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CHAPTER I

Future Prospects of Selected Support Industries in Thailand

1. Introduction

Until recently (up to 1997), manufacturing development in Thailand looked rather promising. It contributed significantly to GDP (28.3% in 1992 and 31.41% in 1996). Its share of export earnings (76.9% in 1992) was high, as was its share of import bills (84.3% in 1992). Although its share in total foreign direct investment (53.7% in 1992) was significant, its employment generation (14.6% in 1992) was rather moderate.

Within the manufacturing industry, the role of transport equipment and electrical machinery and supplies is also very important. In 1996, their value-added generated (at market prices) was 125,741.6 and 185,006.9 million baht respectively. These figures represented 9.28 and 9.77 percent of total manufacturing value added (measured at constant prices). In the same year, the transport equipment and spare parts, and electrical and electronic industries were also responsible for the hire of 118,394 and 242,942 employees respectively.

Table 1.1: Structure of Electrical and Electronic Manufacturing Classified by Number of Employees

	Total	Large	Medium	Small
No. of Factories	2,408	224	399	1,785
%	100.0	9.3	16.6	74.1
Employment (persons)	242,942	180,810	40,224	21,908
%	100.0	74.4	16.6	9.0
Capital Investment (million baht)	151,658.06	108,473.58	29,539.78	13,644.70
%	100.0	71.5	19.5	9.0

Note: A large factory is one that employs 200 or more employees or invests more than 100 million baht; a medium factory is one that employs more than 50 employees or invests more than 10 million baht.

Source: Department of Industrial Works.

Table 1.2: Structure of Transport Equipment and Spare Parts Manufacturing Classified by the Number of Employees

	Total	Large	Medium	Small
No. of Factories	2,979	112	261	2,606
%	100.0	3.8	8.8	87.5
Employment (persons)	118,394	67,920	26,257	24,217
%	100.0	57.4	22.2	20.5
Capital Investment (million baht)	113,795.94	72,360.33	22,606.12	18,820.49
%	100.0	63.6	19.9	16.5

Note: A large factory is one that employs 200 or more employees or invests more than 100 million baht; a medium factory is one that employs more than 50 employees or invests more than 10 million baht.

Source: Department of Industrial Works.

The majority of support industries in Thailand are concentrated in the area of transport equipment and electronics manufacturing. Other support industries such as industrial machine tools and machinery, plastics and metal products, as well as ferrous

and steel, are relatively undeveloped. Fundamentally, support industries in Thailand range from spare parts, mostly metallic parts of engine, body and press parts, chassis and driving systems manufacturing in the transport and equipment industry, and metallic parts in the industrial machinery and machine tools sectors, and parts of other end products such as hand tools.

The metallic parts are important for the machinery industry. These are machinery industry, engine and turbine, agriculture machinery and parts, machinery for wood and fabricated metal product, household appliances, office automation and equipment. Metallic parts of machine tool industry are important for mold and die manufacture and tooling industry.

The output from iron and steel industry is a crucial input for the spare parts industry. While the basic metal industry involves industrial processes for transforming metal into spare parts. These processes include foundry and casting, forging, pressing, plating, machining (turning, drilling, boring, milling, grinding, lapping), heat treatment and welding.

The main objective of this report is to investigate the current status of support industries with special reference to automobiles and parts and electrical and electronic manufacturing in Thailand. To do this, we conducted in-depth interviews and questionnaire surveys.

The report is organized as follows: The second section presents an overview on the structure of support industries in Thailand, concentrating on spare parts manufacture and the electrical and electronic manufacturing industry. The results of the survey are also noted here. The third section discusses government policy on support industries, with particular emphasis on the role of small and medium enterprises (SME). The last section contains the conclusion and recommendations.

Future Prospects of Selected Support Industries in Thailand

Submitted to

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CHAPTER II

Current State of Support Industries in Thailand: Automobile and Spare Parts Industries

1. Production and Supply of Automotive Parts

The significance of the automobile and parts industry is shown by the fact that its combined production value in 1996 was more than 250,000 million baht. It is an industry that employs 80,000 employees and one where sectoral growth had stayed continuously in double figures until it came to a brief halt in 1998.

The automobile industry was initiated with the promotion of the Board of Investment in 1951. At that time, the only automobile spare-parts produced in Thailand were rubber-parts for batteries and lift-springs. Spare-part manufacturing was expanded to include parts for automobile manufacturing when the government issued the Automobile Assembly Policy in July 1961.

Japanese automobiles have held a major share in the market in Thailand since automobile industries were first developed. Due to local content policies, production and supply of Thai's automotive parts as well as parts supplied by Japanese joint ventures have increased. It seemed that the lower wage rate in Thailand and the appreciation of the Yen were incentives for Japanese company investment in automotive parts manufacturing. The parts produced are destined for local and export markets. In Thailand, spare part manufacturing supplies the Original Equipment Market (OEM) and Replacement Equipment Market (REM). At present, automobile spare parts on the market consist of local suppliers and of Japanese affiliated and joint venture companies.

The automotive parts industry was developed from the growing demands of the automobile industry. There were approximately 600 auto-parts makers producing parts for both the OEM and REM as of 1998. According to a JICA study "The Study of the

Development of Small and Medium Industries in Thailand" (Industrial Promotion Department, 1995), the auto-parts manufacturers were composed of 40% OEM producers, 33% intermediate parts producers, 20% REM producers, and 7% export auto-parts producers.

The number of auto-parts makers may change due to the effects of the economic crisis. A significant change in the structure of the auto-parts manufacturing industry is likely to occur as well. We can also consider production trends of automobile parts based on those of automobile assembly. Automobile production reached a peak in 1996 and has been decreasing since then, which will undoubtedly lead to a decrease in the demand for spare-parts in general.

Table 2.1: Production Volume of Assembled Vehicles

Unit: cars

Type of vehicle	**1993**	**1994**	**1995**	**1996**	**1997**	**1998 Jan-Nov**
Passenger cars	144,449	109,830	127,242	138,579	112,041	30,419*
Pick-up trucks	245,903	287,284	346,790	357,802	223,243	111,159
Vans and mini-buses	1,770	1,738	1,625	3,639	1,977	60
Buses	1,056	1,146	1,726	609	554	561
Medium and heavy duty trucks	26,893	34,003	48,297	46,683	22,488	1,467
Total	**420,071**	**434,001**	**525,680**	**547,312**	**360,303**	**143,666**

Remark: * Includes four wheel drive cars (1,706)
Source: Automotive Industry Club

In terms of investment, from 1985 to 1996, automobile machinery and parts recorded the highest level of capital investment due to promotion from the BOI. Automobile body and parts ranked second. Automobile machinery and spare-part

companies promoted by the BOI accounted for 43,213 million baht in capital investment during 1985 to 1996.

Table 2.2: Numbers of Projects and Investment Amount of Automobile Machinery and Parts Companies Promoted by BOI (1985-1996)

Type	Number of projects	Investment Amount (Million Baht)
1. Automobile machinery and parts	60	17,796
2. Controlled turning, spring, and shock absorber systems	24	2,164
3. Lights and electronic systems	16	2,923
4. Automobile body and parts	17	7,022
5. Parts for interior trims	12	1,959
6. Power system and transmission	3	1,193
7. Others	51	10,156
Total	**183**	**43,213**

Source: Board of Investment

These industries supply to the original equipment market (OEM) and replacement equipment market (REM) as intermediate products for other end product manufacturing, and for export.

Automobile spare-parts can be separated into the following 21 groups:

Table 2.3: Automobile Spare-part Groups

Group	**Components**
1. Engine parts	cylinder blocks, cylinder heads, pistons and rings, valves, connecting rods, crankshaft, timing chains, gaskets, flywheels, pulleys, etc.
2. Parts used with the engine	radiators, transmission belts, fans, oil filters, carburetors, distributors, spark plugs, air filter housings, accelerator cables, etc.
3. Electrical equipment	alternators, starter motors, battery cables, wipers, regulators, etc.
4. Electrical wiring	spare plug cables, battery cables, fuses, etc.
5. Exhaust pipe system	exhaust pipes and silencers, etc.
6. Fuel system	fuel tanks, fuel pipes, fuel filters, gauges, etc.
7. Wheels	alloy wheels, tires and tubes, etc.
8. Parts for interior trims	soundproofing, roof side inner & fabric, carpet, door trims, sun visors, consoles, handle window regulator, door weather-strips, etc.
9. Seats	seat adjustments, etc.
10. Glass	weather-strip glass, windshields, door window glass, etc.
11. Lamps	head lamps, tail lamps, turn signal lamps, license plate lamps, interior lamps, etc.
12. Shock absorber system	springs, transverse arms, shock absorbers, front stabilizer bars, strut axles, etc.
13. Brake system	brake discs, covers, lever parking brakes, foot pumps, etc.
14. Clutch system	Clutch panels, clutch lines, etc.
15. Body	panel floors, rooves, doors, bonnets, etc.
16. Bumper	front and rear spring bumpers

Group	Components
17. Gear system	gear housings, gear shafts, gears, gear stems, gaskets, etc.
18. Steering wheel system	steering wheels, steering rods, etc.
19. Power system	prop shafts, universals, differentials, driveshafts, etc.
20. Dashboard	dashboards, speedometers, tachometers, fuel gauges, temperature gauges, switches, etc.
21. Others equipment	air conditioners, radios, safety belts, etc.

Source: BOI

Spare part production can be classified according to production technology as follows:

1) Ferrous metal parts and other metal parts, which include:
   - Casting work such as cylinder blocks, cylinder heads, flywheels
   - Pressing work such as air filters and fuel tanks
   - **Spraying work** such as pistons, carburetors and gear housings
   - Heat treatment work such as intake & exhaust valves, driveshafts, connecting rods and crank shafts
2) Plastic spare parts and the like, such as dashboards, bumpers and steering wheels
3) Rubber parts, such as tires, tubes, transmission belts and glass weather strips
2) Electrical and electronic parts, which include:
3) Lights, such as single lamps, tail lamps, turn signal lamps
4) Wires
5) Equipment for the engine such as ignition coils, alternators, starters

and regulators

6) Parts from other materials such as gaskets, filters, safety glass, and other environmental control devices

The majority of both raw material and semi-finished products used in spare-part manufacturing are imported. The major raw materials are steel plates, wire rods, steel pipes, copper pipes, forging products, plastic products, natural and synthetic rubber, sand and soda ash. Most of these raw materials are imported from Japan, the United States of America, Germany, France, etc. Examples of raw material sources are as follows: (These are not all “raw materials”)

Table 2.4: Source of Raw Material for Spare-parts

Type of Raw material	Sources
Steel, especially steel plates	Japan, Germany, France
Aluminum	Japan, U.S.A., France
Synthetic rubber	Japan, Germany
Plastic and fibers	Japan, Germany
Chemical products	Japan, U.S.A., Germany
Electronics	Japan
Natural rubber	Domestic
Mirrors	Domestic, Sweden
Copper wire	Domestic, Japan, U.S.A.
Animal Skin	Japan, Germany

A report from the Business Economic Department reveals that a large volume of automobile machinery and spare-parts are imported as well. In 1994, 1995, 1996, and

1997, 51,269.5, 77,094.0, 79,468.4, and 45,116.1 million baht, respectively, of spare-parts were imported. It can be deduced from these figures that the level of development of the spare parts industry in Thailand has advanced significantly.

Table 2.5: Import of Automobiles and Parts

(Million Baht)

Product	**Value of Imports**			
	1994	**1995**	**1996**	**1997**
Vehicles	43,802.1	44,798.4	37,364.2	18,524.1
Components and equipment	51,269.5	77,094.0	79,466.4	45,116.2
Motorcycles and motorcycle components	29.8	12.2	41.1	48.6
Total	**95,101.4**	**121,904.6**	**116,871.7**	**63,688.8**

Source: Department of Business Economics

Automobile body chassis with engine installed had an import value of 32,838 million baht, electrical parts 7,095 million baht, engine parts 5,914 million baht, ball bearings 4,430 million baht, and power transmission shifts 2,895 million baht.

