.
9. THONBURI AUTOMOTIVE ASSEMBLY PLANT CO., LTD.	○		○	MERCEDES BENZ	THONBURI PHANICH CO., LTD.
10. Y.M.C. ASSEMBLY CO., LTD.	○			BMW CITROEN PEUGEOT	THAI YARNYON CO., LTD. THAI-EUROPE CORP AUTOSALES CO., LTD. EUROPEAN AUTOMOBILE CO., LTD.
11. BANGCHAN GENERAL ASSEMBLY CO., LTD.	○	○		OPEL, HOLDEN DAIHATSU HONDA	PHRA NAKORN AUTOMOBILE LTD. DAIHATSU-PHRA NAKORN MOTOR CO., LTD. HONDA CARS (THAILAND) CO., LTD.
12. THAI SWEDISH ASSEMBLY CO., LTD.	○			RENAULT VOLVO	SIAM RENAULT CO., LTD. SWEDISH MOTORS CORPORATION LTD.

Table II-2 TOTAL CAR SALES BY TYPE OF CARS

Unit: Cars

CLASS	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
BIG	2,966	2,173	2,256	3,544	3,860	5,377	6,652	7,610	9,041	14,447
MEDIUM	13,924	11,329	10,521	10,940	14,997	16,665	26,952	24,015	40,281	41,334
SMALL	14,610	8,595	9,974	12,580	19,911	25,663	32,260	35,154	72,423	118,388
PASSENGER	31,500	22,097	22,751	27,064	38,768	47,705	65,864	66,779	121,745	174,169
VAN & M. BUS	4,982	2,715	1,863	2,794	4,533	4,964	6,980	7,670	9,620	11,727
LESS <1 TON	2,778	2,080	2,083	2,986	4,372	7,488	11,960	10,200	14,490	14,207
1 TON	60,327	49,913	46,061	59,411	81,514	115,964	167,613	155,366	182,958	224,388
2-4 TON	6,625	3,870	3,380	4,721	7,025	10,629	15,920	10,312	12,465	12,722
BIG TRUCK	7,127	4,310	3,284	4,158	9,349	19,610	32,126	15,895	17,549	15,568
4 x 4	210	237	179	363	919	1,883	3,599	2,388	4,160	3,687
COMERECIAL	82,049	63,125	56,850	74,433	107,712	160,538	238,198	201,831	241,242	282,299
GRAND TOTAL	113,549	85,222	79,601	101,497	146,480	208,243	304,062	268,610	362,987	456,468

Source: For 1984-1991: Outlook of Thai Economy; Japanese Chamber of Commerce, Bangkok

7) Complementation in CBU vehicles

On the assumption that protectionism within the ASEAN region will give way to a borderless age, and that competition with imported automotives is unavoidable, the automotive manufacturers are likely to concentrate their production on specific types or brands. Though the growth rate of demand is high, total demand remains still much less than in industrialized countries. Under such conditions, it seems to be possible for country A to specialize in pickup trucks, country B in passenger cars, and so on. This will enable the assemblers to attain high-volume production of both vehicles and parts, contributing to reduction of cost and stabilization of quality.

(Note) Some assemblers said, "The parts complementation through the BBC scheme does not necessarily lead to cost reduction, due to more packing and transportation cost, damages during transportation and increasing stock of parts to cope with delay of custom clearances. This scheme is not effective especially in the case of light and bulky parts including outer panels and large plastic molding.

II.5 Outline of Thai Electrical/Electronic Industry

(1) Domestic Production and Demand of Electrical/Electronic Equipment

Statistical data on the production of electronic/electric equipment are not officially compiled. The Study Team made up incomplete data and information into the following table including those obtained from interviews to manufacturers. Looking at annual growth rates over the five years between 1988 and 1992, rapid growth was experienced with an annual increase in quantitative output for refrigerators calculated at 20.9% up to the very high figure of 83.9% annual growth in production for air conditioners. Taking all five appliances listed below together the simple average for annual growth in output is 47%.

ANNUAL GROWTH RATE IN PRODUCTION
(Quantitative base) 1988–1992

Refrigerator	20.9%
Electric Fan	33.6%
Microwave Oven	34.8%
Air Conditioner	83.9%
Color TV	61.9%
Simple Average	47.0%

Thai assemblers of electric/electronic equipment are estimated as 70 firms soucing from various directories. Out of 70 assemblers, joint ventures with foreign companies account for around 70% in the number of firms and more than 90% in production volume in Thailand.

According to results of the interviews conducted with local set makers the annual increase in domestic Thai demand over the last 3 to 5 years are estimated to have been as follows;

ANNUAL GROWTH RATE OF DOMESTIC DEMAND

Color TV Sets; 7%	Washing Machines; 10%
VTR; 10%	Electric Fans; 15%
Refrigerators; 14%	Rice Cookers; 8%
Air Conditioners; 14%	Microwave Ovens; 10%

From the above two tables, it is clear that the remarkable growth of the production has been owed by increase in exports more than that in domestic demand.

(2) Import and Export of Electrical/Electronic Equipment

Table II-3 shows a relation among production, consumption and export for items of electrical home appliances in 1992, which was estimated by the Study Team through interview surveys. Items which exceed 80% of production for exports are Microwave ovens (98%), VTRs (94%), Color TVs (82%) and Air-conditioners (80%). Contrary, items which have bigger domestic consumption than exports are Washing machines (83%), Refrigerators (60%), and Electric fans (48%).

Table II-3 PRODUCTION, CONSUMPTION AND EXPORT OF ELECTRICAL/ELECTRONIC HOME APPLIANCES IN 1992

(Unit : 1,000 sets)

ITEM	(1) PRODUCTION	(2) CONSUMPTION (Share of (1))	(3) ((1) - (2)) (Share of (1))
A. Electrical Home Appliances			
Refrigerator	1,200	730 (60%)	470 (39%)
Air-Conditioner	1,100	220 (20%)	880 (80%)
Microwave Oven	1,600	30 (2%)	1,570 (98%)
Washing Machine	240	200 (83%)	40 (17%)
Electric Fan	4,500	2,150 (48%)	2,350 (52%)
Rice Cooker	2,600	900 (35%)	1,700 (65%)
B. Electronic Home Appliances			
Color TV	5,200	930 (18%)	4,270 (82%)
VTR	4,200	260 (6%)	3,940 (94%)
Audio	4,000	1,200 (30%)	2,800 (70%)

(Source) JICA Team estimate

(3) Forecast of the Direction of the Electrical/Electric Industry

1) Growth potential

The electrical/electronic industry in Thailand has very high growth potential up to 2000 for the following reasons.

Domestic consumption for electrical/electronic equipment has been growing at an average 10% - 12% annually (on a volume basis) in the recent 3 - 5 years, with consumer equipment (home appliances) as a major driving force. At the same time, production has been growing at more than 45% annually during the same period greatly affected by strong growth of exports, in addition to domestic consumption. Now, set makers in the country predict that domestic consumption will continue to grow at the same pace as seen in the recent few years, or at an even higher pace, up to Year 2000. At the same time, they are convinced that they will be able to maintain competitiveness in the export market. In fact, they plan to boost production capacity or some of them have already added capacity.

2) International competition and borderless economy

In contrast to the automotive industry, Malaysia takes a lead in the electrical and electronics industry over Thailand, in terms of production volume and localization of components and parts. Today, Malaysia is the world largest exporter of air-conditioners. It has steadily localized production of electrical and electronic components and parts and exports significant quantities to Thailand via Singapore. Also it exports components and parts made in Thailand through export makers. Similarly, Singapore boasts sizable production of audio equipment, ICs, and TVs. Within the ASEAN region, electrical and electronic components are distributed through international procurement offices (IPOs) established in Singapore. The highly complementary trade relationship among Malaysia, Singapore, and Thailand suggests that economic borders are disappearing between these three countries, and the move will intensify in the future.

3) Relations with other countries

Today, electrical and electronic products manufactured in Japan and Asian NIEs are losing competitiveness due to the strong yen, and the high labor and land costs. Smaller companies, mainly components and parts suppliers, are particularly hit hard and intend to survive by relocating their production facilities to countries offering cost advantages. Thailand will continue to attract certain portions of such companies and needs to be ready to accommodate them for its own industrialization.

4) Influence of the inflow of export-oriented makers

Traditionally, like the automotive industry, the country's promotion policy for the electrical and electronics industry has been based on the domestic market until 1980. This somewhat closed and protected system is breaking up with the rapid inflow of export-oriented set makers as well as components and parts makers since 1980s because the investment incentives were set for the export-oriented companies. Thus, the traditional domestic-oriented companies and the new export-oriented companies are intermingled. Since they are allowed to sell a certain parts of their products

to the domestic market as well, they have inevitably brought the competitive reality in the international competition. New comers are lifting a boarder separating the domestic market and the international market.

5) Repercussion on the components and parts industry

The components and parts industry is expected to upgrade their products from domestic standards to international levels if they try to supply their products to the export-oriented set makers. At the same time, they have to expand production capacity significantly, since settlement of the export-oriented set makers has created a market for electrical/electronic components and parts, a few times larger than the domestic market.

III. Current Status of Parts Industry in Thailand

III.1 Autoparts industry

III.1.1 Historical development of the autoparts industry

The components and parts industry in Thailand began development during the first half of the 1960s in parallel to that of the automotive assembly industry. Investment incentive policies were made applicable to the automotive industry in 1962, and to the components & parts industry in 1965.

The initial thrust in development was to substitute imports in the aftermarket or through what is called replacement equipment manufacturing (REM), but with the start of assembly of vehicles in 1964, original equipment manufacturing (OEM) started in the components industry of tires, batteries, springs and other components.

(Note) i) REM means manufacturing of parts and components used for repaing.
ii) OEM means manufacturing of parts and components used for new brands at an assembly line.

The ministry of Industry identified two policies which have accelerated the development of the autoparts industry in the country. One is a guarantee on market for autoparts suppliers by adopting the local content regulation compulsory to the automotive assemblers since 1974. The other is a protection of the interior cost competition against the imported ones through high tariff rates since 1971.

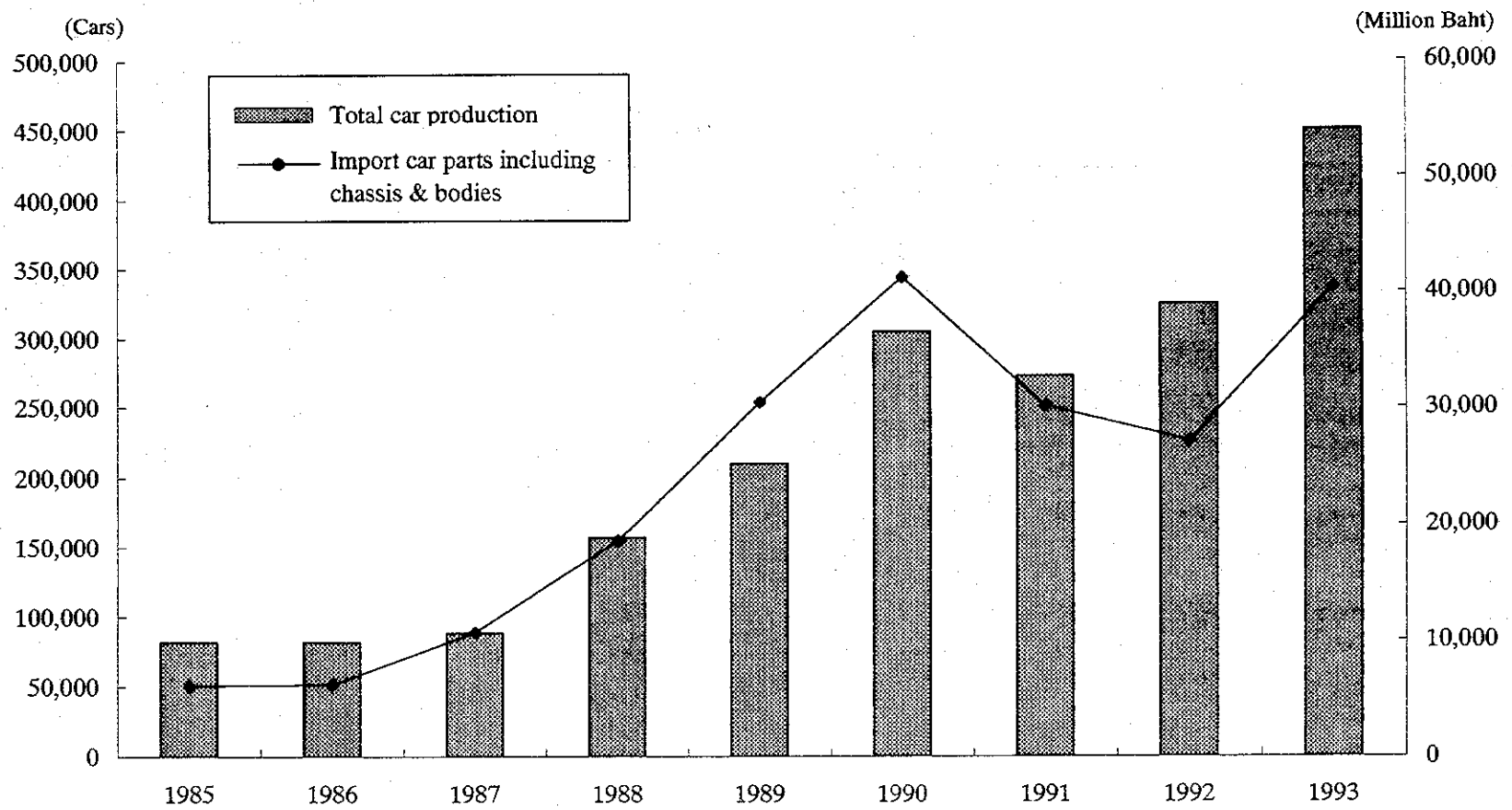
The tariff reduction policy for CKD sets announced in 1991 has intensified competition between domestic parts and imported parts. Further, the concrete steps toward implementation of the BBC scheme within the ASEAN region, since early 1992, as well as the reductions of local content requirements that are now under study, signify the start of a period when the Thai automotive parts industry will be put to the test of international competitiveness, regarding price, quality, and delivery reliability, for both OEM and REM parts.

