III. AUTOMOTIVE METAL PARTS

III. AUTOMOTIVE METAL PARTS

1. Overview of the Industry

1-1. Product Items

1-1-1. Product Definition

Since the range of automotive parts is diverse, the scope of products to be covered by this survey has been fixed as follows.

(1) Vehicles to be Covered

In Malaysia, no distinction is made between automotive parts and motorcycle parts; instead, both are placed under one category, "Auto Component Parts." In this survey, however, products are limited to automobile parts.

Automobiles are classified into passenger cars, commercial vehicles and others. The subject of this survey is limited to passenger cars and commercial vehicles. The latter category includes vans, pickups, 4WD vehicles, trucks and buses.

(2) Parts to be Covered

There is no clear-cut definition for "metal parts." In this survey, therefore, the following guidelines were employed.

- •Parts which use a substantial quantity of metal (e.g., finished seats) will be included in the survey.
- •Electrical equipment (e.g., generators) will not be included.

1-1-2. Promotion, Control and Protection of Domestic Production

There are no existing policy on local content program or on automotive parts to be localized. Domestic production of automotive parts, however, is encouraged through: 1) various tax incentives based on the Promotion of Investment Act, 1986; and 2) tariff protection based on customs regulations, customs orders, etc.

(1) Procurement of Raw Materials and Equipment

Importers of raw materials and components not produced domestically, as well as machinery and equipment not produced domestically and used directly for production, will have their import duties largely reduced or be totally exempted. Since dependence on imports for the above-mentioned items is very high with respect to metal parts, it can be concluded that these measures contribute greatly to the promotion of domestic automotive parts production. No opinion questioning these measures was heard at the firms interviewed during the interviews for this survey.

(2) Regulatory Measures

Under the Industrial Co-ordination Act, 1975 (ICA), parts manufacturers are required to obtain manufacturing licenses. The measure aims at the orderly development of the manufacturing industry. Conditions required for the firms to obtain manufacturing licenses have gradually been relaxed as shown below:

Year	Shareholders' Fund		Number of Full-time Employees
At inauguration of ICA, 1975	$250,000 or more	Or	25 or more
1985	$1 million or more		50 or more
1986	$2.5 million or more		75 or more

Firms with shareholders' fund and number of full time employees falling below the levels specified above are exempted from the manufacturing license requirement in order to simplify the procedures required for them to begin production.

(3) Control and Protective Measures

Imports of automotive parts are regulated under the Customs Act, 1967 and related regulations and orders such as the Customs (Prohibition of Imports) Order, 1988. Importers must obtain import licenses for CKD parts and pay import duties and other tariffs for specified automotive parts. Automakers import automotive parts not produced in the country as CKD for vehicle assembly. For example the import duty on CKD for passenger vehicles is 40%.

To encourage the development of the automotive parts industry, a system called the "Mandatory Deletion Program" has been in effect since 1980. Under this system, the items deleted through the established procedures are not allowed to be imported as the CKD parts.

1-1-3. Approved Items and Actual Production Items

(1) Local Parts Manufacturing Plan

The outline of the time-phased program to develop local manufacture of component parts is shown in the Industrial Master Plan. This program is not the enforcing plan but rather the indicative plan to show the future direction of the automotive parts industry. The schedule for the future is shown in Table V.1-1. Assembly of engines is planned for the 1990s.

(2) Approved Product Items

In conformity with the Promotion of Investment Act, 1986 and the Industrial Co-ordination Act, 1975, incentives and product items are approved to individual firms. The approved items are listed in the "Directory of Approved Auto Component Manufacturers, as at 31/8/87." The list includes parts requiring high technology, such as crankshafts, engines, transmissions and bodies. Crankshaft production was approved in 1986 for firms with foreign capital participation. Engines, transmissions, and bodies were approved in 1987 for the production by firms with 100% local capital. All the items shown in Table V. 1-1 are among the approved items.

(3) Items in Production

Only a few metal parts are currently produced, and none of these require advanced technologies. The parts now in production, and the parts which have been approved but not yet produced, as shown by the survey, are shown in Tables V.1-2 and V.1-3, respectively.

The Mandatory Deletion Program is not applied to all items in production. It is applied only after the requests from parts manufacturers. Currently 30 items, including some non-metal products, have been designated as Mandatory Deleted Components (see Table V.1-4).