It can be said that even though there are not very many part suppliers compared to developed countries, inter-industrial relationships within the support industries in Thailand are quite well established. That is to say, division of labor and specialization among suppliers are well balanced.

Table 2.6: Distribution of Parts Suppliers in 1994

Items	Number of Suppliers
Engine Parts	**119**
1. Pistons and piston pins	6
2. Piston rings	1
3. Cylinder liners	5
4. Engine assemblies	10
5. Gaskets and packing	11
6. Engine valves	5
7. Valve rocker arms and shafts	1
8. Crank shafts	2
9. Connecting rods	1
10. Bearings	5
11. Timing gears	1
12. Carburetors	2
13. Filters (oil, air, fuel)	12
14. Air cleaners	2
15. Manifolds	1
16. Oil pumps	1
17. Water pumps	3
18. Radiators	9
19. Oil coolers	2

Items	Number of Suppliers
20. Fan blades and fan shrouds	4
21. V-belts	7
22. Fly wheels	4
23. Cylinder heads	3
24. Rubber hoses	8
25. Exhaust pipes and mufflers	13
Electrical Parts (1)	**20**
1. Starter motors	4
2. Generators/alternators	5
3. Magnetos	1
4. Voltage regulators	1
5. Distributors	1
6. Ignition coils	3
7. Spark plugs	2
8. Glow plugs	1
9. Condensers	1
10. Electro-Plating	1
Electrical Parts (2)	**65**
1. Head lamps	4
2. Signal and indicator lamps	15
3. Light bulbs	10

Items	Number of Suppliers
4. Speedometers and tachometers	5
5. Fuel gauges	1
6. Wiper arms and blades	1
7. Horns and buzzers	6
8. Switches	8
9. Flashers and relays	4
10. Fuses and fuse boxes	1
11. High and low tension electric cables	3
12. Wire harnesses	8
Drive Transmission & Steering Parts	**88**
1. Clutch covers	3
2. Clutch discs	10
3. Clutch facings	5
4. Clutch cylinders	1
5. Steering shafts, columns and gears	2
6. Steering wheels	2
7. Tie rod ends	1
8. Propeller shafts	1
9. Universal joints	2
10. Ball joints	4
11. Needle roller bearings	1

Items	Number of Suppliers
12. Differential gears and gear wheels	7
13. Axles	6
14. Steel for wheels	2
15. Light alloy for wheels	9
16. Hub wheels	2
17. King pins and shackle pins	1
18. Bushings	10
19. Oil seals and O-rings	9
20. Pedals	4
21. Control cables	10
Suspension & Brake Parts	**72**
1. Leaf springs	3
2. Coil springs	4
3. Tire valves and valve insides	2
4. Shock absorbers	10
5. Torsion bars and stabilizers	1
6. Suspension parts	1
7. Drum brake assemblies	4
8. Disc brakes	5
9. Brake cylinders	2
10. Brake linings, brake hoses, disc pads	25

Items	Number of Suppliers
11. Brake drums and brake discs	4
12. Brake pipes	4
13. Vacuum pumps	1
14. Other parts	6
Body Parts	**160**
1. Pressed parts	40
2. Chassis frames	4
3. Dashboards and panels	2
4. Bumpers	7
5. Fuel tanks	9
6. Brackets	3
7. Window frames	1
8. Weather strips	4
9. Window regulators (incl. power window regulators)	2
10. Anti-theft locking systems, door handles and hinges	9
11. Seats and seat cushions	20
12. Safety glass	8
13. Seat reclining devices and adjusters	4
14. Seat belts	4

Items	Number of Suppliers
15. Sun visors	3
16. Console boxes	2
17. Interior parts	5
18. Mirrors	11
19. Tires and tubes	22
Accessories	**26**
1. Car radios	3
2. Air conditioner	3
3. Helmets	6
4. Roof racks and fiberglass Rooves	7
5. Wheel caps	3
6. Service tools	4
Others	**266**
1. Batteries	16
2. Paint	17
3. Molds and dies	7
4. Jigs and fixtures	29
5. Plastic parts	11
6. Aluminum die casting	23
7. Rubber parts	7
8. Engine mountings	16

Items	Number of Suppliers
9. Automotive assemblies	13
10. Iron and steel foundry products	9
11. Fastenings	5
12. U-bolts	2
13. Iron and steel forging	11
14. Chains	3
15. Crank cases	1
16. Carpets	2
17. Engines	10
18. Automotive distributors	7
19. Import - export and distributors of auto parts	21
20. Special body vehicles (bus, wagon, truck, trailer, etc.)	
21. Hydraulic systems	6
22. Mud guards	5
23. Springs	5
24. Insulator parts	3
25. Pulleys	2
26. Stickers	1
27. Velvets	4
28. Heat treatment	1

Items	Number of Suppliers
29. Iron and steel for motorcycle parts (rims, spokes, handles, bars, stands)	20
30. Three-wheel car (Tuk Tuk)	2
31. LGP valves (copper)	4
32. Leather and artificial leather	19
Total	**839**

Note: Some companies produce more than one product and operate as an importer as well.

Source: Thailand Automotive Directory 1994

Engine manufacturing in Thailand started in 1986. From 1989, small trucks with an engine capacity greater than 1,000 cc had to use local engines. Currently, firms that would like to obtain investment promotion must belong to zone two and three and use local parts (local content requirement is being abolished in March 1999) like cylinder blocks, head and crank shafts in 1999. Import of benzene engines declined by 4 percent to 1,126 million baht in 1995. The import of diesel engines increased 23.53 percent or 1,504 million baht in same year. Export of benzene engines increased 22 percent during 1989-1995. In 1995, the export volume was 458 million baht. The export of diesel engines increased to 793 million baht over the same period.

2. Market Demand for Automobile Spare-parts

Market demand of spare parts originated in repair shops, and initially in the REM. At first, most spare parts were not of high quality and were produced mainly for the import substitution policy of government. When the government began to allow the assembly of automobiles in Thailand, the OEM market started to develop. Market derived demand for spare part depends on sales volumes of automobiles, which in turn is directly linked to the economic situation. Sales of automobiles decreased as a result of the economic crisis in 1996. The number of automobiles sales in 1995, 1996, and 1997 were 571,580, 589,126, and 363,156 units respectively.

Table 2.7: The Number of Automobile Sale Units from 1993 to 1998

Type of vehicle	**1993**	**1994**	**1995**	**1996**	**1997**	**1998 Jan-Nov**
Passenger cars	174,162	155,670	163,371	172,730	132,060	39,822
One ton pick-ups	224,388	258,091	323,813	327,663	188,324	71,186
Vans and Mini-buses	11,727	12,672	12,425	12,633	8,353	2,584
2-4 ton trucks	12,717	14,139	16,383	16,683	9,021	2,604
Large trucks	15,573	22,312	31,766	31,814	11,275	3,467
Others	17,894	22,794	23,822	27,603	14,123	6,514
Total	456,461	485,678	571,580	589,126	363,156	126,177

Source: Automotive Industry Club, The Federation of Thai Industries

Export of auto-parts increased from 10,728.3 million baht in 1996 to 14,198.3 million baht in 1997. The export value of vehicles, components and equipment, and motorcycles and components increased in 1997.

Table 2.8: Export of Thai Automobiles and Automobile Parts

(Million Baht)

Product	1994	1995	1996	1997
Vehicles	2,149.7	2,350.7	4,901.6	18,417.3
Components and equipment	16,598.7	10,287.7	10,728.3	14,198.3
Motorcycles and components	3,980.4	4,723.3	5,202.4	7,364.1
Total	22,728.8	17,361.7	20,832.3	39,979.7

Source: Department of Business Economics, 1998.

One of the important export items is electrical wire, which valued 5,738.72 million baht in 1993. Others include gaskets at 4,913.22 million baht, electrical parts at 4,519.85 million baht and clutches at 2,745.91 million baht.

Spare parts export in 1995 was concentrated in electrical wire sets at 6,916 million baht, ball bearings at 5,907 million baht, light signals at 2,075 million baht, relays at 1,639 million baht, and gaskets at 1,377 million baht.

3. Problem Issues in the Automobile and Parts Industry

The automobile and auto-parts industry is facing a severe economic crisis due to a sudden decrease in demand and an inappropriate import duty structure. Import tariff on CKD differs too much from import tariff on CBU. Although worker skill in this industry has passed through a 'learning through technological change' in the past decades, it is still well behind the level of industrial development. The domestic market is shrinking while the export market cannot yet be effectively promoted. The industry still relies too much on foreign technology and is therefore hindered by limited technology transfer and product development. Most production design and decision is under the development of head offices overseas. Local producers only have the capability to manufacture the design sent to them.

The effective rate of protection (ERP) in the automobile and motor cycle industries is equal **to** 497 and 48 percent respectively. The ERP of automotive spare parts is 112 percent, indicating that Thailand heavily protects its automobile and spare part industry. The domestic resource cost (DRC) of an automobile is 5.18 while it is 1.29 for motor cycle and 1.84 for the spare parts industry. This indicates that the spare part and motorcycle industries have less social opportunity cost in export earnings than the complete unit of an automobile. The revealed comparative advantage (RCA) indicates that Thailand has a comparative advantage over Malaysia, Indonesia, Philippines and China in motorcycles, trailer parts, vans and trucks for special purposes.

The automobile and auto-part industry is confronted with the problem of increasing costs, and therefore has to rely on large scale production. Production plans and models are controlled by the brand-owner. Relocation of industry to Thailand depends solely on the parent company, investment climate, government policy and production conditions. One of Thailand's problems is that it lacks personnel with the appropriate skill to develop production technology.

The main issues are concentrated within the tariff structure. High import tariffs for raw material and subordinated parts is, in total, higher than imported finished CKD parts. This provides no incentive for the production of spare parts. Besides which, the protection provided for the iron and steel industry and the petro-chemical industry implies high tariffs on raw materials, further inducing cost increases in the parts industry. There are insufficient support measures for SME in areas of technology, qualifying testing of products, mold and die design, product quality development, etc. Furthermore, human resource development is insufficient. Most of the parts produced are for the local market, so when the market crashed due to the aforementioned crisis, demand collapsed with it. Information on the export market is insufficient to make fair comment. Technology transfer is not solidly founded and the costs of transfer can not be borne by local producers. And more often than not, the parent company simply does not

want to transfer technology. Human resources on the recipient side are not developed enough to counter this situation.

Another important issue for the Thai automobile industry is its competitiveness compared with world levels. The productivity level of Thai labor is much lower than the world standard. The Thai automobile industry requires 30-92 hours compared to the world standard of 16-18 hours to produce one car. The failure rate in Thailand is 120 with the world standard at 100. Furthermore the cost of raw material in Thailand is 144 as compared with the world standard of 100. Thus, labor productivity is one of the most important issues in the Thai automobile industry and includes aspects such as assembly technology, design and marketing in relation to the world market. Furthermore, automobile and parts manufacturers have to rely on foreign technology. More than 90 percent of OEM parts manufacturers obtain their license from the parent company; however, only production technology is learned. Design technology is simply not considered.

In conclusion, the spare part industry has several serious obstacles to overcome. Basically, they are as follows:

1) The problem of high import duty on certain imports used in part production
2) Inappropriate custom duty structure
3) Import duty on machinery and machine tools that are necessary in die production (e.g. copy million machines, teasers, electro discharge machines, electro discharge wire cutters, universal tool grinders)
4) Problem of non-qualified raw materials such as iron, steel and aluminum, owing to insufficient investment in the steel industry, insufficient capable human resources, and high import duty on precision instruments necessary for quality control in production

5) Sub-optimal economy of scale in production but high capital investment in some products such as ball bearings, crank shafts, fuel injection pumps and carburetors

6) Inability of local makers to develop their own technology. Affiliate companies and joint venture companies have to rely on the parent company's technology and know-how; this situation being exacerbated by the lack of actual technology transfer. Parent companies tend to provide only technical assistance.