III.1.2 Production and trade of autoparts

Statistical data are not available for the autoparts production in Thailand neither in quantity nor value. Exports autoparts accounted for 5.8 billion bahts in 1991, which was 12% imports of autoparts, amounting to 49.2 billion bahts, for the same year.

Figure III-1 gives the correlation between the number of car production and the import value of autoparts for years from 1985 to 1993. The production was obtained by adjustment of car sales with imports and exports, while the import value was computed from Table III-1 by deducting, from the total import valve, items of tires and chassis with engine which should be counted as a CBU. The figure also shows the import value of autoparts for producing a CBU vehicle in Thailand, in thousands bahts per car dividing the import value of autoparts by the number of the car production.

The autoparts import value per car production gradually increased from 1985 to 1989 including inflations and cost push mainly caused by Yen appreciation because Japan has been a major exporter of autoparts to Thailand. Since 1990, however, the unit value begun to decrease in spite that the cost push factor or Yen appreciation continued. Taking 1989 when the unit value recorded a peak as an index of 100, the unit value index was 95 in 1990, 77 in 1991, 59 in 1992 and 63 in 1993. During the period of time, foreign investment rapidly grew in the field of autoparts industry.



Import (Million Bahts)	6,095	6,215	10,656	18,587	30,418	41,238	30,060	27,128	40,401
Production (Cars)	81,790	82,106	88,247	157,005	213,548	304,843	272,600	324,608	450,000
Import/car ('000 Bahts)	74.5	75.7	120.8	118.4	142.4	135.3	110.3	83.6	89.8
Index (1989=100)	52	53	85	83	100	95	77	59	63

Figure III-1 CORRELATION BETWEEN TOTAL CAR PRODUCTION AND IMPORTED CAR-PARTS

Table III–1 AUTOPARTS IMPORT

Unit: Million Baht

Commodity	1970	1975	1980	1985	1986	1987	1988	1989	1990	1991
Rubber hoses, tubes	18.32	36.25	63.23	75.59	73.32	86.10	111.34	147.15	221.40	266.05
Transmission belts	29.86	63.67	108.07	134.75	144.65	179.48	252.87	213.66	279.69	332.72
Tyres	0.00	0.00	81.47	92.31	79.97	96.16	258.51	289.47	391.59	390.08
Inner tubes	0.37	0.25	63.00	11.18	6.14	10.40	36.20	40.36	75.44	41.06
Filter blocks	0.42	1.94	5.78	6.41	6.82	4.11	20.40	3.38	10.31	6.54
Brake and clutch materials	6.46	37.94	49.16	64.45	60.21	73.56	96.02	84.96	101.60	85.90
Safety glasses	9.72	18.66	10.92	34.85	14.58	10.49	12.45	26.96	63.34	45.25
Mirrors	5.40	10.89	32.64	48.67	26.88	25.92	25.77	52.86	76.62	74.11
Springs and leaves	10.49	31.30	49.52	65.22	72.97	104.61	22.15	29.09	31.91	38.83
Gasoline engines	46.57	259.63	361.47	570.62	588.44	767.91	964.12	1,019.30	1,149.30	1,073.60
Diesel engines	170.64	830.40	781.08	1,245.02	753.19	1,219.56	1,695.95	4,055.73	6,783.70	6,056.83
Spark ignition parts	241.43	623.24	1,641.50	1,668.34	1,965.66	2,896.18	3,293.42	3,943.92	4,944.65	4,346.34
Liquid filters	28.95	37.83	33.52	126.31	94.41	97.38	43.45	74.01	115.98	143.02
Gas filters	2.18	3.60	10.19	27.95	25.35	31.37	23.32	22.93	24.29	53.60
Ball bearing	97.65	326.27	509.70	2,523.31	1,604.61	1,597.80	1,071.79	1,329.17	1,635.71	1,900.59
Transmission systems	108.02	353.10	586.07	792.59	774.42	1,199.93	1,630.21	2,289.85	2,787.71	2,949.87
Gaskets	128.87	74.02	95.86	120.49	113.99	150.32	233.77	228.85	302.64	331.68
Machinery parts	17.23	57.20	81.63	111.19	140.04	180.17	238.64	293.81	348.29	415.95
Electric Accumulators	31.99	6.05	13.56	26.82	36.61	63.38	3.64	5.30	7.32	44.81
Starting equipment	1.97	7.16	24.73	170.03	107.61	54.39	1,244.32	1,588.55	1,904.70	1,756.81
Electric lighting	23.37	50.57	131.02	235.55	285.74	358.70	336.80	419.03	521.64	473.02
Ignition and wiring sets	104.19	118.03	121.21	37.03	107.48	295.65	58.33	77.36	69.82	52.28
Chassis with engines	0.00	1,064.97	92.94	1,957.42	2,196.96	3,812.97	14,721.88	19,079.70	24,383.49	13,835.82
Bodies	1.55	10.57	1.45	3.20	2.99	2.99	5.59	16.74	62.14	60.70
Accessories	56.45	142.95	914.39	1,402.68	1,539.25	1,968.50	3,505.06	10,189.66	15,614.19	14,435.45
Total	1,085.65	4,166.49	5,864.11	11,551.98	10,822.29	15,288.03	29,906.00	45,521.80	61,907.47	49,210.91

Source: Investment Opportunity Study, BOI.
Customs Department of Thailand

III.1.3 Structure of the autoparts industry in Thailand

(1) The number of the autoparts manufacturers

The Study Team estimated the number of autoparts manufactures currently operating in Thailand on the basis of data and information sourced from various directories, supplier lists given by automakers, and results of the questionnaire survey made in Thailand for the Study.

The following is the estimated figures by category of types of autoparts suppliers in the country:

1)	Primary suppliers	:	148 (40%)
2)	Secondary or more down-stream suppliers	:	124 (33%)
3)	REM suppliers	:	76 (20%)
4)	Export-oriented suppliers	:	26 (7%)
	Total	:	374 (100%)

(Note) There may be more REM suppliers than the above in actuality.

The four categories of the autoparts suppliers are defined as follows:

1) Primary suppliers
Those who supply OEM parts directly to an automaker(s).

2) Secondary or more down-stream suppliers
Those who supply OEM parts their upstream parts suppliers but not directly to automakers.

3) REM suppliers
Those who supply autoparts only to after-markets for repairing. Co-suppliers of OEM parts and REM parts are categorized in 1) or 2) above.

4) Export-oriented suppliers
Those who have obligations to export their parts with more than 51% foreign share capital.

(2) Types of the enterprises of autoparts manufacturers

Reliable statistics related to the production and producers of automotive parts in Thailand are not available. The most comprehensive information source is thought to be Directory of Supporting Industries in Thailand 1993, published by the SEAMICO Business Information & Research Co., Ltd., with support by industrial associations and BOI.

Therein, 395 companies are listed as comprising the supporting industry related to vehicles. The structure of parts suppliers derived from this Directory is shown in Table III-2. In this table the following points merit attention.

1) Motorcycle parts suppliers are mixed in with autoparts suppliers.

2) In addition to OEM parts suppliers, REM parts suppliers are included.

In Table III-2, Code No. 11 includes castings, forgings and basic metal, and Code No. 33 covers other metal working, includes pasts production and their fabrication that is the core of the autoparts industry. Code No. 60 is electrical parts, Code No. 61 is electronic parts, Code No. 70 is plastic parts, and Code No. 71 is rubber parts. These are major areas in the autoparts industry. It is noteworthy that in Code No. 33, there is a high percentage of foreign participation.

Ownership of the parts suppliers in terms of the capital composition is shown in below. It is summarized in the table below where suppliers with no data in Table III-2 are excluded.

OWNERSHIP

	Number of companies	Share
100% Thai owned	159	48.2%
100% foreign owned	12	3.6%
Joint venture	159	48.2%
	330	100.0%

Table III-2 COMPOSITION OF AUTOMOTIVE SUPPORTING INDUSTRY SOURCED BY DIRECTORY

Code	Subsector	Total No. of Companies	By Ownership			By No. of Employees				
			Thai 1/	For. 2/	n.a.	~100	101~200	201~500	501~	n.a.
11	Iron & Steel Basic Industries	29	14	14	1	5	7	8	5	4
12	Non-Ferrous Metal Basic Industries	21	10	11	0	8	4	5	3	1
20	Gear Cutting	10	4	4	2	3	4	1	0	2
21	Mould Making	8	5	3	0	6	0	0	2	0
22	Other Metal Machining	8	2	1	5	1	2	4	0	1
30	Spring & Wire Products	11	7	2	2	5	1	1	3	1
31	Precision Parts & Components	12	6	6	0	9	1	1	0	1
32	Metal Packaging & Containers	1	1	0	0	0	0	0	1	0
33	Other Metal Fabrication	118	34	60	24	43	18	20	9	28
50	Engines	11	5	6	0	0	3	4	3	1
51	Other Machinery & Equipment	5	4	1	0	5	0	0	0	0
60	Electrical Parts & Components	37	16	14	7	10	6	8	6	7
61	Electronic Parts & Components	6	2	3	1	1	2	1	2	0
70	Plastic & Synthetic Fibres	30	12	12	6	9	7	5	5	4
71	Rubber Products	49	22	13	14	10	6	9	5	19
72	Glass Products	8	2	3	3	2	1	2	0	3
74	Pulp & Paper Produts	2	1	1	0	1	1	0	0	0
75	Chemicals	17	6	10	1	13	3	0	0	1
76	Petrochemicals	1	1	0	0	1	0	0	0	0
79	Other Non-Metal Parts & Process	11	5	3	3	4	2	1	0	4
	Total	395	159	167	69	136	68	70	44	77

Notes: 1/ Thai 100% ownership
2/ Jointventure with a foreign investor(s) or foreign 100% ownership

Source: Directory of Supporting Industries in Thailand 1993, SEMICO Business Information & Research Co. Ltd.

There are approximately the same number of companies that are fully owned by Thai capital and joint venture companies. More than 90% of the latter are invested by Japanese companies.

COMPANY SCALE (BY NUMBER OF EMPLOYEES)

	Number of companies	Share
100 or less	136	42.8%
101–200	68	21.4%
201–500	70	22.2%
501 or more	44	13.8%
	318	100.0%

The number of companies having 100 or less employees is about the same as the number of companies having 101–500. This shows that, even taking into account the absence of small companies from this sort of directory, the scale of companies in the industry is somewhat large compared to that of Thai industry in total.

III.1.4 Domestic supply of autoparts

In Table III–2, the extent that supply is through imports, domestic production, or a combination is shown by name of autoparts.

Components and parts marked by ○ in the table are currently imported or continue to be imported for the time being for the following reasons:

1) Highly precise components directly linked to a rapidly advanced research and development area, which production facility (including prototype production) is difficult to be transferred to Thailand;

2) Those requiring highly costly and advancing machinery and equipment that need sophisticated maintenance techniques, and/or highly advanced production techniques;

3) Those produced by highly costly machinery and equipment that are already installed and operated in other countries as a global strategy; and

4) Those which require volume production in view of cost reduction while Thai market is still small in size.

Components and parts marked by △ are partially localized and partially imported for the following reasons:

1) Those which are imported by some automakers according to their own procurement plans, despite the fact that they are locally available;

2) Those which are partially imported due to the insufficient capacity of local suppliers;

3) Those which local production has only recently started and has not still reached a commercial volume stage, or which automakers are slow to shift to instead of imported components; and

4) Those which are not locally available in a full range of the autoparts in terms of specification.