Among the items which have not yet actually implemented domestic production, there are some which have only recently been approved and others of which production has been discontinued. The sharp recent drop in motor vehicle production is believed to be chiefly responsible for the failure of practical implementation of domestic parts production.

Table V.1-1 Indicative Local Parts Manufacturing Programme for PROTON

Parts		1987—1990	1990—1995
Body Parts	:	Body panels; bumper; radiator grill; window regulator; door handle, lock & hinges; other plastic & rubber parts such as rubber damper; plastic plug; dust covers.	Dashboard
Engine Parts	:	Beltings; pulley; electric cooling fan; engine mounting.	Assembly of engine incorporating local component such as spark plug, oil filter, fuel filter, piston, cylinder liner, gasket, timing chain, manifold, water pump oil pump, fule pump.
Drive, Transmission & Steering Parts	:	Pedals; gear shift lever; sub-assembly of steering system; tie rod end; sub-assembly of propeller shaft.	Clutch assembly incorporating local clutch disc & facing; gear box & rear axle sub-assembly incorporating crown wheel & pinion gear; front, drive shaft sub-assembly incorporating ring pin.
Brak & Suspension Parts	:	Disc pad; brake sub-assembly including local sourcing of drum, disc & lining; brake booster; parking brake lever; torsion bar & stabilizer; suspension arms.	Master brake cylinder sub-assembly; brake caliper; vacuum pump.
Electrical Parts	:	Sensor; electronic device/system for control, monitoring and display of operating & functional data; electronic ignition device; sub-assembly of head lamp, signal & indicator lamp; switches; ignition coil; distributor; cigar lighter; clock.	Complete manufacture of lamps; wiper arm & blade.
Trim & Internal upholstery and general parts	:	Trims; handrest & grip; mirror; warning triangle; tool set; rubber grommets, plastic plugs & clips.	Specialised bolt & nut, screws, clip & other fasteners.

Table V. 1-2 Automotive Metal Parts in Production

Engine Parts	: Air Filter	Air Filter Housing
	Cylinder Liner	Fuel Filter
	Fuel Tubing	Oil Filter
	Piston	Radiator
Transmission & Steering Parts	: Clutch Tubing	Clutch Disc
	Clutch Cover	Rack & Pinion
	Shackle Assy	Shackle Pin
	Shackle Bolt	Steering Linkage
	Tie Rod	Tie Rod End
	Wheel	Wheel Rim
	Wheel Stud	Wheel Bolt
	Wheel Nut	Wheel Weight Balance
	Wheel Cover	
Suspension & Brake Parts	: Air Receiver Tank	Air Receiver Housing
	Ball Joint	Brake Tubing
	Brake Disc	Brake Shoe
	Coil Spring	Leaf Spring
	Spring Pin	Spring Bush
	Shock Absorber	Suspension Shock Absorber
Body Parts	: Bodies-Truck	Bodies-Pick Up
	Bodies-Bus	Bodies-Van
	Bus Seat	Battery Holder
	Bracket	Body-Side Moulding
	Centre-Bolt	Cross-member
	Door Washer	Exhaust Pipe
	Exhaust-clamp U-bolt	Fuel Tank
	Grease Nipple	High Tensile Bolt
	High Tensile Nut	Muffler
	Muffler Hanger	Metal Bush
	Seat Complete	Spare Wheel Clamp
	Safety Belt Metal-parts	Steel Washer
	Spring Washer	U-bolt
	Sun Visor (Metal)	Bodies Passenger Car (only for proton)
Other Parts	: Electronic Horn	Spark Plug
	Screw Jack	

Source: Study Team estimate based on the field survey
MIDA

Table V.1-3 Automotive Metal Parts Whose Production Has Not Yet Been Started or Has Been Ceased after Being Produced Once