4. Present Government Policy

The Thai government has established a policy oriented towards freer trade in the parts industry. The original policy was as follows:

1) Free to establish and extend manufacturing

2) Abolishment of local content requirement policy as of March 1999

The current tariff structure of CBU and CKD is as follows:

Table 2.9: Tax Structure of CBU

Unit: percentage

Type of vehicle	Import Tariff	Excise Tax	Local Development Tax	Value Added
1. Passenger cars/GPs/Vans				
Less than 2,400 cc	80	37.5	10	10
2,401 cc - 3,000 cc	80	43	10	10
Over 3,000 cc	80	50	10	10
2. Small Trucks	60*	5	10	10
3. Medium-large Trucks	30*	-	-	10
4. Trucks (with body) and Buses	40*	-	-	10
5. Off-Road Vehicles				
Less than 2400 cc	80	32	10	10
Over 2400 cc	80	32	10	10
6. Motorcycles	60	3	10	10

Note: *surcharge of 10% on top of tariff is levied up to December 31, 1999.

Source: The Office of Industrial Economics, Ministry of Industry.

Table 2.10: Tax Structure of CKD

Unit: percentage

Type of vehicle	Import Tariff	Excise Tax	Local Development Tax	Value Added
1. Passenger cars/GPs/Vans				
Less than 2,400 cc	20*	37.5	10	10
2,401 cc - 3,000 cc	20*	43	10	10
Over 3,000 cc	20*	50	10	10
2. Small Trucks	20*	5	10	10
3. Medium-large Trucks	10*	-	-	10
4. Trucks (with body) and Buses	20*	-	-	10
5. Off-Road Vehicles	20*	32	10	10

Note: *surcharge 10% on top of tariff is levied up to December 31, 1999. Motorcycles have no tariff schedule - CKD parts will be subjected to each code.

Source: The Office of Industrial Economics, Ministry of Industry.

Formerly, it was necessary to use local spare-parts for automobile assembly in the following ratios:

- Car assembly: not less than 54%; small truck assembly: about 60-70% and use of local automobile engines
- Truck and passenger car assembly: not less than 40-50 %, with 7 designated spare-parts
- Motorcycle assembly: must use local engines

3) BOI to promote automobile and spare-part industries by; ?? (+numbering system???)

4) Main objectives of the export promotion policy for automobiles and spare-parts are:

- Automobile assembly for export excempted from the regulation of using local spare-parts in assembly.
- Exemption from duty on imported raw materials for automobile industry that are used to produce exports.
- Tax refund for export of automobiles and spare-parts in line with the announcement by the Ministry of Finance.
- Reduction of import duty on raw materials by BOI
- Permit establishment of bonded warehouses.
- Establish exports process zones.
- Coordinate with ASEAN in AIJV and BBC project.
- Abolishment of all laws and regulations that cause delay in export procedure - the only exception is for maintenance of health and sanitary standards.
- Support the development of products and quality control for competitiveness.
- Support and promote the development of technology, skilled personnel, technicians, and engineers to be consistent with automotive parts development. Motivate local entrepreneurs to initiate research.
- Upgrade and standardize product quality and quality control testing methods.
- Support development of special technology, process, design and engineering in the mold and die industry to enable design and development of prototypes and products, which will lead to competitiveness in the market
- Create market and investment alliances worldwide to expand marketing channels in foreign countries

- Promote SME accessibility to low cost funding

CHAPTER III

Current State of Support Industries in Thailand: Electrical and Electronic Industries

1. Structure of the Electrical and Electronic Industries

The electrical and electronic industries play a significant role in manufacturing development in Thailand. The electronic industry is also a support industry to the electrical appliance industry. Its export value ranks the highest and it has a high concentration of foreign investment. The development of the electronic industry started in 1957 (TDRI, The Forecasting of 20 Major Export Products of Thailand to World Market. 1998).

During 1959 and 1960, the industry relied on imported electronic parts to assemble electrical and electronic products under a policy of import substitution.

During the 1960s, Thai manufacturing was already producing some electronic parts; this was the starting point of electrical and electronic support industries. Its support industries are in plastic parts, iron casting parts, steel forging parts, sheet coating, molds and dies, etc.

From 1971 to 1975, export promotion policy lead to a significant increase in the number of support industries. In 1990, there were 368 manufacturers that produced circuits, diskettes, hard disk drives, monitors, modems, microwave ovens, VTRs, faxes, cordless telephones, etc. Presently, there are about 563 electrical and electronic manufacturers and producers.

The period between 1991 and 1995 saw the establishment of 283 new producers of electrical and electronic parts. The 3,718 manufacturers in the electrical and electronics industries employ not less than 333,821 persons, a figure that was steadly

increasing before the economic crisis.

Value added worth of electrical and electronic products increases every year. The proportion of value added in this industry as compared to the total value added for the manufacturing sector increased to 13.83% in 1995.

Table 3.1: Value Added of Electrical and Electronics Industries

(Million baht)

Year	Value added of manufacturing sector	Value added of electrical and electronic industries	Percent
1984	271,855	12,263	4.51%
1985	268,133	10,500	3.92%
1988	294,521	13,080	4.44%
1987	341,750	17,796	5.21%
1988	403,034	25,210	6.26%
1989	496,714	31,394	6.32%
1990	594,014	45,154	7.60%
1991	707,911	56,001	7.91%
1992	779,093	71,429	9.17%
1993	893,344	85,093	9.53%
1994	1,014,952	123,246	12.14%
1995	907,233	125,469	13.83%

Source: NESDB

The statistics mentioned above show that the value added worth and share of the manufacturing sector has gradually increased. It was quite high between 1992 and 1995. In 1996, export value of these industries was 450,181 million baht. This accounted for 43.15% of total industrial export value (Ministry of Industries, 1998). But, the value added of these industries is low compared to their gross output or production value. In fact, their support industries create significantly more value added and end product production.

A support industry is any industry or process that supports the production process

of a product. It can be said that support industries support in order to create other production opportunities. (PC&M and Technology PRA Chomkloa Thonburi Institute in “Thailand’s Export of Electrical and electronic products that is Competitive in the World Market.” Industrial Association of Thailand. 1996. P.5-1.) The support industries of electrical and electronic products are as follows:

- Plastic Processing
- Mold & Die for Metal, Plastic, Pressing, etc
- Packing
- Pallets
- Rubber Processing
- Metal working
- Casting by Material
- Painting
- Printing & screening
- Others

The component industry is one of the support industry that produce intermediate products or transform raw material for use in the production of other electrical and electronic products.

2. Support Industry Supply in the Electrical and Electronic Industries

Government policy to implement promotion of the electrical and electronic industries has been in place for 35 years. One of the first companies, generally known was “Thanin Industry Co.,Ltd.”, had developed their own support industries, such as mold and die, plastic pressing, a sheet metal factory, tooling factory, spraying factory, coating factory, and so on. The technology of the electrical and electronic industry has changed rapidly, especially in competitive products; however, most of the parts that we can produce are low technology parts, such as those for electric fans, air conditioners, and so on.

There were about 541 electrical and electronic parts companies in 1993. Most of them manufactured electrical parts and components, and electronic parts and components.

Table 3.2: The Number of Electrical and Electronics’ Support Industries

Type of industry	Number
Iron and Steel Basic Industries	10
Non-Ferrous Metal Basic Industries	13
Gear Cutting	-
Mold Making	6
Other Metal Machining	7
Spring and Wire Products	22
Precision Parts and Components	13
Metal Packing and Containers	-
Other Metal Fabrication	23
Heat Treatment & Surface Finishing	2
Engines	-
Other Machinery and Equipment	7
Electrical Parts and Components	155
Electronic Parts and Components	193

Plastic and Synthetic Fibers	66
Rubber Products	5
Glass Products	3
Ceramic Products	1
Pulp and Paper Products	1
Chemicals	6
Petrochemicals	-
Other Non-Metal Parts and Processes	8
Total	**541**

Source: SEAMICO, Directory of Support Industries in Thailand 1993

There are quite a number of 100% Thai owned companies. Most of these companies are joint ventures. Almost all of the producers of computer and parts promoted by BOI are exporters.

Table 3.3: Computer Parts Projects that Obtained Promotion from BOI in 1996

Company and Location (province)	Export %	Investment (M. Baht)	Product	Production (1,000 unit)
1. K. E. I. C. Thai. Radchaburi	100	61.0	Switching Power Supply	1,440,000 p
2. C.T.C. Plastic. Chonburi	80	36.0	Computer Monitor Case Assemblies	720 s
3. Delta Electronic (Thailand). Samutprakarn.	100	60.0	Monitors	2,190 s
4. Thai Niska. Pratumtani	100	18.0	Paper Feeder Units	48 u
5. Thai Precision Manufacturing Chonburi	80	1,084.0	Floppy Disk Dive Frames Hard Disk Dive Base & Covers Hard Disk Dive Base & Framers	28,000 p 18,720 p 46.720 p
6. Fujikura (Thailand) Pratumtanee	100	146.0	Computer Cords Interface Cord Assemblies	0.6 ton 66,400 s
7. Minibare Thai. Ayuthaya	100	1,679.0	Computer Keyboards Membrane Key Switches	10,980 p 4,230 p
8. Minibare Electronic (Thailand) Lopburi	100	1,486.9	Floppy Disk Dive Heads Rigid Disk Drive Heads Rigid Disk Drive Sliders Out Riggers	12,000 p 6,500 p 13,000 p 24,000 s
9. Minibear Electronic (Thailand) Lopburi	80	456.9	Floppy Disk Drive Heads PM Stepping Motors	3,600 p 4,500 p
10. Mailco Manufacturing (Thailand) Samutprakarn	80	420.0	Floppy Disk Drives	4,200 u
11. Maxer (Thailand) Chonburi	100	489.2	Head Stack Assemblies	12,000 u
12. Magnecom (Thailand) Ayuthaya	100	145.0	Head Gimbal Assemblies	60,000 p
13. Royal Time City. Ayuthaya	70	46.1	FDD Magneto Heads	25,000 s
14. Linkward Electronic (Thailand) Chonburi	100	60.0	Computer Cases Power Supply	1,800 s 1,800 s
15. Winhardwell Electronic Chonburi	100	15.0	Computer & Electronic Cable Assemblies	2,000 p
16. Saha Union Chonburi	100	2,037.0	Hard Disk Drive Assemblies	5,333 p

Company and Location (province)	Export %	Investment (M. Baht)	Product	Production (1,000 unit)
17. Intralex Technology (Thailand) Pratumthane	80	23.9	Head Gimbals Coil Winding	4,000 p
18. Electro Chemical Technology Nonthaburi	90	21.0	Membrane Key Switches	480 METRES
19. Oki (Thailand) Ayuthaya	100	311.1	Image Drum Cartridges For Printers	2,400 s
20. Habiro (Thailand) Prachenburi	80	75.0	Hard Disk Drive Motor Hubs	10,000 p
21. Hi Pro Electronic Chonburi	100	60.0	Switching Power Supply Power Supply For OA Equipment	1,400 p 2,400 p
Total		**8,609.2**		

Source: Board of Investment (BOI)

Remark: p = pieces, s = sets

According to the study conducted by "Pra Chomkloa Technology Thonburi Institute," electrical and electronic parts suppliers are composed of 46.0% local ownership, 21.9% foreign ownership, and 32.1% foreign and joint ventures. Using the composition of this study, the number of enterprises according to the size of each company is as follows:

No. of employees	Composition	No.of enterprises
100 or less	36.9%	200
101-200	21.1%	114
201-500	22.2%	120
501 up	19.8%	107
Total	**100%**	**541**

2.1 Domestic support industries for parts and components

Parts manufacuring, as support industry for the electronic industry, is basically labor intensive. Most companies are joint ventures. The structure of the industry is comprised of multi-national companies, subsidiaries and subcontractors. Most of their clients are in the international market. Currently, the industry has an import content of 80 percent. Most of products are IC PCBs, resistors, capacitors, batteries and coils. On the other hand, domestic part demand is supplied from foreign sources.