Components and parts marked by X are totally met by local production, or there is no import for them.

Table III-3 KEY COMPONENTS AND LOCAL SUPPLY OF AUTOMOBILE (1/2)

A. Engine				
A1. Engine Assy	• Diesel, big buses & trucks	○	• Gasoline, passenger cars	△
	• Diesel, pick-up truck	×		
A2. Engine Body	• Cylinder Block	○	• Cylinder Head	○
	• Engine Mount	○	• Engine Gasket	×
A3. Piston and Crankshaft	• Crankshaft	○	• Connecting Rod	○
	• Main Bearing	△	• Connecting Rod Bearing	△
	• Piston	×	• Piston Ring & Cylinder Liner	△
A4. Camshaft and Valves	• Camshaft	○	• Camshaft Sprocket	○
	• Valve Guide & Sheet	○	• Engine Valve	△
	• Rocker Arm	△	• Valve Spring	×
	• Timing Belt	×		
A5. Fuel System	• Fuel Pump	○	• Fuel Injection Assy	○
	• Carburetor Assy	○	• Fuel Filter	△
	• Fuel Tank	×	• Fuel Hose	×
A6. Intake and Exhaust	• Intake Manifold	△	• Exhaust Manifold	×
	• Air Cleaner	×		
	• Muffler/Pipes	×		
A7. Lubrication and Cooling System	• Oil Cooler	○	• Oil Pump	○
	• Water Pump	○	• Oil Filter/Cooler	×
	• Radiator	×		
B. Body and Press Parts				
B1. Panel	• Outer Panel; doors, front hood, trunk lid quarter, cowel top	△	• Roof & Roof Rail	△
	• Fender Panel	△	• Front & Center Piller	△
	• Front & Rear Frame	△	• Side Sill	△
	• Inner Panel; doors, front hood, trunk lid quarter	×	• Dush Panel	×
	• Floor Pans/Panels	×	• Strut House Panel	×
	• Cross & Side Members	×	• Reinforces	×
B2. Exterior	• Plastic Made Bumper	○	• Steel Made Bumper	×
	• Radiator Grille	△	• Mogal/Side Protector/Garnish	△
	• Rear Spoiler	△	• Wheel Cover	△
B3. Small Press Parts	• Splash Guard, Brake Layer, Door Hinge, Hood Hinge Hood Support, Bracket, Gusset, Belt Bar, Bumper Stay, Gate Lock	×		
B4. Press Die Making, Jigs, Machining	• Dies, Jigs, Tools, Machining	△		

(Note) ○: Mostly imported, ×: Mostly local production, △: Mixture of ○ and ×.

Table III-3 KEY COMPONENTS AND LOCAL SUPPLY OF AUTOMOBILE (2/2)

C. Chassis				
C1. Suspension	• Lower and Upper Arms	○	• Coil Spring	×
	• Shock Absorber	×	• Stabilizer	×
C2. Axle	• Knuckle	○	• Axle	○
	• Wheel Hub	○		
C3. Steering	• Wheel	○	• Column	○
	• Shaft	○	• Gear	○
	• Gear Housing	○		
C4. Brake	• Master Cylinder	○	• Brake Booster	○
	• Disc Brake Caliper	○	• Brake Disc	△
	• Brake Drum	×	• Brake Pedal	×
	• Brake Hose	×	• Brake Tube	×
D. Driving Mechanism				
D1. Transmission	• Transmission Case	○	• Transmision Gear	○
	• Transmission Shaft	○		
D2. Clutch	• Clutch Assy	△	• Clutch Master Cylinder	○
	• Clutch Release Cylinder	○	• Clutch Housing	△
	• Clutch Pedal	×		
D3. Drive Shaft Assy	• Uniform Joints	○	• Differential Gear	○
	• Propeller Shaft	△	• Wheel, Steel	×
	• Wheel, Aluminum	×		
D4. Tyre	• Radial Tyre	×		
E. Electrical Parts and Wiring	• Meter, Switch, Relay, Cruise Control	○	• Battery	×
	• Alternator & Starter	×	• Wire Harness/Cable	×
	• Spark Plug	×	• Horn	×
F. Trim	• Instrument Panel	△	• Console Box	△
	• Seat/Cushion	×	• Floor Carpet	×
	• Seat Belt	×		
G. Exterior and Accessories	• Door Lock/Cylinder	○	• Sticker	△
	• Lamp	△	• Safety Glass	×
	• Mirror	×	• Car Radio	×
	• Air Condition	×	• Hand Tool Set/Bolts & Nuts	×
	• Antenna, Windshield, Wiper & Washer	×		

(Note) ○: Mostly imported, ×: Mostly local production, △: Mixture of ○ and ×.

III.2 Electrical/electronic parts industry

III.2.1 Historical development of the electrical/electronic parts industry

(1) 1950 – 1959

Two set makers, Philips Electric and Sanyo Universal Electric built their plants in 1950s. A parts supplier was established as a joint venture during the period for production of tinplates which were used for various fields of industries.

(2) 1960 – 1969

During the period, 8 set makers invested to serve domestic demand. On the other hand, parts suppliers amounted to 8 only (6 for Thai 100%, 2 for J/V) because set makers procured components and parts by import or in-house production. In-house production has somewhat become the norm of set makers established during the period, and many of them still produce parts by themselves even now. There were 6 parts makers wholly owned by local capital, of which 4 make plastic parts and the other two do not supply functional parts. There are 2 joint ventures, one produces speakers and another paints. Overall, not much growth was seen in parts suppliers in the decade.

(3) 1970 – 1979

A total of 5 set makers and 12 parts suppliers were established during the period. Of 12, 6 are wholly owned by Thai capital and mainly produce plastic parts, while one company produces a functional part, namely capacitors. And, 2 companies are wholly owned by foreign companies (Germany), and one produces pigments and another magnets, although they have not produced electrical/electronic parts only. The rest was 4 joint ventures: One company produces condensers, 1 plastic parts, and 2 paints. During the decade, not much investment by parts suppliers was seen to reflect relatively a small number of investment projects by set makers. Nevertheless, several manufacturers of condensers and capacitors were established to mark the beginning of explosive growth of parts makers during the subsequent decade.

(4) 1980 - 1989

The investment to the industry grew and flourished over the decade. In total, 60 parts suppliers were established during the decade: 44 are foreign affiliates, and 24 more than 51% owned by foreign capital. The figures suggest two different patterns in foreign investment. One represents a group of companies who have established production bases to export parts in Thailand because of favorable investment climate, another group intended to serve set makers operating in the country to meet increasing demand in the domestic market. Compared to the automotive industry, the electrical/electronic industry shows a significantly high percentage of direct exports of component and parts. During the decade, investment projects by set makers amounted to 28.

In the area of raw material, several coil centers to cut sheet metals and steel plates into required sizes started operation. Commercial production of wires was started during the period, as well as a variety of functional parts, including ICs, PCBs, wire harnesses, capacitors, relays, switches, cassette tapes, compressors, and evaporators.

A total of 16 suppliers was wholly owned by local capital, with an increasing number of stamping press products as well as plastic parts. Production of functional parts, such as PCBs, wire harnesses, heads, aluminum diecast, and switches was commenced. The most notable event is production of cathode ray tubes started by Thai CRT in 1989.

(5) 1990 - 1992

New projects in components and parts industries numbered 13 during these 3 years, suggesting that momentum in 1980s still continues in the first half 1990s. Among 13, 11 projects were foreign-based companies. Investment in production of PCB, electronic parts, compressors of refrigerators and copper pipes was remarkable in the years.

III.2.2 Production, export and import of electrical/electronic parts

(1) Production of electrical/electronic parts

Production of electrical/electronic components and parts in Thailand could not be figured out neither in quantity nor in value due to the lack of industries statistics. Estimation is impossible too because new projects have rushed and caused dynamic change in these year.

(2) Export and import of electrical/electronic parts

Being aggregated from Table III-4, import and export show the following changes between 1989 and 1992.

CHANGE OF IMPORT AND EXPORT BETWEEN 1989 AND 1992
(ELECTRICAL & ELECTRONIC COMPONENTS AND PARTS)

	1989 (Billion B)	1992 (Billion B)	1992-1989 (Billion B)	1992/1989 (Ratio)
(1) Import	30.3	60.7	30.4	2.0
(2) Export	21.5	44.6	23.1	2.1
(1)-(2)	8.8	16.1	7.3	1.8

Source: Table III-4

As seen in the table, imports of electrical/electronic components and parts doubled between 1989 and 1992 from 30.3 billion Bahts to 60.7 billion Bahts. This represents an increase of 30.4 billion Bahts. On the other hand, exports grew by 2.1 times from 21.5 billion Bahts to 44.6 billion Bahts, representing an increase of 23.1 billion Bahts.

In terms of trade balance, the country recorded a deficit of 8.8 billion Bahts in 1989, which increased by 1.8 times to 16.1 billion Bahts in 1992. Looking at individual component categories by Table III-4, integrated circuits dominated exports and imports in 1992, accounting for 61% and 64% of total respectively. IC trade also shows a deficit of 8.3 billion Bahts in 1992, which shares 52% of the total deficit of 16.1 billion Bahts.

This is because, (1) although Thailand is one of major IC exporters, parts for IC, however, are mostly imported (2) import of IC which are not available in

Thailand in terms of specification have increased significantly and (3) IC imports for re-export purposes grew rapidly.

The second largest deficit comes from cathode-ray tubes (CRTs) for TVs and amounts to 4.5 billion Bahts. While CRTs for the domestic market are mostly supplied by Thai CRT, those for re-export, as a parts of TV, have increased. Re-exports of CRTs are thus included in TV exports of 17 billion Bahts in 1992.

(Note) Imported parts for the assembly of finished goods for re-export are statistically recorded only in the classification of imports.

Other items producing the deficit are electronic elements parts, including capacitors (2.4 billion Bahts), transformers (1.3 billion Bahts), and registers (0.9 billion Bahts)

On the other hand, printed circuit boards (PCBs) showed a major surplus of 2 billion Bahts in 1992. This reflects active investment by 9 PCB makers, 1 in the 1970s, 6 in the 1980s, and 2 in the 1990s.

(3) Export and import of the entire electrical/electronic industry

With regard to the relation that exported finished goods include imports of their parts, they have to be viewed as exports ad imports of the entire electrical/electronic industry. Table III-5 gives the aggregated figures of finished goods and parts for both import and export.

As seen in the table, the electrical/electronic trade for the country recorded a deficit of 5.7 billion Bahts in 1989 and 1.9 billion Bahts in 1990, then it turned to a surplus of 9.9 billion Bahts in 1991 and 20.4 billion Bahts in 1992. A major reason for this is a rapid increase in export of finished goods by 4.3 times during 1989 to 1992. Meanwhile, exports of components and parts grew by 2.1 times, and total electrical/electronic exports by 2.9 times. On the other hand, the entire imports of electrical/electronic industry remained by 2 times. In particular, imports of finished goods remained by 1.8 times.

In terms of value, import for components and parts accounted for 3.7-fold of that for finished goods. Greater part of the imported components and parts were re-exported as part of finished goods.