Engine Parts	:	Crank Shaft	Constant Velocity Assembly
		Engines for M.V. & Other Use	Engine Valve Spring
		Engine Oil Filler Cap	Engine Cooling Water Jacket Plug
		Piston Pin	
		Piston Ring	
		Radiator Cap	
Transmission & Steering Parts	:	Drive Shaft	Crown Wheel and Pinion Gear
		Hub Bolt	Gear Shift Assy
		King Pin	Hub Cap
		Pedal-Accelerator	Pedal-Brake
		Propeller-Shaft	Pedal-Clutch
		Rear Axle	Propeller Tube
		Spindle Knuckle	Spring Shackle
		Steering Lock Assy	Steering Column
		Steering Gear Housing	Steering Gear Syprocket
		Transmission	Transmission Gear Syprocket
			Wheel Disc
Suspension & Brake Parts	:	Brake-Drum	Brake-Hub
		Brake-Booster	Brake-Master Cylinder
		Brake-Caliper	Connecting Arm
		Hand Brake Lever	Hand Brake Bracket
		Parking Brake Assy	Suspension Connecting Rod
		Stabilizer Bar	Suspension-Front
		Suspention-Rear	Torsion Bar
Body Parts	:	Body Stamping Parts (except PROTON's)	Bonnet Prop
		Chassis	Door-Lock
		Door-Latch	Lock for Trunk
		Door-Handle	Lock Nut
		Lock Cylinder Key	Lock for Hood Lid
		L-bolt	Seat Slide
		Lock for Seat	Window Latch
		Trunk Hinge	
		Window Regulator	
Other Parts	:	Bearing Ring	LPG Conversion Kit

Source: Field interview survey
MIDA

Table V.1-4: Items whose Imports as CKD are Prohibited

Items	Passenger cars	Commercial vehicles
1. Air Filter	o	o
2. Brake/clutch/fuel tubing	o	—
3. Coil spring	o	o
4. Electric Horn	o	o
5. Exhaust muffler	o	o
6. External body protective moulding	o	o
7. Fuel tank	o	o
8. Leaf spring	—	o
9. Radiator	o	o
10. Seat Assembly	o	o
11. Shock absorber	o	—
12. Suspension shock absorber	—	o
13. U-bolt, spring pin & shackle pin	—	o
14. Wheel nut & stud	o	o
15. Alternator & regulator	o	o
16. Battery	o	o
17. Carpet and underlay	o	—
18. Flasher relay unit	o	o
19. Melt damping sheet	o	—
20. Paints	o	o
21. Radiator hose	o	o
22. Safety glass	o	o
23. Safety seat belt	o	o
24. Seat padding	o	o
25. Starter motor	o	o
26. Tube valve & tubeless type valve	o	o
27. Types and Tubes	o	o
28. Windshield washer motor	o	o
29. Wiper motor	o	o
30. Wiring harness	o	o

Note: As of December 31, 1987.
o ; to be prohibited
—; none to be prohibited
Source: MIDA

1-2. Production Trends

1-2-1. Automobile Production Trends

Automobile production is reviewed here because the production of automotive parts for OEM depends largely on automobile production trends.

(1) Production Volume

Automobile production statistics show that the number of vehicles produced has declined yearly after peaking in 1984 (see Table V.1-5). Production fell by almost 50% in 1986, followed by a further drop below the 50,000-unit mark in 1987.

Table V. 1-5: Changes in the Number of Automobiles Produced

Calendar year	Passenger cars (units) a)	Commercial vehicles (units) a)	Total (units) a)
1983	100,201 (100)	18,240 (100)	118,441 (100)
1984	96,261 (96)	28,555 (157)	124,186 (105)
1985	69,769 (70)	42,054 (231)	111,823 (94)
1986	42,015 (42)	19,821 (109)	61,836 (52)
1987	33,685 (34)	15,305 (84)	48,990 (41)

Note: a) indicates an index taking 1983 as 100.
Source: MIDA; reports on monthly production achievement of assemblers.

The Industrial Master Plan had forecasted annual increases in automobile production from 1985. A quick glance, however, indicates a large discrepancy between the forecast and actual results starting in 1986, as shown in Tables V.1-6 and V.1-7.

Approval of component production continues, but actual production is expected to depend on a recovery in automobile production.

Table V.1-6: Comparison of Forecast with Actual Results in Passenger Car Production

Calendar year	Results (units)	Forecast (units)	Results/Forecast
1985	69,769	107,010	65%
1986	42,015	115,280	36%
1987	33,685	124,260	27%

Source: MIDA

Table V.1-7: Comparison of Forecast with Actual Results in Commercial Vehicle Production

Calendar year	Results (units)	Forecast (units)	Results/Forecast
1985	42,054	31,950	132%
1986	19,812	35,630	56%
1987	15,305	39,690	39%

Source: MIDA

(2) Production Status by Firm

Currently, there are 12 automobile assembly plant (including PROTON), of which two have ceased production and 10 continue to operate. Of the 10 firms, two produce commercial vehicles.