Home appliances and devices have a long manufacturing history. The manufacturers are able to develop their own designs and can produce their own parts. They also have their own brand and production to order. The parts manufacturers have to rely on imported raw materials, such as steel, aluminum, copper, plastic, and chemical products. Important products are as follows:

- ***Air conditioners***

Major components of air conditioners are compressors, condensers, and evaporators. There are 3 compressor manufacturers—Siam Compressor, Thai Compressor Manufacturing, and Daikin Industries (Thailand). All of these receive BOI promotion.

Evaporators and Condenser manufacturers do not have special suppliers for production. Plastic parts for production are manufactured in-house or obtained from other domestic sources.

- *Refrigerators*

There are 2 main producers of compressors for refrigerators: Sanyo Universal Electric Company (uses technology from Japan) and “Kulthorn Kurby” (uses technology from America).

A company named “Thai Refrigeration Components” produces evaporators for refrigerators. It is a 70% Japanese and 30% Thai joint venture, which had a production of 700,000 units in 1992—enough to supply domestic demand.

Larger plastic parts are procured from both large and small local suppliers.

- *Washing Machine*

Major components are wash-motors, tubes, and spin-motors. These components are imported and supplied by local companies. For instance, “Kanyoung Electric” company uses motors produced by a domestic supplier, and “Thai Toshiba Electric” and “Sanyo Universal” produce their own.

Iron press products and structural parts, and unit products and plastic parts of the cover are mostly supplied from local producers or produced by the washing machine companies themselves.

- *Microwave ovens*

Major microwave oven producers are “Sharp Appliances (Thailand)” and “Emmy Industry,” These companies are also exporters. The major component of microwave ovens is the magnetron, which is imported from South Korea and Singapore.

Some components, such as motor and glass plates, have no supplier available in Thailand. Other major components of microwave ovens are also exported.

- ***Electric fans***

Support industries for this industry are fully developed. All components of electric fans can be produced by the electric fan companies or by domestic suppliers. Electric fan manufacturers produce fans, fan motors, fan covers; stands and other components can be supplied from domestic producers.

- ***Rice Cookers***

Major rice cooker manufacturers are “Thai Toshiba Industry”, “A.P. National”, “Peacock Electric”, and “Sanyo Universal Electric”. Rice cooker manufacturers produce all rice cookers components except electrical wiring, which is supplied by domestic producers.

- ***Televisions***

The major component in televisions is the CRT (Cathode-ray tube), which accounts for 40% of the production cost. “Toshiba Display Device (Thailand) produces CRTs, mainly for export. The domestic VRT market of re-export. It is necessary to import panels, shadow masks, electron guns, electron gutters, and wire to produce CRTs. Another major company in this industry is “Thai C R T”, which produces DY (Deflection Yokes) for export. Both companies are promoted by the BOI.

- ***VTRS***

Major components are VTR magnetic heads, and front loading systems. “Summit Electronic Components” produces VHS and FDD heads. Magnetic heads for VTRs are mostly imported. Domestic suppliers and “Thai Mitsuwa” company produce system front loading, frames and cases.

- ***Telephones***

“Asian Stanley International” produces electrical displays and meters. “Mini Bare Thai” produces speakers. Telephone cases use domestic raw material or that obtained

from domestic suppliers.

- *Facsimile machines (Fax machines)*

The “Sharp Appliances” company produces major components. Most components are imported, except some parts such as ICs, of which about 10% are produced by domestic suppliers.

- *Software and Other Support Industries*

It should be noted that the software production industry has a significant role in itself, as well as being an electrical and electronic support industry. The emergence of muti-media technology in telecommunication requires appropriate software, such as application software, CAI and Programmable Logic. The software market in Thailand was valued at 0.22 million US dollars in 1996, equivalent to 0.23 percent of the world market value.

The mold and die, metal parts, and plastic part industries are also important support industries in Thailand. Currently, the metal working (such as forging, pressing, drawing, sheet forming, drilling, milling, planing, gear cutting etc.) and machine tools industries in Thailand are not yet developed as support industries to the electrical and electronic industries. Most machine tools and precision tools are imported.

3. Export of Electrical Appliances and Electronic Products

The export of electrical appliances and electronic products from Thailand gradually increased during the period from 1993 to 1996. The major export value of electrical appliances is in radio and television receiver equipment. In 1996, their value was 34,626.8 million baht. Major export products are V.D.O. players, radio equipment and components, microwave ovens and electrical heater appliances. Electronic products and parts, computers, and computer equipment components hold the the highest export value.

Table 3.4: Export Value of Electrical Appliances and Electronic Products from 1993 to 1997.

(Million Baht)

Items	**1993**	**1994**	**1995**	**1996**	**1997 (Jan.-Oct.)**
Major electrical appliances	88,326.4 (20.75)	125,914.7 (20.8)	153,924.5 (42.6)	156,262.5 (22.3)	154,639 (17.4)
1. V.DO. players, radio equipment and components	14,486.4 (-9.09)	22,727.6 (56.9)	23,269.5 (2.4)	16,516.4 (-29)	17,724.5 (24.52)
1.1 VDO players	6,704.5 (-23.8)	12,668.7 (89)	10,373.7 (-18.1)	59,92.5 (-42.2)	8,763.8 (69.65)
1.2 Components of Videos and Recorders	6,662.2 (8.43)	9,258 (39)	9,258 (33.4)	12,353.7 (-17.7)	8,608.9 (-1.78)
1.3 Magnetic Tape for Videos	119.7(12.78)	800.8 (-28.5)	542.2 (-32.3)	355.7 (-34.4)	351.9 (15.74)
2. Radio receivers and components	22,205.6 (9.11)	28,031.9(26.2)	31,589.2 (12.7)	34,626.8 (9.6)	33,517.1 (16.32)
3. Color television tubes	2,246.2 (138.55)	3,412.2 (51.9)	4,337.7 (27.1)	5,026.2 (15.9)	3,876.9 (-10.28)
4. Amplifiers and components	1,466.5 (8.69)	2,384.2 (62.6)	2,726 (14.3)	2,794.5 (2.5)	2,706.4 (17.78)
4.1 Amplifiers	1,371.8 (10.67)	2,244 (63.6)	2,569.4 (14.5)	2,580.1 (0.4)	2,439.2 (14.57)
4.2 Components of Amplifiers and Microphones	94.7 (-13.65)	140.3 (48.4)	156.7 (11.7)	214.3 (36.8)	267.2 (58.14)
5. Microwave and electric ovens	5,322.5 (-3.01)	5,828.4 (9.5)	6,914.4 (18.6)	7,991 (15.6)	6,747 (0.63)

Items	1993	1994	1995	1996	1997 (Jan.-Oct.)
5.1 Microwave ovens	3,378.8 (-8.48)	3,948.9 (16.9)	4,360.3 (10.4)	5,065.3 (16.2)	4,240.3 (-0.76)
5.2 Electric ovens and Components	1,943.7 (8.23)	1,879.5 (-3.3)	2,554.1 (35.9)	2,925.7 (14.6)	2,506.2 (3.08)
5.3 Other ovens incl. Boilers and Roasters	14.1 (-55.25)	18.8 (33.1)	35.1 (86.5)	40.4 (15.3)	39.3 (17.32)
5.4 Hair Stylers and Dryers	724.3 (34.16)	695.3 (-4)	933.1 (34.2	1,065.7 (14.2	859.1 (2.72)
5.5 Irons	23.6 (148.33)	22.8 (-3.7)	11.3 (-50.5)	12.6 (11.5)	5.9 (-49.44)
5.6 Toasters	0.2 (-76.75)	0.6 (156.4)	0 (-95.5)	0.3 (894.3)	0.9 (248.56)
5.7 Other Electrical Appliances for Heating and Components	1,181.4 (-2.68)	1,142 (-3.3)	1,574.6 (37.9)	1,806.8 (14.7)	1,600.8 (3.33)
6. Electric fans	3,544.3 (22.53)	4,443.1 (25.4)	3,763.8 (-15.3)	3,256.8 (-13.5)	2,233.3 (-23.7)
7. Refrigerators and parts	2,553.6 (11.79)	3,262.7 (27.8)	5,379.3 (64.9)	4,675.6 (-13.1)	4,659 (16.85)
8. Air conditioners and components	8,325.1 (13.38)	13,491.3 (62.1)	20,177.3 (49.6)	24,073.6 (19.3)	23,065.5 (9.42)
9. Electric cable wire	2,139.1 (58.27)	1,935.3 (-9.5)	2,367.2 (22.3)	2,665.5 (12.6)	3,098 (43.05)
10. Magnetic tapes and discs	1,519.1 (75.45)	3,517.1 (131.5)	3,769.2 (7.2)	4,938.3 (31)	5,138.3 (33.82)
11. Transformers and components	5,603.2 (95.64)	8,472.4 (51.2)	14,062.9 (66)	15,115.1 (7.5)	17,612.6 (43.03)
12. Audio equipment and components	1,185.5 (41.09)	450.7 (-62)	123.9 (-72.5)	382.2 (208.5)	415.6 (24.96)
13. Batteries and components	924.4 (12.86)	917.9 (-0.7)	1,335.2 (45.5)	1,643.4 (23.1)	1,644.1 (24.21)
14. Electric parts for combustion and components	4,519.9 (595.06)	5,774.1 (27.7)	1,467.6 (-74.6)	812.5 (-44.6)	672.2 (-3.29)
15. Electric bulbs	1,058.7 (23.87)	1,278.6 (20.8)	1,478 (15.6)	1,698.3 (14.9)	1,666.1 (16.92)
16. Breakers	2,602.6 (41.85)	4,139.2 (59)	5,461.3 (31.9)	5,452 (-0.2)	6,124.6 (33.38)
17. Current Storage Devices and others	2,134.4 (6.24)	3,219.3 (50.8)	4,069.2 (26.4)	4,267.5 (4.9)	4,265.8 (19.89)
18. Other electrical appliances	6,488.4 (45.03)	12,628.9 (94.6)	21,632.7 (71.3)	20,326.8 (-6.0)	19,472.6 (13.83)
Electronic	136,271.9 (15.21)	185,245.1 (35.9)	246,587.9 (33.1)	293,198.6 (19.2)	291,054.3 (20.61)