Table III-4 IMPORT AND EXPORT OF MAIN COMPONENTS AND PARTS (ELECTRICAL ELECTRONIC) (1/2)

(Unit: Value in Million Bahts)

Products	Import or Export	1989		1990		1991		1992	
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
A. Components and Parts	**Import**	**—**	**1,883**	**—**	**3,028**	**—**	**4,033**	**—**	**4,369**
(Qty: ton)	**Export**	**—**	**744**	**—**	**1,307**	**—**	**2,354**	**—**	**3,828**
Air Conditioner	Import	776	193	3,516	486	2,671	751	2,250	679
	Export	2,380	499	2,422	480	4,162	854	3,649	735
Refrigerator	Import	1,150	287	922	286	1,736	537	1,236	450
	Export	189	36	736	164	405	82	475	100
Washing Machine	Import	317	55	588	113	565	127	32	4
	Export	5	1	–	–	6	1	900	167
TV and Radio excl. CRT	Import	3	1,348	7	2,143	4	2,618	7	3,236
	Export	1	208	2	663	4	1,417	6	2,826
B. Critical Parts	**Import**	**—**	**1,982**	**—**	**3,044**	**—**	**4,064**	**—**	**6,227**
(Qty: 1,000 sets)	**Export**	**—**	**7**	**—**	**428**	**—**	**867**	**—**	**972**
Cathode-Ray Tube (CRT) for TV	Import	1,492	1,980	2,313	2,560	3,550	3,438	5,234	5,413
	Export	22	7	362	428	1,434	853	1,460	950
Magnetoron for Microwave Oven	Import	0.1	2	1,040	484	1,487	626	1,685	814
	Export	0.7	0.3	0.7	0.3	3.2	14	234	22

Table III-4 IMPORT AND EXPORT OF MAIN COMPONENTS AND PARTS (ELECTRICAL ELECTRONIC) (2/2)

(Unit: Value in Million Bahts)

Products	Import or Export	1989		1990		1991		1992	
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
C. Electronic Parts and Device (Qty: ton)	**Import**	**—**	**26,428**	**—**	**34,593**	**—**	**43,578**	**—**	**50,055**
	Export	**—**	**20,782**	**—**	**25,812**	**—**	**32,220**	**—**	**39,778**
Registor	Import	715	269	1,567	504	3,923	1,076	5,074	1,442
	Export	37	119	39	121	532	389	1,479	522
Capacitor (Condensor)	Import	1,428	1,368	2,392	2,278	3,060	3,094	3,453	3,888
	Export	403	351	913	701	1,326	1,361	1,978	1,490
Transformer	Import	131	782	236	1,367	272	1,892	298	2,340
	Export	10	172	23	398	41	708	72	1,008
Micro Motor	Import	27	679	37	1,107	46	1,694	47	2,004
	Export	12	1,140	18	1,695	22	2,101	27	2,374
Printed Circuit Board (PCB)	Import	105	911	191	1,506	268	2,843	300	3,296
	Export	52	575	71	1,247	108	1,658	105	5,315
Relay	Import	3	110	4	199	5	214	5	200
	Export	–	1	4	70	16	249	34	450
Integrated Circuit	Import		22,309	–	27,632	–	32,765	–	36,885
	Export		18,424	–	21,580	–	25,754	–	28,619
GRAND TOTAL (A.+B.+C.)	**Import**	**—**	**30,293**	**—**	**40,665**	**—**	**51,675**	**—**	**60,651**
	Export	**—**	**21,533**	**—**	**27,547**	**—**	**35,441**	**—**	**44,578**

Note: See ANNEX V for classification codes of each item.

Source: FOREIGN TRADE STATISTICS, Custom Department

Table III-5 OVERALL TRADE OF ELECTRICAL AND ELECTRONIC INDUSTRY

(Unit : Million Bahts)

	1989	1990	1991	1992	Ratio 1992/1989
(1) Export of Finished Goods	12,245	24,237	40,139	52,859	4.3
(2) Export as Component/Parts	21,533	27,547	35,441	44,578	2.1
A. Export Total	33,778	51,784	75,580	97,437	2.9
(3) Import of Finished Goods	9,191	13,020	14,017	16,391	1.8
(4) Import as Components/parts	30,293	40,665	51,675	60,651	2.0
B. Import Total	39,484	53,685	65,692	77,042	2.0
(5) Balance (A. – B.)	(5,706)	(1,901)	(9,888)	(20,395)	–

III.2.3 Structure of the electrical/electronic parts industry

(1) The number of the electrical/electronic parts manufacturers

The Study Team estimated the number of the electrical/electronic manufactures currently operating in Thailand on the basis of data and information sourced from various directories, supplier lists given by set makers, and the results of the questionnaire survey made in Thailand for the Study.

The following is the estimated figures by category of types of electrical/electronic parts suppliers in the country:

Primary suppliers	:	175 (44%)
Secondary and lower-tier suppliers	:	126 (31%)
REM suppliers	:	28 (7%)
Export-oriented suppliers	:	73 (18%)
Total		402 (100%)

Definition of the four categories of parts suppliers is the same as mentioned in III.1.3 (1) for the autoparts industry.

(2) Types of enterprises of electric/electronic parts manufacturers

This section attempts to analyze the structure of the electrical/electronic

components and parts industry on the basis of "Directory of Supporting Industries in Thailand 1993" compiled by SEAMICO Business Information & Research Co., Ltd., as done for autoparts. The directory lists 393 companies as supporting industries for the electrical/electronic industry in Thailand.

From the directory, 18 subsectors have been identified as supporting industries, and the number of enterprises, ownership, and employment in each subsector are calculated and listed in Table III-6.

First of all, all the enterprises in the table, except for those lacking the data (indicated as n.a.), are classified according to ownership as follows:

OWNERSHIP (ELECTRICAL/ELECTRONIC)

Ownership	No. of enterprises	Composition
100% local:	172	46.0%
100% foreign:	82	21.9%
Foreign/local J/V:	120	32.1%
	374	100.0%

Enterprises wholly owned by foreign capital account for 22% of total, and foreign-affiliated enterprises including joint ventures represent 54% of total. Japanese companies account for 57% of all the wholly owned foreign enterprises and 66% of all the joint ventures.

Focusing on individual subsectors, foreign-affiliated companies dominate electronic parts (Code No. 61) with a 75% share. On the other hand, wholly owned local enterprises and foreign-affiliated ones get even in iron castings, forgings, and basic metal (Code No. 11), metalworking products (Code No. 33), and plastic components and parts (Code No. 70). Local enterprises dominate electrical parts (Code No. 60) with a 73% share.

Secondly, all the enterprises are classified by scale of company according to the number of employees as follows:

COMPANY SIZE OF PARTS SUPPLIER
(NUMBER OF EMPLOYEES)

Employment size	No. of enterprises	Composition
100 or less	140	36.9%
101 - 200	80	21.1%
201 - 500	84	22.2%
501 -	75	19.8%
	379	100.0%

Enterprises employing 101 - 500 persons exceed those with 100 or less employees in number, and those with 501 or more employees account for 20% of total. Thus, electrical/electronic components and parts suppliers seem to be larger in size than the industrial average for the country.

Table III-6 COMPOSITION OF ELECTRICAL/ELECTRONIC SUPPORTING INDUSTRY SOURCED BY DIRECTORY

Code	Subsector	Total No. of Companies	By Ownership			By No. of Employees				
			Thai 1/	For.2/	n.a.	~100	101~200	201~500	501~	n.a.
11	Iron & Steel Basic Industries	10	5	4	1	0	4	3	2	1
12	Non-Ferrous Metal Basic Industries	10	4	6	0	3	1	3	2	1
21	Mould Making	6	4	2	0	5	0	0	1	0
22	Other Metal Machining	5	2	3	0	2	1	2	0	0
30	Spring & Wire Products	15	6	7	2	12	1	1	1	0
31	Precision Parts & Components	9	3	6	0	0	0	1	5	0
33	Other Metal Fabrication	20	9	9	2	3	5	4	2	2
40	Heat Treatment & Surface Finishing	1	0	0	1	7	0	1	0	0
51	Other Machinery & Equipment	5	2	3	0	1	0	1	0	0
60	Electrical Parts & Components	117	81	30	6	4	32	21	20	2
61	Electronic Parts & Components	132	27	99	6	42	22	31	36	8
70	Plastic & Synthetic Fibres	43	20	22	1	35	10	11	4	0
71	Rubber Products	4	2	2	0	18	0	2	0	0
72	Glass Products	3	2	1	0	2	0	1	1	0
73	Ceramic Products	1	0	1	0	1	0	1	0	0
74	Pulp & Paper Products	1	1	0	0	0	1	0	0	0
75	Chemicals	5	1	4	0	3	1	0	0	0
79	Other Non-Metal Parts & Process	6	3	3	0	2	2	1	1	0
	Total	393	172	202	19	140	80	84	75	14

Notes: 1/ Thai 100% ownership
2/ Jointventure with a foreign investor(s) or foreign 100% ownersh

Source: Directory of Supporting Industries in Thailand 1993, SEMICO Business Information & Research Co. Ltd.

III.2.4 Domestic supply of major components and parts

As mentioned earlier, unlike automotive industry, set makers or assemblers of electrical/electronic equipment often sell, to other set makers, their components and parts that were made in their own factories.

This section analyzes domestic supply of major components and parts for leading electrical/electronic equipment. Major components and parts here are defined as those requiring advanced design techniques and precise production technology, and accounting for large portions of the total production cost. Note that the localization rate and export ratio indicated in description below are approximated figures, since they vary greatly from one set maker to another.

Major components and parts have been classified into two categories; locally produced or to be imported; based on the interview survey for set makers (See Table III-7). The table shows the classification according to the following marks by component and part.

- ○ : Mostly imported
- △ : Partly imported and partly localized
- × : Mostly localized

The reasons why those parts and components marked by ○ or △ are the same as mentioned in III.1.4 for the autoparts.

Table III-7 KEY COMPONENTS AND LOCAL SUPPLY OF ELECTRICAL / ELECTRONIC EQUIPMENT

Finished Products	Key Components			
A. Electrical Home Appliances				
Air Conditioner	· Cabinet	×	· Chassis Assy	×
	· Condenser	×	(Front Grille)	×
	· Compressor	△	(Discharge Grill)	×
	· Evaporator	△	· Pachaging Box	×
	· Fan Motor	△		
	(Propeller Fan)	×		
	(Cross-Flow Fan)	×		
Refrigerator	· Shell-liner	×	· Meet Tray	×
	· Inner Door	×	· Egg Tray	×
	· Evaporator	△	· Shelf Net	×
	· Compressor	×	· Fan Motor	△
	· Water Evaporator	×	· Packaging Box	×
Washing Machine	· Body Unit (Metal)	×	· Wash-Motor	△
	(Body Base)	×	· Spin-Motor	△
	· Wash Tub	×	· Switch Control	×
	(Pulsator)	×	(Panel Face)	×
	(Tub Cover)	×	(Time Switch)	×
	(Spinner Tub)	×	· Packaging Box	×
Microwave Oven	· Magnetron	○	· Frame & Body Assy	△
	· Fan Motor	○	· Packaging Box	×
	· Glass Tray	○	· Door (Shealed)	○
Electric Fan	· Fan Motor	×	· Fan Cover	×
	· Stand	×	· Metal Parts	×
	· Fan	×	· Packaging Box	×
Rice Cooker	· Lid, Pan, Body	×	· Anodizing Process	×
	· Switch Panel	×	(Automatic Paining)	×
	· Thermal Fuse Assy	×	· Packing Case	×
	· AC-Cord	×		
B. Electronic Home Appliances				
CTV	· Cathode Ray Tube (CRT)	△	· Component Chassis	△
	(Funnel)	×	(FB Transformer)	×
	(Panel)	○	(Turner)	×
	(Shadow Mask)	○	(PCB)	△
	(Shadow Frame)	×	(Speaker)	△
	(Electric Gun)	○	(Condensor)	△
	(Internal Magnetic Shield)	×	(Transformer)	△
	(Tension Band)	×	· Cabinet	×
	(Phosphor Screen)	×		
	(Wire)	○		
	(Deflection Yoke)	×		
VTR	· Front Loading Systme	△		
	· VTR Magnetic Head	○		
	· Body and Front Case	×		
C. Communication Equipment				
Telephone Set	· Body Case	×	· Cable	×
	· Light Emitting Diodes (LED)	△	· Electronic Part	
	· Conector	○	and Device	○
	· Speaker	×		
Facsimile	· Thrmal Head	○	· Cutter	○
	· Nickel Battery	○	· IC	△
	· Mirror	○		

(Note): ○: Mostly imported ×: Mostly localized △: Mixture of imported and localized
( ): Key parts of the components
(Source): JICA team interview survey

IV. Diagnoses of Production and Management Technologies in Thai Supporting Industries

IV.1 Method of technology diagnosis method

(1) Diagnosis by visiting companies

The Study Team selected companies in autoparts and electrical/electronic parts industries from several directories of Thai supporting industries.
And, technical experts visited the selected companies to make technological diagnoses by inspecting the plants and by interviewing persons responsible for these plants. All of four technical experts specialized for each process visited and diagnosed 56 companies, as indicated in the table below.

Process	Number of companies visited
Ferrous foundry	11
Presswork	14
Plastic molding	12
Rubber molding	6
Al alloy die-casting	8
Die-forging	5
Total	56

(2) Setting Technology Level Rating Items

The Team classified technologies roughly into 2 categories: "production technology" and "quality control and assurance technology". Each of the 2 categories was divided into "hardware" and "software". Thus, a matrix of 4 rating sub-categories was constructed. The 4 rating sub-categories are common to all processes.

	A. Production	B. Quality Control & Assurance
1. Hardware	A-1. Production facilities	B-1. Equipment for quality control/assurance
2. Software	A-2. production technology	B-2. Quality control/assurance system and its operation

Each of the 4 sub-categories, A-1, A-2, B-1 and B-2, was broken down

into 5 to 8 sub-items, specific to each process, because there are different rating sub-items between industries, for example, between die-casting and presswork industries.

(3) Rating Criteria

The Team adopted 5 rating criteria for sub-items, of which the highest score (5 marks) corresponds to the average technology level in industrialized countries with the lowest score (1 mark) corresponding to a cottage industry level.

(4) Summarizing and Averaging of Marks and Scores

The marks rated by the experts were summarized and simply averaged as a score for the sub-category. Such calculations were made for each of 4 sub-categories (A-1, A-2, B-1, B-2) plant by plant.

Any scores computed by the above processing results in 5-grade rating system because the sub-items, that is the base of all marking, were rated by 5-grade rating and any other scores were obtained by a simple averaging method.

(5) Assessment of totalized and averaged scores

The Study Team adopted 4 grades, A, B, C and D, for assessment of the averaged scores and set the limits of scores for each grade as well as the meaning of each grade (Table IV-1).

Table IV-1 GRADES FOR ASSESSMENT AND THEIR MEANINGS

Rank	Range of scores	Level	Quality of products available in a plant(1)
A	4.5 – 5.0	OEM International brand, International market	Products are on the average technology level in industrialized countries, and may be directly and indirectly exported as OEM parts.
B	3.8 – 4.4	OEM International brand, Local market	Products are on the upper to top level of technology in the ASEAN area, and may be supplied as OEM parts to J/V. companies with foreign capital but only for domestic market.
C	3.0 – 3.7	OEM Local brand Local market	Products are on the middle level of technology in the ASEAN area, and may be supplied as only for domestic market parts to companies (which have relatively low quality standards) other than those J/V. with foreign capital in Thailand.
D	2.9 and lower	REM Local market	Products are on the technology level on which they may be only supplied as repair parts to the Thai after-market.

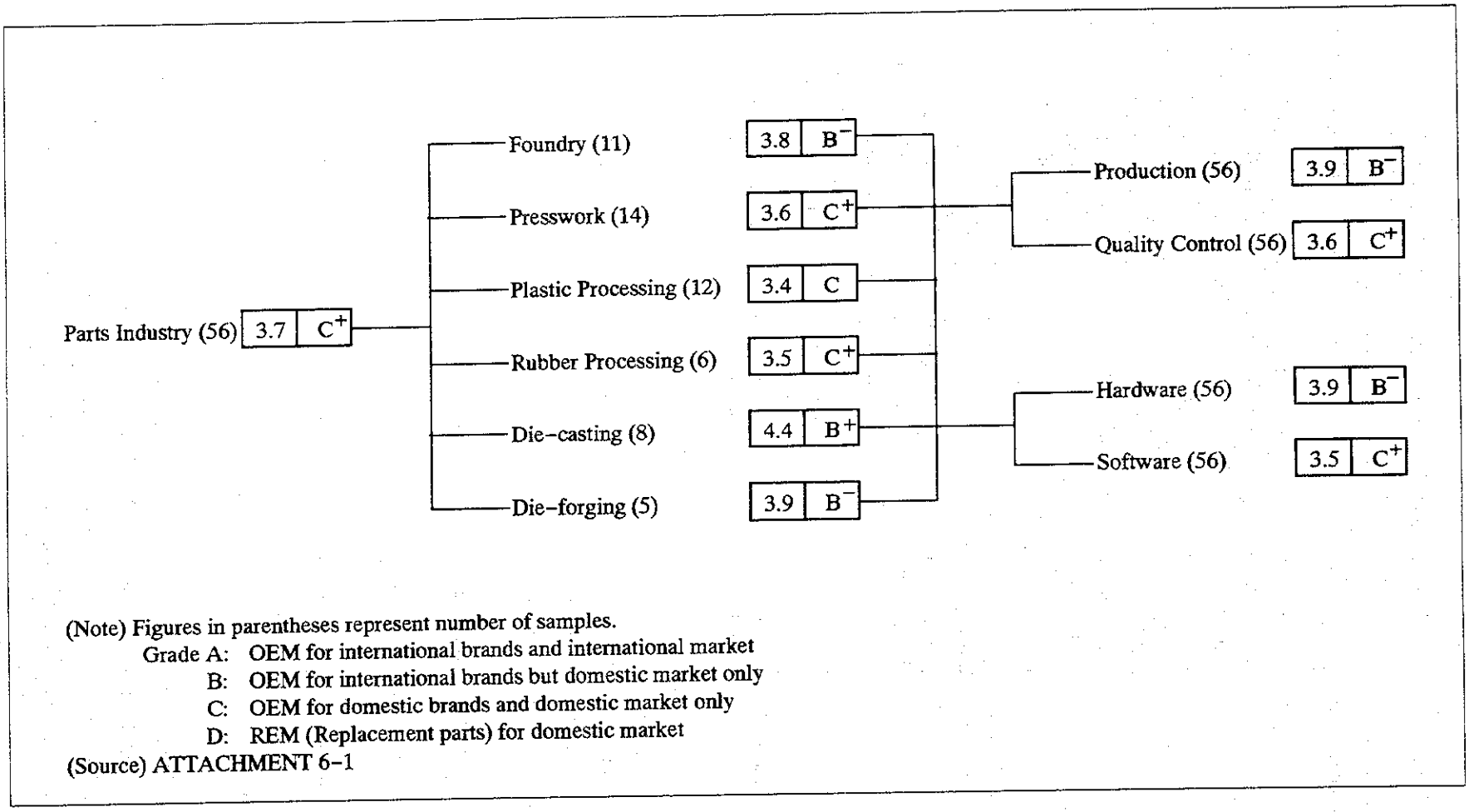
Note (1): The range of scores were not set by considering what markets the enterprises are now supplying their products to, but by determining whether or not these plants have a technological level which "generally assures the manufacture of products meeting quality requirements in a market".

IV.2 Results of the technological diagnosis

(1) Assessment of parts industries by process

Figure IV-1 shows the results of rating by process. The "parts industries" found in the descriptions below represents in both of autoparts and electrical/electronic parts industries.

Average score made by the whole of parts industries is 3.7 (C+). This grade corresponds to a technology level that is slightly lower than the level on which OEM parts of international brand may be supplied to a local market. Grade C+ is ranked as the top of the middle level in the ASEAN area.



(Note) Figures in parentheses represent number of samples.

Grade A: OEM for international brands and international market

B: OEM for international brands but domestic market only

C: OEM for domestic brands and domestic market only

D: REM (Replacement parts) for domestic market

(Source) ATTACHMENT 6-1

Figure IV-1 SUMMARY OF TECHNOLOGY DIAGNOSIS OF PARTS-INDUSTRY IN THAILAND

In the rating by process, Aluminum alloy die casting made the highest score 4.4 (B+). Grade B+ is positioned between the top level in the ASEAN area and the average level in industrialized countries. This process made the highest score among all processes, because 8 samples include 4 joint ventures as well as 1 local company technically tied up with a foreign maker. Another factor is that the Al alloy die casting technology so largely depends on facilities that the installation of modern facilities may solve a considerably great part of technical problems. The highest score made by this process is also backed up by the average score, 4.9, of 8 samples for production facilities (A-1), as indicated in Figure IV-2.

Die-forging with a score of 3.9 (B-) was ranked No.2. Forging is divided into free forging and die-forging which assures the mass production of auto-parts. Thus, 5 samples employing this process include no free forging plant. The number of samples is as small as 5, but adequate, because the MIDI estimated that there are about 10 die-forging plants at most in Thailand. The electrical & electronic industry use few forged parts, and the Thai auto-parts industry does not yet produce forged parts (such as crankshafts and connecting rods) for motor vehicles, but it is now planning the construction of forging plants to supply auto parts. The 5 sample companies have somewhat small capacity of forging presses which press capacity is upto 2500 tons most of forged auto-parts needs more larger capacity of press machines in general, and produce mainly forged parts for motorcycles and agricultural machines (of small sizes).

One of the factors which contribute to the die-forging ranking No.2 with a high score is that many companies were established in the second half of 1980s and the 1990s to supply forged parts for motorcycles, for which the demand has remarkably expanded in recent years. Companies are still young and new. Another factor is that the forging industry has been well equipped with modern facilities and introduced foreign technologies. These facts are proved by its score, 4.8, for production facilities (A-1) as shown in Figure IV-2 as well as its technology level that reaches that in industrialized countries. The weakness of this industry only in quality control (B) causes a difference between this and Al alloy die casting industry.

Iron & steel casing is ranked No.3 with a high score, 3.8 (-B), comparable to

that of die-forging. Unlike Al alloy die-casting and die-forging ranked No.1 and No2 respectively, iron & steel casting attaches greater importance to production technology & skill and quality control than to production facilities. Thai Iron & steel casting technology made a high score and can be considered to be on a high level in the ASEAN area, though it is under the unfavorable conditions that it has a lower dependence on facilities and that 11 samples include only 2 joint ventures (the iron & steel casting industry has a few joint ventures by nature in Thailand).

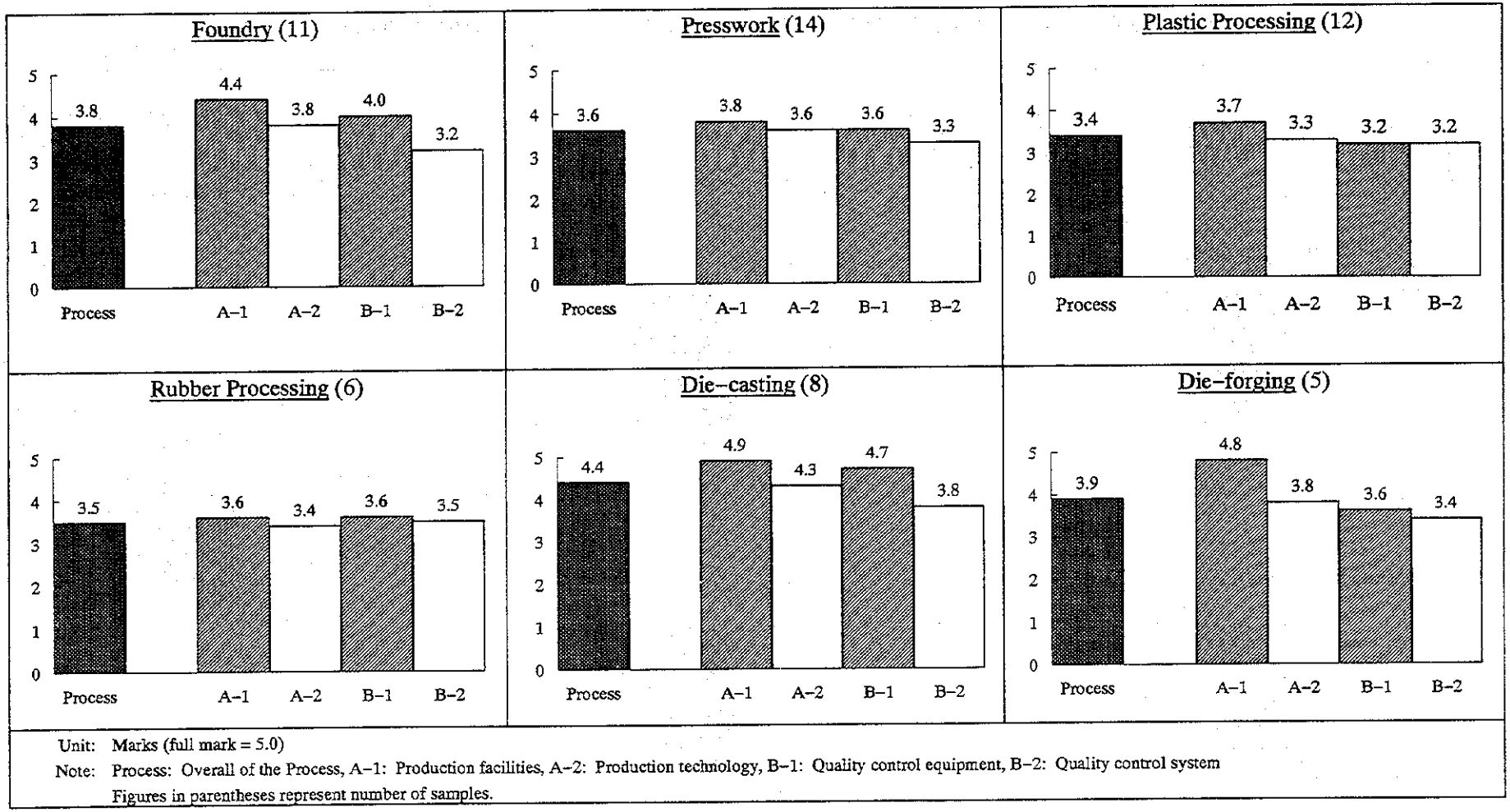
Aluminum alloy die-casting, die-forging and iron & steel casting technologies in Thailand are now on a higher or top level in the ASEAN area, and may supply parts of international brand to the local markets.

Presswork, plastic processing and rubber processing technologies are rated at 3.6 (C+), 3.5 (C+) and 3.4 (C) respectively, and ranked on a middle to high level in the ASEAN area. These technologies may supply OEM parts of local brand to the local markets. Compared with the 3 top-ranked processes, production facilities (A1) are rated at relatively low scores, which have a reducing effect on the total process averages. From data by process as shown in Figure IV-2, it proves that rubber molding is characterized by an almost same level of scores in 4 items (A. production facilities and B. quality control as well as hardware and software), that plastic molding is rated at a low level of scores in 3 items other than production facilities (A-1), and that plastic molding has low scores in quality control system (B2) that reduce the process average.