Items	1993	1994	1995	1996	1997 (Jan.-Oct.)
1. Computers, computer equipment and components	65,270.9	94,590.2	131,241.9	167,673.9	159,276.0
	(13.07)	(44.9)	(38.7)	(27.8)	(16.4)
1.1 Computers and components	24,004.9	53,254.8	71,499.1	89,946.8	67,367.9
	(85.74)	(121.8)	(34.8)	(25.8)	(-8.75)
1.2 Components	38,774.8	38,859.4	57,005.1	75,393.8	89,893.9
	(-8.73)	(0.2)	(46.7)	(32.3)	(47.24)
1.3 Computer wire	2,491.2	2,475.9	2,737.7	2,333.2	2,014.2
	(7.43)	(-0.6)	(10.6)	(-14.8)	(-26.88)
2. Electronic calculators	4,296.1	5,160.1	6,730.8	5,055.2	3,227.0
	(16.28)	(20.1)	(30.4)	(-24.9)	(3.9)
3. Integrated circuits	35,550.0	45,310.8	5,818.8	58,538.6	60,407.8
	(24.2)	(27.5)	(28.4)	(0.6)	(-23.38)
4. Printed boards	5,901.7	10,106.1	13,887.0	11,673.4	14,582.3
	(11.02)	(71.2)	(37.4)	(-15.9)	(55.43)
5. Ball Bearings	5,149.7	4,913.0	5,914.2	6,175.3	515.7
	(-1.26)	(-4.6)	(20.4)	(4.4)	(7.22)
6. Motors and generators	4,324.3	7,285.7	9,896.3	14,227.8	16,625.8
	(27.76)	(68.5)	(35.8)	(43.8)	(42.37)
7. Telegraph and fax machines	3,365.8	3,325.2	4,481.0	6,313.7	5,667.3
	(-2.15)	(-1.2)	(34.8)	(40.9)	(7.17)
8. Telephone sets and equipment	5,840.4	5,300.2	4,942.2	5,132.8	5,025.9
	(5.03)	(-9.3)	(-6.8)	(3.9)	(21.53)
8.1 Telephone receivers	4,641.3	4,445.8	4,315.6	4,314.9	4,264.4
	(10.03)	(-4.2)	(-2.9)	(0)	(20.42)
8.2 Answering machines	1,199.1	854.4	626.6	817.9	761.5
	(-10.68)	(28.7)	(-26.7)	(30.5)	(28.19)
9. Telex and televisions	1,716.4	2,326.5	2,158.0	2,325.9	2,929.8
	(43.83)	(35.5)	(-7.2)	(7.7)	(50.37)
10. Telephones, telegraphs and components	799.1	1,139.0	1,372.8	2,621.5	2,530.5
	(0.84)	(42.5)	(20.5)	(91)	(21.5)
11. Diode transistors, and semi-conductors	4,057.2	5,788.3	7,781.7	14,180.4	15,266.3
	(21.74)	(42.7)	(34.4)	(82.2)	(33.02)
11.1 Semi-conductors	1,309.8	1,695.5	1,994.7	6,207.2	6,724.8
	(-30.31)	(29.5)	(14.7)	(219.2)	(37.64)
11.2 Transistors	2,049.2	3,194.4	4,397.7	6,358.2	7,423.8
	(108.05)	(55.9)	(37.7)	(44.6)	(44.22)
11.3 Diodes	698.6	898.5	1,439.3	1,615.0	1,117.7
	(49.0)	(28.6)	(60.2)	(12.2)	(-22.54)

Note: The number in parentheses is the current growth in export value (%).

Source: Ministry of Industry, 1998.

Major export market for these products is in Asia, Europe, Japan, and America. America is an important export destination for Thailand. However, between 1991 and 1995, the value of exports to America decreased.

3.1 Demand for electrical and electronic parts

Demand for electrical and electronic parts is dependant on the market size of electrical appliances and electronic products. The proportion of Thailand's market share in the world market has gradually increased. Electronic parts and components has the largest share of all products. In 1998, its share was about 7.19 % of the world market.

Table 3.5: Market Size of IT Products and Services

Unit: Billion baht

	1993	1994	1995	1996	1997	1998	1999	2000	CAGR (1995-2000)
Computer parts									
- Thailand	0.53	0.57	0.78	0.96	1.09	1.24	1.40	1.55	12.5
- World	118	126	132	140	148	156	165	175	5.8
- %	0.45	0.45	0.59	0.69	0.74	0.80	0.85	0.88	
Telecommunication Devices									
- Thailand	0.87	1.13	1.41	1.67	1.93	2.20	2.47	2.73	14.2
- World	150	162	192	211	232	255	581	309	10.0
- %	0.58	0.69	0.73	0.79	0.83	0.86	0.88	0.88	
Electronic Parts and Components									
- Thailand	4.58	6.33	8.59	10.51	12.51	14.52	16.52	18.53	16.6
- World	81	105	136	155	177	202	230	262	14.0
- %	5.65	6.03	6.31	6.78	7.07	7.19	7.18	7.07	
Computer Software									
- Thailand	0.14	0.15	0.18	0.22	0.24	0.27	0.30	0.33	10.3
- World	70	77	86	97	108	122	136	153	12.2
- %	0.20	0.19	0.21	0.23	0.23	0.23	0.22	0.22	
IT Services									
- Thailand	0.13	0.15	0.19	0.24	0.27	0.31	0.34	0.37	12.1

	1993	1994	1995	1996	1997	1998	1999	2000	CAGR (1995-2000)
- World	250	282	325	367	414	468	528	596	12.9
- %	0.05	0.05	0.06	0.07	0.06	0.07	0.06	0.06	
Communication services									
- Thailand	2.29	3.07	4.13	5.00	5.92	6.84	7.76	8.68	16.0
- World	470	511	601	664	734	811	896	990	10.5
- %	0.49	0.60	0.69	0.75	0.81	0.84	0.87	0.88	

Source: Ministry of Industry and Customs Department

Thailand's market share of electronic parts and components is forecasted to have a high growth rate from 1995 to 2000. All items of parts and components of electronic products are expected to increase by more than 13% per year. Circuit sets are expected to show the highest growth rate at 20.8%.

Table 3.6: Electronic Parts and Components in Thailand

Unit: Thousand Million Baht

	1993	1994	1995	1996	1997	1998	1999	2000	CAGR (1995-2000)
Electrical Circuit Boards	3.4	4.9	9.8	12.4	15.6	18.8	22.0	25.2	20.8
Diodes, Transistors, and Semi-conductors	5.2	8.6	12.6	16.2	19.9	23.6	27.3	31.0	19.7
CRT Tubes	8.4	11.4	18.3	22.6	27.6	32.5	37.5	42.4	18.3
Integrated Circuits	48.7	67.8	93.5	114.8	137.2	159.6	182.0	204.4	16.9
Audio Visual Parts and Components	4.9	6.9	7.3	8.8	10.0	11.2	12.4	13.6	13.2
Part and Component of Telephones and Televisions	7.2	8.8	11.9	14.0	16.4	18.7	21.1	23.4	14.5
Parts and Components of Computers and Computer Spare Parts	39.0	53.0	65.6	79.1	92.4	105.7	119.0	123.3	15.1
Total	116.8	161.4	219.0	267.9	319.0	370.1	421.2	472.3	118.5

Source: Customs Department

Remark: The statistics for 1996 to 2000 have been forecast using a time trend analysis method.

On the other hand, the computer equipment market will not increase as much as electronic parts and components. Equipment for mini computer will show a 12.5% decrease. Personal computers, printesr, and small computers will increase by 15.7, 12.2, and 11.8 % respectively.

Table 3.7: Component Demand in Thailand

Unit: Thousand Million Baht

	1993	1994	1995	1996	1997	1998	1999	2000	CAGR (1995-2000)
Main Frame Computers	1.22	0.04	1.05	1.10	1.02	1.05	1.08	1.11	1.6
Mini Computers	0.97	0.48	0.80	0.76	0.67	0.60	0.52	0.45	-12.5
Micro Computers	0.51	0.93	0.72	0.83	0.93	1.05	1.17	1.29	11.8
Other Computer Systems	0.40	0.42	0.46	0.38	0.41	0.40	0.4	0.40	1.4

Total	3.09	2.23	8.03	3.06	3.03	3.10	3.17	3.24	2.3
Workstations	0.61	0.44	0.60	0.63	0.62	0.64	0.67	0.69	2.2
PCs	5.96	8.43	11.60	15.08	17.90	20.95	24.00	27.06	15.7
Total	6.57	8.87	12.20	15.71	18.52	21.59	24.67	27.74	17.9
HDs	1.23	0.94	1.16	1.42	1.38	1.46	1.54	1.62	3.4
Printers	2.07	2.02	2.96	3.58	4.03	4.58	5.23	5.68	12.2
Monitors	0.52	0.57	0.61	0.83	0.87	0.97	1.06	1.16	8.8
Total	3.82	3.52	4.73	5.83	6.28	7.01	7.73	8.45	24.4
Grand Total	13.50	14.60	20.00	24.60	27.80	35.60	35.60	39.40	64.8

Source: Office of Industrial Economics references from ATCI & CAT-VG

Remark: The statistics for 1997 to 2000 have been forecast using a time trend analysis method and adjusted by the forecasting of IDC

The supply of local companies is inadequate to keep abreast of the rapid expansion of the information technology market. The computer market is very competitive. There is, however, a high rate of growth in the import of electrical and electronic products. Import growth rate was very high in 1993 and 1994. After that, imports dropped off a little, especially those of electric machines and components, electrical circuits, components of telephones, telexes, and televisions, and electrical appliances. In 1996, electrical and cable wires import growth rate reached a peak, accounting for 47.4 %

Table 3.8: Import of Thai Electrical and Electronic Products (1993-1997)

Items	**1993**	**1994**	**1995**	**1996**	**1997 (Jan-Oct)**
1. Electric machines and components	110,314.1	136,764.9	170,496.2	171,593.2	169,469.0
	(35.69)	(24.0)	(24.7)	(0.6)	(16.68)
1.1 Electric motors, generators and components	24,491.2(82.33)	18,897.1 (-22.8)	21,108.0 (11.7)	18,048.4 (-14.5)	16,832.7 (8.45)
1.2 Telephone handsets, telex, and equipment	9,918.8 (56.70)	13,140.9 (32.5)	11,844.5 (-9.9)	12,915.3 (9.0)	18,550.3 (75.03)
1.3 Audio Visual Transmitters	6,505.8	12,326.9	13,186.1	10,695.7	10,195.2

Items	1993	1994	1995	1996	1997 (Jan-Oct)
	(47.96)	(89.5)	(7.0)	(-18.9)	(9.75)
1.4 Circuit breaker control boards	17,781.0 (25.13)	24,144.2 (35.8)	29,698.0 (23)	28,541.5 (-3.9)	30,994.7 (29.89)
1.5 Electric cable wire	6,424.4 (23.77)	7,538.5 (17.3)	10,894.9 (44.5)	16,056.4 (47.4)	16,426.9 (21.94)
1.6 Transformers and components	7,754.2 (40.39)	9,397.0 (21.2)	12,899.9 (37.3)	13,731.1 (6.4)	13,207.1 (15.02)
1.7 Current storage devices	4,762.5 (8.61)	7,296.2 (53.2)	10,622.9 (45.6)	9,653.3 (-9.1)	9,314.1 (13.91)
1.8 Printed circuit boards (PCB)	3,385.8 (2.71)	4,919.1 (45.3)	9,853.0 (100.3)	10,020.4 (1.7)	8,794.8 (6.09)
1.9 Diodes, transistors, and semi-conductor equipment	5,215.9 (28.86)	8,602.3 (64.9)	12,619.2 (46.7)	14,806.3 (17.3)	11,873.1 (-7.46)
1.10 Industrial furnaces and electrical ovens	1,131.1 (-54.42)	1,201.8 (6.3)	1,533.5 (27.6)	1,695.0 (10.5)	1,875.3 (42.03)
1.11 Other electrical machinery and components	22,943.2 (27.44)	29,300.8 (27.7)	36,236.4 (23.7)	35,429.7 (-2.2)	31,404.3 (3.03)
2. Computers, equipment, and components	38,968.2 (5.69)	52,983.7 36)	65,587.8 (23.8)	72,169.2 (10.0)	75,300.8 (27.03)
2.1 Computers and equipment	9,513.4 (11.1)	12,825.3 (34.8)	15,722.2 (22.6)	16,309.7 (3.7)	14,205.9 (3.07)
2.2 Computer components	29,454.9 (4.05)	40,158.4 (36.3)	49,865.6 (24.2)	55,859.5 12.0)	61,094.8 (34.3)
3. Integrated circuits	48,729.6 (32.11)	67,821.3 (39.2)	93,454.5 (37.8)	101,603.0 (8.7)	97,937.5 (13.61)
4. Components of radio transmission equipment, telexes, and televisions	7,205.5 (6.34)	8,799.8 (22.1)	11,859.2 (34.8)	10,571.3 (-10.9)	10,841.6 (20.02)
5. Television tubes	8,357.1 (14.42)	11,426.3 (36.7)	18,340.8 (60.5)	24,437.5 (33.2)	21,312.1 (5.68)
6. Record players and tape recorders, videos	4,857.8 (-28.94)	6,883.6 (41.7)	725.2 (5.5)	5,355.6 (-26.2)	5,717.6 (25.89)
7. Electrical appliances	22,746.8 (25.09)	33,896.1 (49)	43,318.5 (27.8)	42,797.5 (-1.2)	33,411.4 (-5.64)
7.1 Air conditioners	1,759.6 (32.89)	2,191.6 (24.5)	2,603.6 (18.8)	2,810.2 (7.9)	2,494.7 (1.16)
7.2 Water heaters	1,525.5 (18.03)	1,725.2 (13.1)	2,387.8 (38.4)	2,413.5 (1.1)	2,100.2 (7.94)
7.3 Microphones	2,291.8 (20.4)	2,791.2 (21.8)	3,146.7 (12.7)	3,056.6 (-2.9)	2,260.4 (-12.2)