Presswork, plastic molding and rubber molding technologies in Thailand are ranked on the middle level in the ASEAN area, and may supply OEM parts of local brand to the local markets.

(2) Assessment of parts industries by field of technologies

In this section, The Team analyzed the general characteristics of Thai parts industries by technology from the data obtained on 56 samples. Refer to Figure IV-3.



Unit: Marks (full mark = 5.0)

Note: Process: Overall of the Process, A-1: Production facilities, A-2: Production technology, B-1: Quality control equipment, B-2: Quality control system
Figures in parentheses represent number of samples.

Figure IV-2 GRADING OF TECHNOLOGY LEVEL BY PROCESS

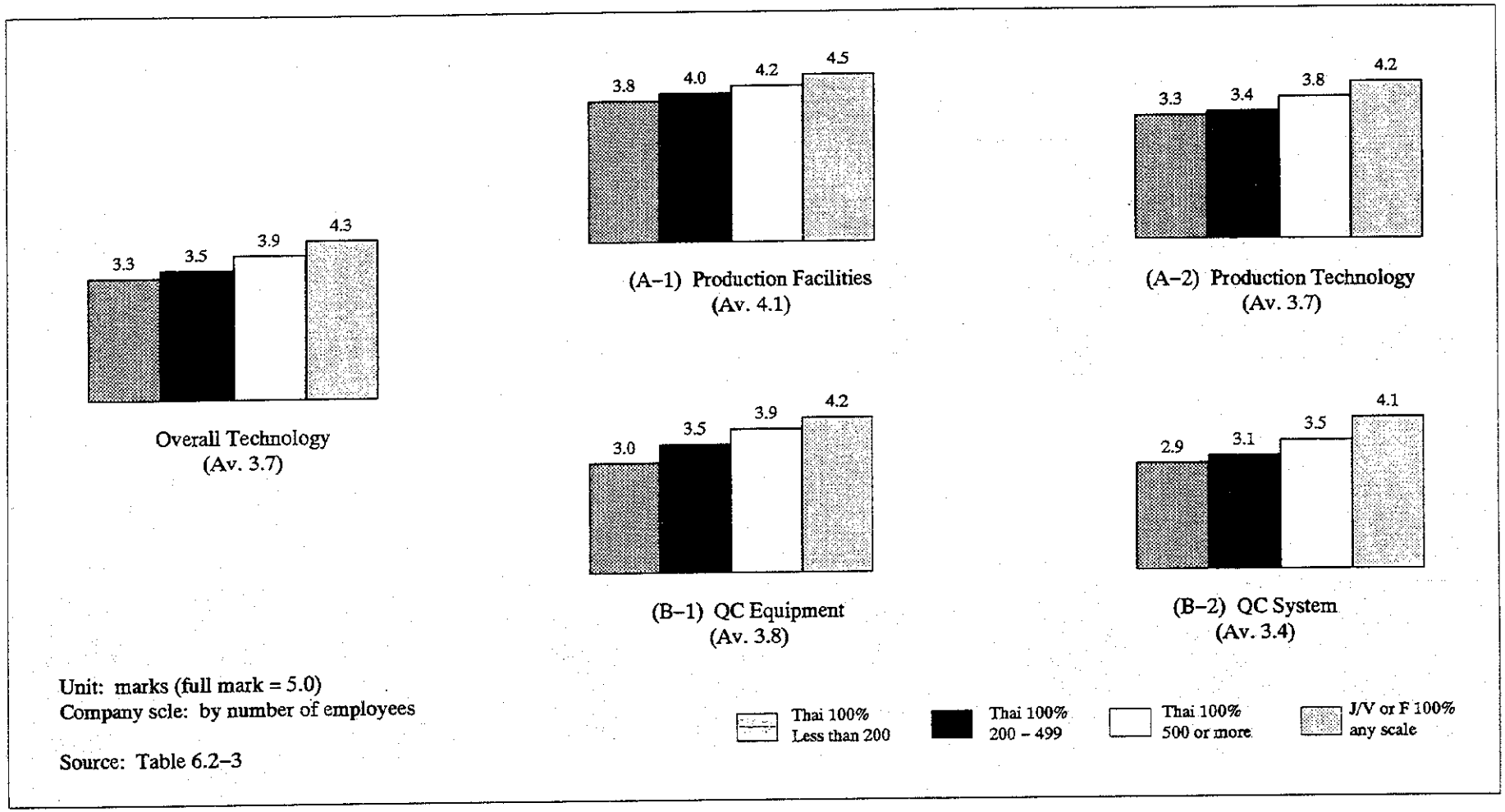


Figure IV–3 TECHNOLOGY LEVEL BY TECHNOLOGICAL AREA BY OWNERSHIP AND SCALE OF COMPANY

Categories A and B can be broken down in hardware and software as follows:

(A-1)	Production facilities (hardware)	4.1 (B)
(A-2)	Production technology (Software)	3.7 (C+)
(B-1)	Quality control equipment (hardware)	3.8 (B-)
(B-2)	Quality control system and its operation (software)	3.4 (C)

Production facilities (A-1) are ranked in the top class within the ASEAN area. Production technology (A-2) is lower by 0.4 points than the facilities and ranked on the upper-middle level in the ASEAN area. Quality control equipment (B-1) is lower by 0.3 points than the production facilities. Quality control system and its operation (B-2) is far lower, 3.4 (C).

Software (A-2), production technology, includes "designing", "casting plan", "Mounting of jigs and tools", "production planning and control", "operation of machinery", "safety", "ability to improve quality of products in order to reduce the rejected ratio" and "researches and development", for which the basic theories of production technology are indispensable. Software (B-2) in the quality control sector includes "inspection on production lines", "inspection for quality assurance before delivery", "feedback of the results of inspection to production lines" and "Total Quality Control (TQC)". There is a close relationship between software in the production sector and that in the quality control sector, which are related to the organization and management of a company as well as human resources.

(3) Assessment of parts industries

Figure IV-3 shows the results of technology level rating by scale and ownership of company as well.

A total of 56 samples were divided into 4 groups as follows:

Group	Ownership	No. of employees	No. of samples	Scores	Grade
1	100% Thai	199 or less	18	3.3	C
2	100% Thai	200 to 499	14	3.5	C
3	100% Thai	500 or more	9	3.9	B-
4	J/V	Whole	15	4.3	B+
	Total (Group 1 to 4)		56	3.7	C+
	Total (Group 1 to 3)		41	3.5	C

(Note) The J/V is a joint venture with Thai and foreign capitals, regardless of ownership ratios. The J/Vs include 2 companies with 100% foreign ownership.

Figure IV-3 and the above table reveal that all the scores are increasing from Group 1 to Group 4 in turn. In overall technology, the group of joint ventures (Group 4) is rated at 4.3 (B+), while Group 1 (199 and less employees) is 3.3 (C). The average of all the 100% Thai companies in Groups 1, 2 and 3 is 3.5 (C).

The greatest difference between Groups 1 (companies on the smallest scale) and 4 (joint ventures) is 1.2 points both in quality control equipment (B-1) and in quality control system and its management (B-2). Group 1 is rated at 2.9 (D) for Item (B-2), and does not reach even the average in the ASEAN area. The difference between Groups 1 and 4 is 0.9 points in production technology (A-2), and the smallest, 0.7 points, in production facilities (A-1).

IV.3 Problems and solutions in Thai parts industries

This section describes problems common to Thai parts industries and considers countermeasures, based upon the results of quantitative and qualitative analyses on technology level. Both analyses pointed out almost the same problems over any production processes. The whole of Thai parts industries is now rated at 3.7 or in Grade C+. The Team considers it as the most urgent task for the parts industries to raise the score up to 4.0 (B) in the near future. If the overall technology reaches 4.0 (B), the number of companies in Grade A will probably be much greater.

(1) Production facilities (with 4.1 marks)

Production facilities now exceed 4.0 in scoring. This indicates that many companies have purchased modern and proper facilities. The Team assesses

that there is no significant weakness in production facilities, with the condition that Thai parts industries will continue to make reinvestments in order to renew these facilities.

(2) Production technology (with 3.7 marks)

In Thailand, it is imperative to strengthen the software for production. The Team believes that the most urgent task for Thai parts industries is to improve the production technology in order to "reduce the ratio of rejected products". However, the reality is that a small change, for example, in die & mold design results in so many rejected products that foreign engineers must be invited to correct the defective design. It will be necessary to establish an educational system wherein experts visit plants under operation and teach the basic theory of production to employees working in the field. A method of "teaching tour" seems to have good effects.

(3) Quality control equipment (with 3.8 marks)

Some sample plants were not equipped with instruments and tools necessary for inspection and other quality control operations. Others had more expensive machines than required, out of harmony with the others or lacking in necessary parts. In general, plants in developing countries tend to make investments in production facilities, but not in inspecting instruments that make no direct contribution to increasing the production. Therefore, it is necessary to give a thorough education to managements by using techniques such as cost analysis in order to penetrate them with the notion that the production capacity is as good as increased, if improvements in a quality control technology can result in a reduction of rejected products.

On the other hand, small and medium businesses have not any fund enough to purchase expensive inspecting instruments. To give them financial and technical assistances, it may be necessary to strengthen public institutions in charge of inspection, to create special loans at low interests, and to establish a leasing system for machinery and equipment.

(4) Quality control system and its operation (with 3.4 marks)

Of all the rating items, this item was rated at the lowest level of marks. On the contrary, it may be considered that the primary priority should be given to this item, because there is still the largest room to improve the technology level with high efficiency. This item made the lowest score, because some of the sample companies have not yet established any standard and manuals for inspection and the quality of products as well as any quality control system or organization. Many companies in Thailand have performed only pre-delivery inspections to assure quality assurance, but not any inspection in the production & processing phase. Even if they inspected their products before delivery, they often did so only to exclude rejected products from shipments. No improvement has been made in their inspection processes, because the results of inspection were not fed back to designing departments and production lines. This situation has been caused by the managements and inspectors who did not fully understand the significance and purposes of the quality control and the inspections for quality assurance.

Movements such as QC and TQC seminars have been deployed in Thailand to spread the methodology of quality control and assurance among local companies. However, teaching general QC theories in seminars had limited effects, because companies could not fully apply these general theories to their plants. Therefore, it is necessary to establish an educational system wherein experts visit plants and teach actual problems and their solutions as well as basic theories to employees working in the field. In short, this is a simple method of education in the form of a teaching tour.

(5) Upgrading companies with a middle level of technology

Based upon the above-described views, it is necessary to focus the education and training on a group of companies in Grade C (with 3.0 to 3.7 marks), on the grounds that this group includes many companies, and that this group has great possibilities of improvement to push its grade relatively easily up to Grade B (with 4.0 marks). The group of companies in Grade C is weak in software, as described above. Therefore, it is necessary to teach thoroughly the basic theories of software to this group, that is, to promote the technology transfer from foreign companies to this group.

Note: Generally may think that scientific and mathematics abilities are considered to be required to understand "basic theories". However, the "basic theories" mean here those that people understand fully if they have the same scholastic ability as high-school graduates and have mastered the four rules of arithmetic.

V. Questionnaire Survey of Supporting Industry in Thailand and Japan: Results and Analysis

This survey employed a questionnaire and interviews to ascertain the worries and desires of companies belonging to supporting industry. To devise a master plan for fostering supporting industry, what is most important is to understand the needs of the related companies. Thus, under the guidance of the survey team, a Thai survey company, Advanced Research Group Co., Ltd. (ARG), interviewed Thai companies in supporting industry. In addition, questionnaires were given to supporting-industry companies (small and medium scale industry manufacturers of parts) of a third country that were presumably considering investing in Thailand. Based on the wishes of the Thai government, Japan, the country with the greatest influence and interest in supporting industry, was chosen as the third country.

V.1 Results and Analysis of Questionnaire Survey to Thai Companies

V.1.1 Outline of companies interviewed

The questionnaire survey was made by the face-to-face interviews for Thai companies in parts industries except assemblers. For this survey, 500 small to medium scale industry manufacturing companies (companies with 300 employees or less) that were thought to be belong to the target industries – autoparts and electrical/electronic parts – were selected from several corporate directories. The companies that answered to the questionnarie were then interviewed. All together, 239 companies were interviewed and answered the questionnaire.

An outline of the answering companies is presented in Table V-1 and Table V-2 .