Items	1993	1994	1995	1996	1997 (Jan-Oct)
7.4 V.DOs	1,781.6 (4.99)	2,245.9 (26.1)	3,198.6 (42.4)	3,109.1 (-2.8)	2,403.2 (-5.36)
7.5 Voice Mail Devices and Pagers	6,270.7 (88.8)	12,041.0 (92)	17,112.5 (42.1)	18,151.4 (6.1)	13,761.2 (-7.53)
7.6 Radio receivers, telexes and television receivers	4,783.4 (3.45)	6,354.8 (32.9)	8,003.1 (25.9)	6,440.1 (-19.5)	4,381.2 (-17.76)
7.7 Refrigerators and freezers	2,128.7 (13.48)	3,853.3 81.0)	3,136.7 (-18.6)	3,307.9 (5.5)	2,545.6 (-7.0)
7.8 Other electrical appliances	2,205.6 (2.77)	2,693.1 (22.1)	3,729.3 (38.5)	3,508.7 (-5.9)	3,464.9 (17.55)

Remark: The numbers in parentheses represent the percentage growth rate.

Source: Ministry of Industry, 1998.

Table 3.9: Telecommunications Market in Thailand

Unit: Thousand Million Baht

	1993	1994	1995	1996	1997	1998	1999	2000	CAGR (1995-2000)
Devices with Wire	19.3	22.7	22.2	24.3	25.7	27.1	28.6	30.0	6.2
Wireless	2.2	5.0	9.4	12.7	16.2	19.8	23.4	27.0	23.6
Other	0.8	1.0	4.4	5.6	7.4	9.1	10.9	12.7	23.8
Total	22.3	28.7	35.9	42.5	49.3	56.1	62.9	69.7	53.6

Source: Goldman Sachs and TOT

Table 3.10: Computer Software Market

Unit: Thousand Million Baht

	1993	1994	1995	1996	1997	1998	1999	2000	CAGR (1995-2000)
System Software and Utilities	0.95	0.90	1.24	1.63	1.78	2.01	2.25	2.49	11.2
Machine Software	0.45	0.41	0.56	0.77	0.83	0.94	1.05	1.16	10.8
Applied Software	2.07	2.52	2.71	3.27	3.59	3.97	4.36	4.74	9.7
Total	3.46	3.83	4.51	5.67	6.20	6.93	7.66	8.39	21.7

Source: ATCI & CAT-VG

Most of these imported parts are products that cannot be produced by local manufacturers. Research and development institutes of the products and parts are in head offices overseas. Nevertheless, Thai investors have not enough development funds to invest. Furthermore, companies in Thailand are insufficiently developed technologically.

3.2 Problem Issues in Government Industrial Policy

Most of the problems in this industry are concentrated in the inappropriate tax structure. The tariff structure does not support the application for local parts. The tariff rate for finished products is lower than tariff rate on substitute parts for the parts manufacturer.

The industry also has insufficient human resources, skills, management and technology. The parent company controls

management and transfer of technology. Thus, engineers and technicians lack the know-how gained from research and development. Technology transfer is not smooth owing to language barriers. Local manufacturers in this industry lack full information on the market and are therefore unable to access cheap sources of raw material. No R&D investors have been found among local manufacturers both locally and foreign owned or among subcontractors. The support industries for electronic and electrical appliances (SME) are not strong enough to support the industry alone. Besides, the industry has high import content, thus generating only low value added for the domestic economy. More importantly, standardization is not widely prevalent in the industry. Most importantly, Thailand is not yet in the position to introduce its own ‘Made in Thailand’ brand image.

In the past, government policy in electronic industry has been accused of creating distortion in production. The Effective Rate of Protection or ERP of the electronic industry was very high. The nominal rate of protection was as high as 100 percent.

However, the electronic industry is highly dependent on imports—more than 70 percent of parts and components are imported. Thus, high import tariffs imply a high cost of production. Recently, the import tariff was restructured according to the WTO and ASEAN agreement from the previous structure to 1- 45%. In any case, some tariffs are still higher than called for by the agreement. The ERP in this industry is 29.5 indicating that the industry is protected by government policy and making abnormal profits. The domestic resource cost (DRC) in this industry is 1.12 indicating that electronic industry is not efficient. To earn a foreign exchange of 1 dollar, Thailand has to spend 1.12 dollars **as social opportunity forgone. It is however close to 1.00 the borderline for social optimum**????. In terms of Revealed Comparative Advantage (RCA), Thailand is comparatively less competitive than Malaysia, Singapore and South Korea in computer production and in the export of electronic parts and components. Despite this, Thailand is competitive in labor cost compared with the above-mentioned countries, but much less competitive in technology. China, however, has a lower RCA than Thailand.

1)National Economic and Social Development Plans

During first to third plans, national policy stressed import substitution. This policy aimed at stimulating electrical and electronic industries, involved in the assembly of imported parts into products such as radios, televisions, refrigerators, and so on.

The government was interested in specific industry during the fifth plan. It defined electrical and electronic industries as one of those which needed to be restructured. In its seventh plan, the government focused on the electronic industry as one of the target industries to be promoted.

Government measures used to protect domestic industries are import customs duties, and extra custom imports. Non-tax measures include control of imports**.**

Other measures are financial assistance through the Bank of Thailand, IFCT, SIFO, and consultations with the Ministry of Science, Technology and Energy, and the Ministry of Industry.

The significant policy that influences these industries is the Industrial Promotion Policy. The Board of Investment promoted the electrical and electronic industries in 1962. At present, BOI divides promotion policy for electrical and electronic industries into 2 groups. They are the electronic product group, and the electronic parts group. All products must be exported, except for company that are Thai joint ventures, for which this figure must be not less than 75%. A company must export not less than 50%. Televisions, radios, and radio-tape receivers must all be exported because supply exceeds demand.

Electronic components are not subject to any conditions for export, except 12”-27” television tube, which must all be exported. The government decreased import customs, and sales tax on raw materials for produced electronic parts by 50%.

2)Protection and promotion policy

Protection and promotion of support industries comes in the form of exception from customs and sales tax. Export promotional measures by the Bank of Thailand, export promotion by the Ministry of Commerce: located free trade and warehouse areas, support for credit, initiation of goods assurance loans for export, financial flow, and protection from export risks.

3)Support and promotion from public offices

- Board of Investment gives many rights and benefits to producers such as exemptions from income tax and sales tax for 5 years, and from import tax, and give rights and benefits to investors who invest in the promotion zone.

- The Bank of Thailand gives special rights to BOI.

The special rights and benefits the Bank of Thailand gives to producers are reduced credit tax and regulation of import/export currency in the electrical circuit industry. The Bank of Thailand will examine cases of import or export currency involving no more than 20,000 baht. Nevertheless, they will help in the purchase of bank notes for export by offering special low interest rates and long term borrowing for credit used in the purchase of bank notes. Reducing electrical cost per unit is one measure of support needed in the electrical industry. The Bank of Thailand will reduce about 20% of electrical value used in production, but the company involved has to export not less than 50,000 baht in one year.

Ministry of Commerce

The Ministry of Industry has assigned the Customs Department to temporarily permit sending of scrap from circuits abroad after being prohibited by yhe Ministry of Commerce since 15 October 1982.

On 10 March 1989, the Board of Investment revised the Electronic Promotion

Policy by dividing the industry into 3 groups—electronic products group, electronic parts group, and support industries group. This will be useful for positive industrial development.

Ministry of Finance

Promoted companies are exempt from sales tax and export customs on their exports and are given a tax refund on their imports of circuits. In 1987, the tax rate for television transmission components was reduced from 35% to 5% of import value. Other import tax is 10% of import value. In the case of exemption of export tax and customs duty, a company can reduce personal tax to 5% of net income of export.

We can conclude that the electrical and electronic industries are faced with the following basic problems:

1) Raw materials

The industries are highly dependent on foreign raw materials. The high cost of imports means lower competitiveness if the local support industries are not strong enough.

2) Short life cycle of products: decrease the margin of old products each time a new product is introduced.

4. Proposed Measures for Development

According to these problems, the government should issue support measures for the industry as follows:

1. Thailand should increase its technical capability. The government should give basic support for R&D in the private sector. Machinery and machine tool development should be a priority in the electronic industry.
2. Creation of a subcontracting system and network in support industries. Provision of technology and innovation or support provided for manufacturers in parts and components by setting up a Research and Development Institute for the Electronic Industry.
3. Arrange low interest loans and give public funding for research and development of major parts.
4. Support and promote personnel development.
5. Promote industrial linkage and sub-contracting by building group and business relations between manufacturers of products and parts.
6. Provide support to reduce production cost through design development. Use low cost raw materials. Develop own brand name brand royalties.
7. Support and promote an increase in the production of parts and components by revising laws and regulations that are obstacles to domestic production of parts and components.

CHAPTER IV

Mid Term Policy of Support Industries Development

1. Survey of Support Industry under Crisis

In our study, we conduscted in-depth interviews with 2 automotive parts factories and one electronic part supplier within the support industries. Moreover, we completed a questionnaire survey on various support industries mentioned above. The survey results are interpreted as representative of each support industry under study. We have summarized them as follows:

Case	Company Profile	Products	Market	Problem Encountered	Problem Solving Method	Assistance Needs
Case 1	Registered capital of 250 million baht; 2,070 employees in 1995 and 1,240 in 1998. 27 years industry experience.	Automotive seats, sun visors, door parts, roofing sheets	Domestic 100%	1) Assembly unit of car declined substantially, no demand for company's product, sales and revenue flow stops. 2) Company has made significant amount of capital investment to produce products supplying automobile assemblers. Currently, the market is at a stand still with no orders being made. 3) Company lacks basic knowledge to upgrade to higher technology. Mostly the company relies on parent company. No inhouse R&D. 4) Import duty on raw material for part production is higher than import duty on finished imported parts. 5) Abolishment of local content policy will make car assemblers import parts from abroad. 6) Lack of human resources with enough knowledge and experience to produce automotive parts	1) Cost reduction 2) Lay – off 3) Rationalization of company structure to be flexible in management	1) Reduction of import duty on raw material 2) Research and development on production technology 3) Human resource development
Case 2	Registered capital 200 million baht; 400 employees in 1995 and 600 in 1998. 11 years industry experience.	Automotive batteries, Motorcycle batteries	Domestic 30%; Export 70%	1) The company is facing high costs as a result of delaying VAT refund for export products 2) Currently, batteries are subject to excise tax and delay in refund	No concrete method	Reduction of government red tape in tax refund
Case 3	Registered capital 250 million baht; 3,100 employees in 1995 and 1,600 in 1998. 40 years industry experience.	Automotive body parts of car and truck, roofing, metal dies, jigs, springs, hydraulics, spare parts, dump trucks, trailes, and special vehicles	Domestic and Export	1) Liquidity and credit crunch 2) Source of credit supply to support company and production 3) High cost of production 4) High cost of funds (interest charge) 5) How to restructure or rationalize internal system to be ready for free local content policy	1) Cost reduction 2) New product launch in market 3) Expand new market both domestic and overseas 4) Increase capability of personnel 5) Development of product quality ISO, QS	1) Restructuring of import tariffs, ranging from raw materials and semi-intermediate products to finished products 2) Reengineering of government bureaucratic system to be faster and more efficient, to support private business in areas of

Case	Company Profile	Products	Market	Problem Encountered	Problem Solving Method	Assistance Needs
						private business in areas of regulation and finance as result of credit crunch
Case 4	Registered capital (NA.); 450 employees in 1995 and 480 in 1998. (NA) years industry experience.	PC boards	Domestic and Export	1) Product quality 2) Delivery 3) Workers lack discipline 4) Working environment is not appropriate	1) Upgrade to ISO 9002 2) QS 9000 3) Training and Development Schedule Plan	None
Case 5	Registered capital 570 million baht; 11,486 employees in 1995 and 10,309 in 1998. 36 years industry experience.	Electrical wiring for automobiles, speedometers in automobiles, plastic spare parts, battery cables and internal automotive body electrical cables	Domestic and Export	1) Government policy and political stability 2) GSP issues may affect the market demand 3) High wages 4) Skill of workers	1) Introduce QS 9000 into work process	1) Solid promotion of export
Case 6	Registered capital 170 million baht; 550 employees in 1995 and 380 in 1998. 18 years industry experience.	Ceramic cups used in electrical power distribution	Domestic and Export	1) Decreases in demand 2) High interest cost	1) Reduction of production, and lay-off 2) Need to find foreign counter-part	NA.
Case 7	Registered capital 540 million baht; 500 employees in 1995 and 650 in 1998. 9 years industry experiences.	Telephones and cordless telephones, car radios, assembly of general electric circuit boards	Domestic and Export	1) High cost of funds (interest charges) 2) Reduction of sale and revenue 3) Credit crunch due to lack of circulating capital 4) Clients cancelling orders more frequently	1) Change in role of core business from 'Turnkey' to subcontractor 2) Down sizing and partial lay-off 3) Cost reduction and rationalization	1) Interest cost reduction 2) Force financial institutions to provide usual credit with fewer conditions
Case 8	Registered capital 200 million baht; 430 employees in 1995 and 130 in 1998. 26 years industry experience.	Parts for car air conditioners, parts for building air conditioners	Domestic and Export	1) Domestic demand decreases as car sales decrease 2) Down sizing of production 3) Company has higher fixed unit cost of production 4) Exchange loss due to devaluation in	1) Try to export more 2) Cost reduction 3) Reschedule short-term debts to long-term debts	1) Find export market for product 2) Find source of investment funds

Case	Company Profile	Products	Market	Problem Encountered	Problem Solving Method	Assistance Needs
				company loan 5) High interest costs and credit crunch		
Case 9	Registered capital 420 million baht; 230 employees in 1995 and 1,899 in 1998. 11 years industry experience.	Floppy disk drives	100% Export	1) Product price decrease every quarter 2) Rapid change of technology, high risk in stocking of raw material and capital investment in new machinery 3) High labor costs even though labor supply is in excess of demand 4) Too many competitors 5) Import tariff is unfair and not systematic 6) Lack of sufficient infrastructure	1) Reduction of raw material cost by negotiating to reduce price of spare parts and inventing new model that can reduce production costs 2) Rationalization of cost internally	1) Giving privileges to companies that achieve ISO 9000, ISO 14000, since these companies help to reduce social and environmental costs 2) Giving privileges to companies that pay tax early or on time, etc., in order to motivate entrepreneurs to act rightly according to tax code or better than what tax code intends to achieve. Simply punishing tax evaders is not sufficient.
Case 10	Registered capital 233 million baht; 500 employees in 1995 and 325 in 1998. 25years industry experience.	Car radios, loud speakers, hand held radios, electronic parts	Domestic 100%	1) Sudden market demand shrinkage 2) Unstable exchange rate inducing high import cost of raw materials 3) High cost of funds in 1997-98	1) Reduction of production and lay-offs 2) Finding a foreign market for the products directly and indirectly 3) Cost reduction 4) Increase productivity and product quality	1) Government should be a mediator in debt restructuring to make it fair and efficient 2) Stimulation of demand 3) Reduction of barriers to export, such as transport customs, and promotion.

Most of the survey results indicate that manufacturers are encountering not only fundamental problems but also feeling the crunch from external factors (i.e. the credit crunch) severely. Their response to this is quantity adjustment through laying off of employees as well as rationalization of their production processes. There are virtually no efforts being made in R&D among these manufacturers.

2. Structural Change of Industry in Crisis: 1997

From the survey results we can deduce that Thailand has made efforts towards industrial restructuring since the previous government. A committee was set up to identify problems faced by industry. This committee also set long-term goals for industrial development in Thailand. This may be regarded as the beginning of the process of industrial policy formulation even before the crisis hit. In order to materialize the plan under the vision mentioned above, detailed studies were executed.

Problems concerning current industrial structure can be deduced from the survey results and other sources of information such as those that follow:

Firstly, the support industry has overall low productivity and lacks capability in new technology. It also lacks modern machinery as well as timely maintenance. The textile and textile product industry in particular is faced with this problem. The food, shoes and leather, ceramic and glass, electronic and electrical appliances, iron and steel industries are also facing a trend towards lower productivity. In addition, the wood and furniture industry is facing problem with the introduction of new technology and modern machinery.

Secondly, industries having problems such as lack of information from technology transfer, accessibility to research and development information within the government and private sectora is insufficient, transfer of patents is not favorable to further development**.** Industries faced with this problem are for example, home electrical appliances and electronics, etc.

Thirdly**,** industry as a whole lacks specialized personnel that have the skills to work with modern production processes.

Fourthly, industrial structure is lacking in support industries, which are small and medium enterprises. In particular, the iron and steel and petro-chemical industries lack proper coordination between their upstream and downstream components.

Fifthly, some industries are facing a problem of market access. New market development is still insufficient, it is difficult to obtain full market information; they are hindered by product dumping from foreign suppliers and by sub-standard products owing to their poor quality control system. Furthermore they do not have the access to new designs to meet market needs, lacking of indigenous brand royalty for own brand creation, etc.

Sixth, in certain industries, such as textiles and textile products, there is an over-concentration in a particular area. When wage costs are high, the industry is unable to compete.

Seventh, industry faces rising environmental costs for example in textile and textile products, and plastic products.

Eighth, industry faces problems with raw materials, particularly with regard to quality and regularity of supply. One such industry is that of food processing, where raw materials are becoming costly. Leather and ceramics, jewelry, and iron and steel face same problem with raw materials both supplied domestically and imported from abroad.

Ninth, industrial development lacks long term, low interest capital funds.

Tenth, the crucial problem is concerned with government policy and measures. The Thai government lacks common goals and direction with regard to industrial development, especially in wood and furniture, rubber and rubber products, iron and steel. The government needs to clarify whether they should protect these industries. The petro-chemical industry faces insufficient domestic demand and is threatened by cheap imports. Wood and furniture industries face problem of strict laws and regulations on wood import, and restrictions on export in regards to declaring the origin of raw materials. Electrical appliances and electronics industries face the problem of unfavorable duty and taxation measures on their support industries.

Despite all the above obstacles to Thai industrial development, the Thai government through the industrial restructuring committee of the Ministry of Industry has predicted the future development of Thai industries in the world as follows:

Table 4.1: Vision for Year 2002 on Production: Thailand as Central Production Base for Export-Center for Trade-Higher Export Value and Market Share-Higher Value Added in Production and Sustained Growth-Linkage Effect and Support Industries

Industry	***Target***
Food products	Higher value added from fishery, grains, fruit and vegetables, and meats. System of sustainable supply of raw material for the food industry and cooperation with neighboring countries to procure long term supply of raw materials.
Textile products	Sub-contractor of world brand name; higher value added, and use more local content.
Shoes and leather products	Make acceptable by world standard. Promote support industries to produce and trade-in equipment and machinery for this industry.
Wood furniture	Increase the current export volume by more than 3 times, with the 1997 price. Specialized support industries. Raw material can be from managed forests, import substitution of logs for construction, and efficient and transparent import wood supply system for furniture.
Medical and chemical products	Import substitution of 50% of import. Become leading exporter in ASEAN. Increase exports to more than 3 times that of 1997. Become the most advanced production base for herbal medicine and herbal products.
Rubber and rubber products	Maintain the major export of rubber and rubber product. Thailand should become world center for natural rubber trade. Promote more rubber products to reduce import content. The domestic use of rubber as raw material should reach 400,000 ton in 2002, double that of 1996.
Plastic products	Become a production base for plastic parts for the Asian market. Become the leading exporter of ASEAN in melamine, sheet and film. Expand direct investment to neighboring countries to increase competitive capability.
Ceramics and glass products	Produce and distribute high standard products to the world. Introduction of new products into the content of existing products. Research additional raw material for bone china, porcelain and machinery industry for ceramics and glass.
Electrical appliances and electronic products	Maintain the role of significant production base of Asia. Gain 1% of world market share and increase local content at least 85% for electrical appliances, and 50% percent for electronics.
Transport equipment and parts	**Automobile industry for export, passenger car, one ton pick up truck, motorcycle, that Thailand has competitive????**. Become the world class production base of selected spare parts. Become the repair center of Asia. Promote measures toward efficient SME for

Industry	*Target*
	support industries for parts.
Jewelry	Become one of the world production bases of jewelry. Increase exports to 100 billion by year 2002 or double the volume of 1996.
Iron and Steel	Have exports in year 2002 of more than 100 billion baht or 5 times that of 1996. Design new products to substitute for natural construction materials to conserve natural resources and lower costs.
Petro-Chemical	Become one of the leading producers and be responsible for the export of more than half of the production capacity of the industry in both quantity and quality by year 2002.

Table 4.2: Vision for Year 2002 on Marketing: Thai Product will Create Own Brand Royalty???- Center of Product Design- Image of Quality and Price

Industry	*Target*
Textile products	To be a design center acceptable world wide; the industry must be competitive in all streams
Shoes and leather products	To have the leading fashion in shoes and leather products of Asia; 'Made in Thailand' to be accepted world wide
Wood furniture	To be the center of wood furniture design of Asia; all wood furniture production to obtain ISO 9000 and have an image of a green industry that protects natural resources
Medical and chemical products	Raise the image of medical and chemical product in the world market
Rubber and rubber products	Raise Thai rubber quality to world standard
Plastic products	Create Thai brand name 'Made in Thailand'; recycle plastic products to conserve natural resources and the environment
Ceramics and glass products	Create high quality products that can compete on the world market; turn subcontracting into own brand 'made in Thailand' products
Electrical appliances and electronic products	Become capable of developing some products by own technology on molds and dies
Jewelry	To be the development center of design
Iron and Steel	Standard product to have ISO 9000 approval
Petro-Chemical	Reach world standard in management, environment and safety (ISO 9000/14000/18000)

With the above mentioned vision, it is necessary to lay the foundations in industrial restructuring, fiscal measures, industrial finance, industrial design and marketing, and technology transfer etc. Complete partnership between local competitors as 'competing while cooperating' is vital, and the cooperation between private and government agencies of concern is also important.