Table V-1 OUTLINE OF COMPANIES ANSWERED

	Nos. of Companies	Scale of Companies 1/			
		Small	Medium	Large	Total
Automotive	98	21%	48%	31%	100%
Electrical/Electronic	141	11%	50%	39%	100%
	239	15%	49%	36%	100%

(Note) 1/ Small: Less than 50 employees
Medium: 50 to 199 employees
Large: 200 employees or more

A joint-venture company is here taken to mean any company in which foreign capital, no matter how much, has been invested. The proportion of joint-venture companies surpassed 50% in total. The electrical/electronic parts group had more joint ventures than the autoparts group. The proportion of companies with at least 51% foreign capital was 38% in the electrical/electronic parts group while it was 25% in the autoparts group.

Table V-2 OWNERSHIP (%)

	Automobile (98)	Electrical/ Electronic (141)	Total (239)
Thai 100%	49.0	39.0	44.0
Foreign 1 - 49%	26.5	23.4	25.0
Foreign 51 - 100%	24.5	37.6	31.0
Total	100.0	100.0	100.0

V.1.2 Production facilities and technologies

(1) Production facilities

As shown in Table V-3, 42% of the companies as a whole said that their production capacity was short of the current market demand.

Table V-3 EVALUATION OF THE EXISTING PRODUCTION CAPACITY

Number of answers	239
Over capacity	5.4%
Appropriate	52.3%
Short-capacity	42.3%
	100.0%

Table V-4 pertains to problems with buying new machines and equipment. The top problem, given by 46% of the companies in both groups, was that the price was "too expensive". Next in order was "high interest rate on loans" accounting for 35%. As the third, 24% of the companies mentioned a "lack of capability and knowledge to operate modern machinery and equipment". (For this question, the

companies were given 7 answers, including "Other," and were asked to choose the 2 that were most appropriate.)

Table V-4 PROBLEMS WITH BUYING NEW AND MODERN MACHINES & EQUIPMENT

Order	Particulars	Compaies answered: 239
1.	Too expensive price	46.0%
2.	High interest rate of loans	34.7%
3.	Lack of capability & knowledge to operate modern M & E	24.3%
4.	Insufficient market demand	17.2%
5.	Difficulty in borrowing money	16.7%
6.	Lack of information on modern M & E	13.8%
7.	Others	17.6%

The study team considering the case that the companies face difficulties to purchase new machinery, a question was provided on interests in buying the second-hand machinery. Around one half or 45.5% of the companies showed their interests on the second hand machinery. In addition, intention on machinery leasing instead of purchasing was asked. A group of 61% of the companies showed interest in the machinery leasing. (see Table V-5)

Table V-5 INTEREST IN BUYING SECOND-HAND MACHINERY AND LEASING MACHINERY

	Second-hand Machinery	Leasing of Machinery
Companies answered	235	231
Interested	45.5%	61.0%
Not interested	54.5%	39.0%
Total	100.0%	100.0%

(2) Production technology and quality control

Table V-6 deals with complaints from customers. As shown, the most frequent complaints were about "delivery" being followed by "pricing". The third most-frequent complaint was "lack of production capacity" which means that bigger domestic demand exists than their production capacity. On the other hand, "quality" was mentioned relatively infrequently. (For this question, the companies were given 6 answers, including "Other," and were asked to choose the 2 that were most appropriate.)

Table V-6 MOST SERIOUS OR FREQUENT COMPLAINTS LODGED BY CUSTOMERS

Order	Particulars	Companies answered: 209
1.	Delay or inconsistent delivery	45.9%
2.	High pricing	42.1%
3.	Short production capacity	34.0%
4.	Low or uneven quality	23.0%
5.	Insufficient technological capabilities	12.0%
6.	Others	5.7%

The companies were asked what kinds of support they would want if cost were no object. The results obtained are shown in Table V-7. The most frequent answer was "workshops on production technology," which was given by 48% of the companies. The second most-frequent answers were "training of key personnel in training centers of Thailand" and "training of key personnel overseas", each given by more or less 38% of the companies. "Strengthening of the technical institutions and centers" was also requested by 29% of the companies in total. (For this question, the companies were given 10 answers, including "Other," and were asked to choose the 3 that were most appropriate.)

Table V-7 KINDS OF SUPPORTS HOPED FOR TECHNOLOGY TRANSFER FROM OVERSEAS

Order	Particulars	Companies answered: 226
1.	Workshops for production technology easily applicable	48.2%
2.	Training of key persons overseas	38.1%
3.	Training of key persons in training centers in Thailand	37.6%
4.	Strengthening of technical centers in Thailand	29.2%
5.	Seminar for new technology	27.0%
6.	Permanent advisory services by foreign consultants	25.7%
7.	License production with training programs	21.2%
8.	Technological info through publications	22.6%
9.	Extension advisory services by consultants	22.1%
10.	Others	3.1%

V.1.3 Labor force and labor management

Table V-8 pertains to problems with manpower recruitment and management. As shown, the biggest problems were "job hopping" and "difficulty in recruiting highly educated persons (e.g., engineers)". Next in order were "lack of discipline and morale" and "difficulty in training and educating employees in-house." (For this question, the companies were given 7 answers and asked to choose the 2 that were most appropriate.)

Table V-8 PROBLEMS WITH LABOR MANAGEMENT

Order	Particulars	Companies answered: 214
1.	Job-hopping	51.9%
2.	Difficulty in recruiting highly educated persons	51.4%
3.	Lack of discipline/morale	38.3%
4.	Difficulty in training/educating employees in-house	31.3%
5.	Increasing wages	24.3%
6.	Labor disputes/strikes	1.4%
7.	Other	4.7%

V.1.4 Subcontracting businesses

Table V-9 concerns the intention to newly start or expand subcontracting businesses as an OEM pats supplier. As shown, around 40% of the companies said that they had such an intention, while 50% of the companies had no interest in the subcontracting businesses..

Table V-9 INTENTION TO START OR EXPAND SUBCONTRACTING BUSINESS

Order	Particulars	Companies answered: 236
1.	Intends to start/expand	39.8%.
2.	No interest	50.0%
3.	Sufficient so far	10.2%
	Total	100.0

Table V-10 deals with the difficulties in starting or expanding subcontracting operations. Around 41% of the respondents mentioned a "lack of information on potential customers". Next in order was the fact that "many customers have already established their own subcontracting networks", pointed out by more than 34% in total. Moreover, about 28% cited an "insufficient production capacity to cope with large orders." (For this question, the companies were given 7 answers, including "Other," and were asked to choose the 2 that were most appropriate."

Table V-10 DIFFICULTIES IN STARTING OR EXPANDING SUBCONTRACTING BUSINESS

Order	Particulars	Companies answered: 114
1.	Lack of information on potential customers	41.2%
2.	Many have already established their own subcontracting networks	34.2%
3.	Insufficient production capacity to cope with large orders	28.1%
4.	Lack of selling capability	26.3%
5.	No measures to contact potential customers	16.7%
6.	Lack of competitiveness of products	12.3%
7.	Others	10.5%

V.1.5 Top priority tasks for promoting business

This article aims to clarify to what tasks the supporting industries have given top priority to promote their business. Each of the respondents is requested to single out a task they think most important among the following.

1. Modernization of machines
2. Transfer of production technology
3. Upgrading of quality control
4. Upgrading of manpower
5. Making the most of institutional financing
6. Promotion of match-making and subcontracting
7. Promotion of direct export
8. Improvement of management
9. Making the most of technical and training institutions

As shown in Table V-11, many of the respondents said they would give top priority to "upgrading of manpower" or "modernization of machines." They were mentioned by more than 20% of the companies in each group. In addition, more than 10% of the companies cited "transfer of production technology" or "upgrading of quality control" as top-priority tasks; the former was specified by 20% of the electrical/electronic parts companies. On the other hand, a low degree of priority was given to "improvement of management," "promotion of matchmaking and subcontracting," and "making the most of technical and training institutions".

When the answers are viewed according to company size, it is found that "upgrading of quality control" was more frequently given by the large companies. On the other hand, the tasks that were more frequently mentioned by the small and medium scale companies included "modernization of machines" and "making the most of institutional financing."

Table V-11 TOP PRIORITY TASKS TO PROMOTE BUSINESS (%)

	Automotive				Electrical/Electronic				Total			
	Small (21)	Medium (47)	Large (30)	Total (98)	Small (14)	Medium (69)	Large (55)	Total (138)	Small (35)	Medium (116)	Large (85)	Total (236)
Upgrading of manpower	28.6	31.9	23.3	28.6	7.1	27.5	25.5	24.6	20.0	29.3	24.7	26.3
Modernization of machines	23.8	25.5	23.3	24.5	35.7	21.7	23.6	23.9	28.6	23.3	23.5	24.2
Transfer of production technology	19.0	6.4	10.0	10.2	7.1	26.1	16.4	20.3	14.3	18.1	14.1	16.1
Upgrading of quality control	4.8	10.6	20.0	12.2	21.4	10.1	18.2	14.5	11.4	10.3	18.8	13.6
Making the most of institutional financing	14.3	8.5	6.7	9.2	14.3	2.9	5.5	5.1	14.3	5.2	5.9	6.8
Promotion of direct export	4.8	8.5	10.0	8.2	0.0	5.8	1.8	3.6	2.9	6.9	4.7	5.5
Improvement of management	0.0	0.0	3.3	1.0	7.1	5.8	1.8	4.3	2.9	3.4	2.4	3.0
Promotion of match-making/subcontracting	4.8	2.1	0.0	2.0	0.0	1.4	1.8	1.4	2.9	1.7	1.2	1.7
Making the most of technical/ training institutions	0.0	2.1	0.0	1.0	7.1	0.0	1.8	1.4	2.9	0.9	1.2	1.3

V.1.6 Overall analysis of the results of the questionnaire survey to Thai supporting industries

What they need most is clearly expressed as top priority tasks for developing their business in the previous article. These top priority tasks include the following three points.

1. Modernization of production facilities
2. Upgrading of manpower
3. Promotion of technology transfer

As to modernization of production facilities, a strong demand for second-hand machinery and equipment can be pointed out first. The survey shows that more than 46% of the respondents plan to buy second-hand production facilities while around 26% of them plan to buy new ones. This seems to be mainly due to a lack of investment funds and high interest rates in Thailand. At present, Thailand has no promotional privileges to introduce second-hand machinery and equipment, although it has so far granted some taxational incentives to import new ones. Taking account of the strong demand for second-hand production facilities, however, it could help local manufacturers modernize their factories if some incentives were given to introduce second-hand ones.

The second point is their strong interest in the leasing system for new machinery and equipment. About 60% of the respondents have found it instrumental in modernizing their factories. Leasing systems for small to medium scale manufacturers have been already introduced in Malaysia and Taiwan, contributed to development of their industrial sectors. Therefore, it is necessary for Thailand to examine these leasing systems.

The gist of upgrading manpower is to strengthen the local institutions for technical guidance and training. It includes the following three factors.

1. Upgrading and expansion of the programs for technical guidance and training.

2. Strengthening of publicity activities for the existing institutions.

3. Setting-up of new institutions or implementing of extension advisory services by the existing institutions.

According to the survey, many respondents point out a lack of engineers and technicians as well as a difficulty in educating and training their workers in-house. These complaints result in their strong demand for upgrading and expansion of the existing programs for technical guidance and training. To meet this demand, it is firstly needed to increase necessary staff or to make the most of the existing staff. Many respondents also mention the following two points as major problems with using the technical institutions; a lack of information on their services and their inconvenience in location. These complaints lead to great demand for increase of such institutions or extension advisory services by the existing ones. The locational problem in particular, which is pointed out by more than half of the respondents, should be examined in a long-term perspective.

As to promotion of technology transfer, some 30% of the respondents give the first place to transfer of production technology or quality control technology. The respondents with more employees tend to give higher priority to improvement of quality control technology. One of the basic standpoints of this study is to understand technology transfer in the context of promotion of OEM, although it is given rather lower priority to in the results of the questionnaire survey. In other words, supporting industries would not develop unless secondary or tertiary parts makers tried to supply their products more under OEM to primary parts makers or

assemblers to introduce their technology for production and quality control. According to the questionnaire survey, more than 40% of the respondents point out a lack of information on potential customers for OEM. Therefore, it is necessary first of all to strengthen BOI's information and match-making services for the purpose of promoting their OEM business.

V.2 Results and Analysis of Questionnaire Survey to Japanese Companies

V.2.1 An outline of the answering companies

The questionnaire was distributed to companies selected from "Parts Industry," a directory of manufacturers of automotive and electrical/electronic parts. The distributees were limited to manufacturers; assembly companies of finished goods were excluded. The number of questionnaires sent and the number of answered questionnaires returned are as stated below.

	Autoparts companies	Electrical & electronic parts companies	Total
Questionnaires sent	3,635 (100%)	2,419 (100%)	6,054 (100%)
Valid questionnaires	578 (16%)	236 (10%)	814 (13%)

Of the answering companies, 74% were small and medium scale concerns with 300 employees or less (Table V-12).