3. Role of Small and Medium Industries

Recently, the government was alerted to the idea of SME or small and medium enterprises, which was put forward by the public. The Ministry of Industry set up a committee in August 1996 to draft an act to promote SME. The act is called ***Act on the Promotion of Small and Medium Enterprise (Industry)***, and was placed open for public scrutiny in December 1998. The law is drafted along similar lines to the ***Medium and Small Enterprise (Industry) Modernization Promotion Law*** of Japan. By virtue of the act, the government intends to set up an SME Fund with initial establishment fund of not less than 5,000 million baht each year, and an additional subsidy to be earmarked to the fund from budgetary disbursement. The SME Fund will be allocated for the capital investment of small and medium enterprise to raise efficiency and management capability. The Industrial Finance Corporation of Thailand and Small Industrial Finance Corporation of Thailand will manage the fund.

The scope of SME promotion concentrates on the process of technology transfer and selecting appropriate technology for SME, standardization of products, supporting marketing activities of SME, and supporting SME with information technology. The SME will be encouraged to link with one another and the local community, both in urban and rural areas. In the proposal, the government intends to set up an ***Office of the SME Promotion*** the main task of which will be the administration of the SME Fund. It appears that it will have authority in itself, only being guided by board of executives and chaired by the permanent secretary of Ministry of Industry.

In our view, there is no clear vision as to what SME would mean. It seems that the government is taking for granted that SME is SMI. The latter are small and medium

scale industries, mostly subcontracting in nature. **???While** SME in alternative sense is ***skill driven*** small and medium enterprise that would be a ***stand alone SME*** and produce significant amount of value added for Thai **industry????**. They are the fundamental strength of the Thai economy. It is therefore unfortunate that they only have access to a very small percentage of all banking credit.

4. Industrial Finance of SMEs

In Thailand there are specialized financial institutions that provide loans to SME as follows: The government owned ***Small Industry Finance Corporation*** provided credit to 921 SME amounting to 3,488 million baht from 1996-1998. The credit is limited to SME with assets not exceeding 50 million baht with loan amounts of 0.5 – 25 million baht. Currently, the SIFC has subsidiaries in three provinces apart from BMR. The government has allocated a fund of 500 million baht provided by the ADB and Japan and 750 million baht from the loan on Structural Adjustment Fund (SAL).

The Industrial Finance Corporation of Thailand (IFCT) has provided loans to SME as well. It had outstanding loans amounting to 134, 578 million baht as of September 1998. It has 40 provincial branch offices. Currently, it has obtained allocation of 24,000 million baht from government, of which 12,000 million baht is under the SAL program and 12,000 million bath is from J-EXIM.

The Bank of Agriculture and Agricultural Cooperatives (BAAC) offers a 'two-step loan' from OECF, Japan and other sources to extend credit to agricultural sector. It has 586 provincial branch offices and 840 district offices throughout Thailand. It has been allocated 6,000 million baht, 3000 million of which is to be used to recapitalize its status and the remaining 3,000 million to extend additional loans to the sector. The BAAC is allowed to extend credit to agricultural related activities such as cottage industries, or in other words, small local industries, as well.

The Government Saving Bank was allowed to provide loans to SME as well as it has not less than 557 branch offices. The Bank of Thailand land provides assistance to SME through the discount window of commercial banks and specialized financial institutions.

The BOT provides a 60:40 proportion of loans that commercial banks extend to SME at low interest rates. Currently, the BOT has prepared 12,000 million baht of credit to extend loans to SME, and prepared another 7,200 million baht to be used in co- financing with the IFCT. In total, SMEs will be able to access credit of 32,000 million baht.

The Industrial Promotion Department has also provided assistance to SMEs in the form of technical explanations and advice to the home and handy craft industries. Each loan does not exceed 500,000 baht. In 1998, the department provided 91.30 million baht to 1,286 households.

Despite the full effort made by government agencies concerned, it is obvious that the credit extension to SMEs is not only necessary but still not sufficient when compared to the industrial finance extended to large enterprises. Besides which, most SMEs are not able to access the funds. Instead, they have to rely on informal sources of finance with relatively high interest rates for short-term loans. There are no long-term loans available for them, as the size of production and marketing for SMEs is quite small and considered by banks to have high transaction costs compared to large project finance. The government realizes this and has set up Small Industrial Credit Guarantee Corporation to insure against the risk of SMEs with assets under 50 million baht. In 1998, the corporation provided credit guarantee to 1,183 projects to a total of 1,813 million baht.

Currently, Thailand lacks a ‘venture capital’ investment facility to support high risk SMEs. In Thailand, 38.3 percent of the funds for SMEs is from their own capital funds.

Table 4.3: Source of Capital Funds of SMEs

Source of Capital Funds	*Percentage %*
Own Capital Funds	38.3
Borrowed from Financial Institutions	56.4
Provided by Government Finance Corporations	10.6
Informal Capital Markets	9.6
Foreign Capital Funding	1.4
Other	2.3

Note: Total percentage is 118.6% as SMEs obtain funding from more than one source.
Source: Advance Research (1997), ***Report on Small and Medium Enterprises in Thailand***, Ministry of Industry.

Government is considering setting up the SME Board in the Stock Exchange of Thailand and other measures in the OTC market to help raise funds for SMEs. Investors will be able to judge from 'disclosure-based' information rather than the usual 'merit-based'. The Security Exchange Commission agreed in principle on November 1998 to allow venture capital funds to trade in the security market by the first quarter of 1999.

Appendix

Case 1:

Company Profile: Registered Capital 250 million baht, 2,070 employees in 1995 and 1,240 in 1998. 27 years industry experience.

Products: Automotive Seats, Sun Visors, Door Partss, Roofing Sheets

Market: 100% Domestic

Problems Encountered:

1) Assembly unit of car declines substantially, no demand for company's product, sales and revenue flow stopped.
2) Company has made significant amount of capital investment to produce products supplying to automobile assemblers. Currently, the market is at a stand still with no orders being made.
3) Company has not basic knowledge to upgrade to higher level technology. Mostly the company relies on parent company. No own R&D.
4) Import duty on raw material for part production is higher than import duty on finished imported parts.
5) Abolishment of local content policy will make car assemblers import parts from abroad.
6) Lack of human resources with enough knowledge and experience to produce automotive parts.

Problem Solving Method:

1) Cost reduction
2) Lay – offs
3) Rationalization of company structure to be flexible in management

Assistance Needs:

1) Reduction of import duty on raw material
2) Research and Development on production technology

3) Human resource development

Case 2:

Company Profile: Registered capital 200 million baht; 400 employees in 1995 and 600 in 1998. 11 years industry experience.

Products: Automotive Batteries, Motorcycle Batteries

Market: Domestic 30%, Export 70%

Problems Encountered:

1) The company is facing high costs as result of delaying VAT refund for export products
2) Currently, Battery is subjected to excise tax and delay in refund (if any)

Problem Solving Method:

No concrete method

Assistance Needs:

Reduction of government red tape in tax refund

Case 3:

Company Profile: Registered capital 250 million baht; 3,100 employees in 1995 and 1,600 in 1998. 40 years industry experience.

Products: Automotive body parts of cars and trucks, roofing, metal dies, jigs, springs, hydraulics, spare parts, dump trucks, trailers, and special vehicles

Market: Domestic and Export

Problems Encountered:

1) Liquidity and credit crunch
2) Source of credit supply to support company and production

3) High cost of production
4) High cost of funds (interest charge)
5) How to restructure or rationalize internal system to be ready for free local content policy

Problem Solving Method:

1) Cost reduction
2) New product launch in market
3) Expand new market both domestic and abroad
4) Increase capability of personnel
5) Development of product quality: ISO, QS

Assistance Needs:

1) Restructure of import tariffs, ranging from raw material and semi-intermediate products to finished products
2) Reengineering of government bureaucratic system to be faster and more efficient, to support private business in areas of regulation and financial as result of credit crunch

Case 4:

Company Profile: Registered capital (NA.), 450 employees in 1995 and 480 in 1998. (NA) years industry experience.

Products: PC boards

Market: Domestic and Export

Problems Encountered:

1) Product quality
2) Delivery
3) Workers lack discipline
4) Working environment is not appropriate

Problem Solving Method:

1) Upgrade to ISO 9002
2) QS 9000
3) Training and Development Schedule Plan

Assistance Needs:

None

Case 5:

Company Profile: Registered capital 570 million baht; 11,486 employees in 1995 and 10,309 in 1998. 36 years industry experience.

Products: Electrical wiring for automobiles, speedometers for automobiles, plastic spare parts, battery cables and internal automotive body electrical cables

Market: Domestic and Export

Problems Encountered:

1) Government policy and political stability
2) GSP issues may affect the market demand
3) High wages
4) Skill of workers

Problem Solving Method:

1) Introduce QS 9000 into work process

Assistance Needs:

1) Solid promotion of export

Case 6:

Company Profile: Registered capital 170 million baht; 550 employees in 1995 and 380 in 1998. 18 years industry experience.

Products: Ceramic cups used in electrical power distribution

Market: Domestic and Export

Problems Encountered:

1) Decreases in demand
2) High interest cost

Problem Solving Method:

1) Reduction of production and lay-offs
2) Need to find foreign counter-part

Assistance Needs:

N.A.

Case 7:

Company Profile: Registered capital 540 million baht; 500 employees in 1995 and 650 in 1998. 9 years industry experience.

Products: Telephone and cordless telephones, car radios, assembly of general electric circuit boards

Market: Domestic and Export

Problems Encountered:

1) High cost of funds (interest charges)
2) Reduction of sale and revenue
3) Credit crunch due to lack of circulating capital
4) Clients canceling orders more frequently

Problem Solving Method:

1) Change in role of core business from ‘Turnkey’ to subcontractor
2) Down sizing and partial lay-offs
3) Cost reduction and rationalization

Assistance Needs:

1) Interest cost reduction
2) Force financial institution to provide usual credit with fewer conditions

Case 8:

Company Profile: Registered capital 200 million baht; 430 employees in 1995 and 130 in 1998. 26 years industry experience.

Products: Parts for car air conditioners, parts for building air conditioners

Market: Domestic and Export

Problems Encountered:

1) Domestic demand decreases as car sales decrease
2) Down sizing of production
3) Company has higher fixed unit cost of production
4) Exchange loss due to devaluation in company loan
5) High interest costs and credit crunch

Problem Solving Method:

1) Try to export more
2) Cost reduction
3) Reschedule short-term debts to long-term debts

Assistance Needs:

1) Find export market for product
2) Find source of investment funds

Case 9:

Company Profile: Registered capital 420 million baht; 230 employees in 1995 and 1,899 in 1998. 11 years industry experience.

Products: Floppy disk drives

Market: 100% Export

Problems Encountered:

1) Product price decrease in every quarter
2) Rapid change of technology, high risk in stocking of raw material and capital investment in new machinery
3) High labor costs even though labor supply is in excess of demand
4) Too many competitors
5) Import tariff is unfair and not systematic
6) Lack of sufficient infrastructure

Problem Solving Method:

1) Reduction of raw material cost by negotiating to reduce price of spare parts and inventing new model that can reduce production costs
2) Rationalization of costs internally

Assistance Needs:

1) Giving privileges to companies that achieve ISO 9000, ISO 14000, since these companies help to reduce social and environmental costs
2) Giving privileges to companies that pay tax early or on time, etc., in order to motivate entrepreneurs to act rightly according to tax code or better than what tax code intends to achieve. Simply punishing tax evaders is not sufficient.

Case 10:

Company Profile: Registered capital 233 million baht; 500 employees in 1995 and 325 in 1998. 25years industry experience.

Products: Car radios, loud speakers, hand held radios, electronic parts

Market: 100% Domestic

Problem Encounter:

1) Sudden market demand shrinkage
2) Unstable exchange rate inducing high import cost of raw materials
3) High cost of funds in 1997-98

Problem Solving Method:

1) Reduction of production and lay-offs
2) Finding a foreign market for the products directly and indirectly
3) Cost reduction
4) Increase productivity and product quality

Assistance Needs:

1) Government should be a mediator in debt restructuring to make it fair and efficient
2) Stimulation of demand
3) Reduction of barriers to export, such as transport customs, and promotion

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