Table V-12 SIZE OF ANSWERING COMPANIES

No. of employees	Proportion of companies (%)
1,000 or more	11.0
501 – 1,000	8.6
301 – 500	6.5
11 – 300	70.5
10 or less	3.5
Total	100.0

V.2.2 Foreign investment trends among Japanese parts manufacturers

Small and medium scale manufacturers of parts are also trying to escape the pressures of the strong yen by investing abroad. This section analyzes the survey results related to the companies' attitudes towards investing abroad.

(1) Experience or Not in Investing Abroad

A question was made on whether or not the answering companies had had a production base abroad.

Table V-13 FOREIGN INVESTMENT EXPERIENCE OF ANSWERING COMPANIES

Company size (Employees)	Foreign investment experience		
	(With experience)	(Total answers)	(Proportion with experience)
1,001 or more	69	84	82.1%
501 – 1,000	31	68	45.6%
301 – 500	18	50	36.0%
300 or less	70	576	15.9%
Total	188	778	24.2%

Of the 778 answering companies, 188 had experience in foreign investment. Proportionally, this was 24.2%. However, this 24.2% was not distributed evenly among the various-sized companies. Rather, the bigger the companies were, the greater was the proportion of them with experience in foreign investment. Of the companies with at least 1,001 employees, 82.1% had such experience. Conversely, as the companies were smaller, so did the proportion of them with foreign investment experience. Of the largest group of answering companies, those with 300 or less employees, only 15.9% had such experience.

(2) Future Plans for Foreign Investment

A question was made to the companies on whether they had plans to invest abroad in the near future. For the answer, the companies chose one of the following three alternatives.

a) We presently have concrete plans to invest abroad.
b) We haven't made any concrete decisions but we intend to invest abroad.
c) At this point we haven't considered investing abroad.

The results were as follows (multiple answers possible).

Table V-14 EXISTENCE OR NOT OF FOREIGN INVESTMENT PLANS AND INTEREST

Company size (Employees)	(a) Concrete plans (%)	(b) Intention (%)	(c) No consideration (%)	(d) Total answers (%)
1,001 or more	24 (28.6)	47 (56.0)	13 (15.4)	84 (100)
501 - 1,000	13 (19.1)	23 (33.8)	32 (47.1)	68 (100)
300 - 500	5 (10.4)	18 (37.5)	25 (52.1)	48 (100)
300 or less	30 (5.3)	146 (25.8)	390 (68.9)	566 (100)
Total	72 (9.4)	234 (30.5)	460 (60.1)	766 (100)

According to the totals, 72 companies (9.4%) said they "have concrete plans," and 234 companies (30.5%) said they "haven't decided anything yet but intend to invest." Combining these two groups reveals that 40% of the companies expressed a desire to invest abroad. The remaining 460 companies (60%) hadn't thought about foreign investment. The above table does not give a breakdown of the answers by company group. However, 33% of the auto parts companies expressed a desire to invest abroad ((a) + (b)), while a substantial 56.6% of the electric and electronic parts companies were similarly disposed.

The desire to invest was also linked to company size. The bigger the companies were, the greater was the proportion of them with that desire; conversely, the smaller the companies were, the smaller was that proportion. The answering companies included a large sampling of companies with 11 to 300 employees; of them, 36 had investment plans and 139 intended to invest.

(3) Countries for past investment and future investment

Names of countries were ask to the companies; both those already invested to and those as candidates in the future investment.

The results are compared in Table V-15 between the countries for the past investment and those for the future investment. (A company is allowed to list plural names of countries.)

Table V-15 COUNTRIES FOR PAST INVESTMENT AND FUTURE INVESTMENT

Country/area	Existing		Future	
	(Nos.)	(Rank)	(Nos.)	(Rank)
Western	137		61	
U.S.A	98	①	43	⑤
Europe	39	④	18	⑨
ASEAN	135		281	
Thailand	35	⑤	80	②
Malaysia	44	③	52	④
Indonesia	14	⑨	39	⑥
Philippines	12	⑪	27	⑧
Singapore	30	⑥	15	⑩
ASEAN, unspecified	–	–	68	③
Far East	95		35	
Taiwan	52	②	14	⑪
Korea	30	⑥	8	⑬
Hong Kong	13	⑩	13	⑫
China	28	⑧	224	①
Others	29		78	
Vietnam	0		30	⑦
Others	29		48	
Total	424		679	

The answers to the question revealed differences in countries to have invested and to invest in the future. They are reluctant to invest in the industrialized countries, U.S.A. and Europe and the same tendency was shown to Asian NIEs. Ranking for the future investment is downward for Singapore, Taiwan, Korea, Hong Kong when compared with the past performance.

A total of 281 companies have interested in the ASEAN region as candidates for the future investment. Actually, Thailand, Malaysia, Indonesia and the Philippines in this region raised their ranking than that for the past investment. Thailand was second, with 80 companies. Third, with 68 companies, was some as yet undecided country in the ASEAN regions under the "ASEAN, unspecified" in the table. Some of them will select Thailand in the future decision making. The most significant changes, in comparison of the past and the future, were seen in China and Vietnam. China was the top-ranking

candidate country with 224 companies. Seventh, with 30 companies, was Vietnam, a country in which none of companies had previously invested.

V.2.3 Evaluation on investment environment of Thailand

As mentioned in section (3) above, 80 companies expressed interest in investing in Thailand. Table V-16 shows those companies break down.

Table V-16 BREAKDOWN OF COMPANIES CONSIDERING THAILAND AS A CANDIDATE FOR INVESTMENT

Company size (Employees)	Auto parts cos. (No. of companies)	Elec. parts cos. (No. of companies)	Total (No. of companies)
1,001 or more	6	11	17
501 - 1,000	5	1	6
301 - 500	1	2	3
11 - 300 or less	42	12	54
Total	54	26	80

Of the autoparts companies, those with up to 300 employees (companies that, by Japanese standards, belong to the small and medium scale category) were far and away the largest group, comprising 42 companies. Generally speaking, auto parts companies saw Thailand as a candidate for investment more than the electric and electronic parts companies did.

To find out what factors are given importance in the decision to invest in a foreign country, the companies were provided with 15 possible answers, including "Other", and asked them to choose five. The totaled results are presented in Table V-17 as "Grade of Importance".

The previous question did not designate the investment environment of any particular country. Rather, it sought to find out the investment environment factors that are generally given importance in making a foreign investment decision. On the other hand, sought to find out the companies' attitudes towards the investment environment in Thailand. For each of the 15 investment environment factors in Table V-17, the companies were asked to evaluate Thailand's investment environment as either "Good" or "Not Good." The results are shown in Table V-17 by symbols whose meanings are as stated below.

Symbol	Meaning
○○	"Good" evaluations were at least 2 times greater than "Not Good."
○	"Good" evaluations were more than 1.1 but less than 2 times greater than "Not Good."
△	The difference between "Good" and "Not Good" was within 10%.
×	"Not Good" evaluations were more than 1.1 but less than 2 times greater than "Good."
××	"Not Good" evaluations were at least 2 times greater than "Good."

Table V-17 THE IMPORTANT FACTORS OF INVESTMENT CLIMATE AND EVALUATION OF THAILAND

Rank	Particulars	Grade of importance		Evaluation of Thailand
		No. of answers	Proportion (%)	
1.	The quality and cost of labor	280	65.1	○○
2.	The size of the country's market	258	60.0	○○
3.	The state of the infrastructure: industrial parks, roads, etc.	231	53.7	△
4.	Availability of engineers and skilled workers	200	46.5	×
5.	Local procurement of raw materials	184	42.8	××
6.	Political stability	140	32.6	○○
7.	The existence of relevant companies: parts suppliers, etc.	137	31.9	×
8.	The existence of a local partner	135	31.4	△
9.	A favorable investment policy	133	30.9	○
10.	The supply of electricity, water and other services	121	28.1	○○
11.	Feelings towards Japan, hospitality	53	12.3	○○
12.	Economic growing power, etc.	36	8.4	○○
13.	The state of the facilities at inspection agencies and testing sites	13	3.0	××
14.	Financial conditions	12	2.8	××
15.	Other	1	nil	-
Grand Total 1-15		1,934		
	No. of answering companies	430		
	Average No. of answers	4.5		

Let's see how Thailand was evaluated for the first 5 factors. With regard to "The quality and cost of labor," it was rated superior. It was also viewed favorably as a prospective country for investment because "the size of its market is big." In other words, Thailand is highly evaluated on these two factors which are given more importance in making a decision to invest in a foreign country. On the other hand, "The state of its infrastructure" is only somewhat advanced. Moreover, there was concern about the "Availability of engineers and skilled workers." The answering companies also said that the "Local procurement of raw materials" would probably be difficult, although it is something they would like to do.

With regard to the remaining factors, Thailand was given high marks for "Political stability," "The supply of electricity, water, etc.," "Feelings towards Japan," "Economic growing power," etc. However, concern was expressed about "The facilities of inspection agencies," "Financial conditions," and "The existence of relevant companies." As regards "The existence of a local partner," the evaluation was neither favorable nor unfavorable.

V.2.4 Anxieties of Japanese SMEs in foreign investment

In the past, the Japanese foreign direct investment was mainly made by rather large scale companies which had a lot of qualified manpower, financial power and capabilities to solve by themselves various problems concerning the foreign investment. On the other hand, the majority of manufacturers in parts industry of Japan are SMEs, and in this questionnaire too, it was mentioned earlier, 74% of the answering companies were SMEs with 300 employees or less – companies that have less experiences in doing business abroad. They may has various anxieties in foreign investment as well as requests to the government of the country to invest.

(1) Problems during the Preparatory Stage for a Foreign Investment

This question asked these respondents what kinds of concerns and worries they might have during the stage prior to deciding a foreign investment. The companies were given 11 answers, including "Other" as shown in Table V–18 and were asked to choose three.

Table V-18 SUBJECTS OF CONCERN DURING THE PREPARATORY STAGES FOR A FOREIGN INVESTMENT

Order	Particulars	Answers	Proportion (%)
1.	Management of local employees	210	50.7
2.	Lack of temporary and long-term personnel from Japan	178	43.0
3.	Lack of investment capital	135	32.7
4.	Ignorance about local legal and accounting procedures	123	29.7
5.	Inability to pre-determine buyers of products	97	23.4
6.	Unfamiliarity with how to conduct pre-investment survey (F/S)	79	19.1
7.	Unfamiliarity with how to look for a partner	79	19.1
8.	Safety of personnel from Japan and education of their children	76	18.4
9.	Dissatisfaction that the proportion of stock is less than 50%	41	9.9
10.	Absence of a local party to cooperate in a local survey	22	5.3
11.	Other	20	4.8
Total (1-11)		1,060	-
No. of answering companies		482	
Average No. of answers per company		2.2	

(2) The Desired Share of Stock

Developing countries frequently have a policy that attempts to keep the share of foreign capital below 50%. Thailand, too, has such a policy, except in special circumstances (for example, all the products produced are exported, or the factory is built in an outlying location). To find out how this policy might be received by potential investors, the companies were asked what proportion of the stock they would want to own.

Table V-19 DESIRED SHARE OF STOCK

Proportion of stock	Answering companies	Proportion(%)
100%	88	23.8
more than 50%	187	50.7
less than 50%	94	25.5
Total	369	100.0

Of the answering companies, 23.8% said they would want to own 100% of the stock, and 50.7% said they would want to own more than 50%. Thus, a total of 74.5% would want to own a majority of the stock and have the right to control business.

(3) Method of Procuring Machinery and Equipment

We asked the companies whether they would want to bring in used machinery from Japan if they made a foreign investment. In developing countries it is frequently the case that used machinery is not afforded special benefits such as import tax exemptions. That was the reason for this question. There were no significant differences between the answers of the auto parts companies and those of the electric and electronic parts companies. Moreover, there weren't any particular differences in answers due to company size. Therefore, the results were combined together, as presented in the following table.

Table V-20 MACHINERY AND EQUIPMENT PROCUREMENT PLAN FOR A FOREIGN INVESTMENT

	Answering companies	Proportion (%)
We will buy all new machinery	59	21.1
We will import all used machinery	61	21.9
We will mix new and used machinery	159	57.0
Total	279	100.0

Of the answering companies, 21.9% said they would acquire only used machinery, and 57.0% said they would mix new and used machinery. Thus, more than 78.9% said they would want to bring in at least some used machinery.

(4) Method of Acquisition of Land and Factory Building

If the companies were to establish a new production base abroad, how would they obtain the related land and factory? For purposes of reference, we also asked what kind of industrial park or location they would want the country receiving the investment to provide. Generally speaking, there were three approaches to the issue of land and factory.

(a) Buy the land and build a factory designed by one's own company (with everything becoming one's own property).
(b) Buy a factory of a standard design (a ready-built type of factory) (with it