The particularly sharp drop in passenger car production after peaking in 1983 is more prominent when broken down by firms, as shown in Table V.1-8. Although production of the PROTON SAGA national car began in 1985, only 33,685 passenger cars were produced in 1987, of which the PROTON SAGA accounted for all but 9,503. Seven firms were responsible for the production of these remaining units, averaging 1,358 vehicles a year per assembly plant.

13 foreign automakers, including Toyota and Ford, supplied the CKD parts for assembly of the 9,503 units. 31 vehicle models, including the Corolla and Telstar, were assembled with the supplied CKD. On average, therefore, each foreign automaker produced 731 units, and 307 units of each vehicle model were assembled.

Specifications of automotive parts normally differ in accordance with vehicle models. Volumes of specific parts for vehicles other than the PROTON were remarkably small.

Table V.1-8: Number of Passenger Car Production by Firms

Firm	1983	1987	87/83
Proton	0 (units)	24,182 (units)	—
Others	100,201	9,503	9.5%
Total	100,201	33,685	33.6%

Source: MIDA

1-2-2. Trends in Automotive Metal Parts Production

(1) Production

Statistics reveal that the value of automotive parts production has steadily risen from 1981 to 1985, as shown in Table V.1-9. The figures for metal parts alone indicate a similar trend.

Automotive parts production has increased despite the drop in automobile production. The increase is believed to have come from increased demand in the replacement market, including exports and parts installation rate for new vehicles.

Table V.1-9: Actual Value of Automotive Parts Production a)

(Unit: M$1,000)

Calendar year	Total production value b)	Metal parts alone c)
1981	98,948	46,781
1982	106,486	52,753
1983	147,092	66,315
1984	151,356	86,984
1985	178,326	92,553

Note: a) Peninsular Malaysia alone. In and after 1983, only firms with no less than 30 employees.
b) Including all product codes of MIC code 38439.
c) Including the following product codes out of MIC code 38439.
02-15, 17-19, 24-27, 30, 31, 33, 35, 36 and 43-45.

Source: Bureau of Statistics (Figures after 1985 not published yet.)

(2) Current Production Status

Parts manufacturers are experiencing difficulties. Seen from several viewpoints, the situation is as follows:

1) The parts manufacturers interviewed during this survey uniformly raised the question of declining automobile production. They probably have the capacity to raise operation rates. Some manufacturers said that, given the current situation, investment for automation aimed at improving efficiency seems to be out of the question, let alone new plant and equipment investment for upgrading of production facilities.

2) Production of new parts requires metal dies, moulds and other tools. The tools would be necessary even if existing facilities are fairly complete. Such expenses are extremely high when viewed in light of the limited production volume. Many parts manufacturers complained that the costs involved in commencing production of new parts are prohibitive. A similar problem arises with existing parts when automakers revise their models. Many parts manufacturers pointed out the difficulties caused by an excess of vehicle models and frequent model changes.

3) Metal materials for the parts are mostly imported from Japan. Because of the appreciation of the yen, suppliers of the materials have requested price increases. The requests are said to have been repeated every two or three months, thus exerting pressure upon the management at parts manufacturers.

4) According to the earlier-mentioned "Directory," 156 metal parts licenses have been approved, of which 35 after January 1, 1986. Of the 121 cases approved by the end of 1985, 60 have been implemented. In other words, 50% of the licenses approved more than two years ago have not yet been implemented. Since many items not yet produced include those already under production by other manufacturers, it can be concluded that low demand is mainly responsible for the failure to start production.

5) The 156 licenses were granted to 135 firms. However, only 57 of the firms are operating, due mainly to the reasons stated above. Notable is the fact that licenses for production of each of the earlier-mentioned items requiring high technology (such as engines and transmissions) have been granted exclusively to one manufacturer. It is expected that, in the future, major parts will tend to be produced by a few, large firms.

1-3. Import and Export Trends

1-3-1. General Status

Naturally enough, imports exceed exports in the balance of trade for automotive parts, as is shown in Table V.1-10. Exports remain at a level ranging from 0.72% to 2.55% of imports (including CKD parts). Automotive parts accounted for only 0.035% of Malaysia's total exports in 1987. Trade statistics for metal parts alone were not available.

Table V.1-10: Exports and Imports of Automotive Parts Inclusive of CKD Parts

(Unit: M$1,000)

Calendar year	Exports (FOB)	Imports (CIF)	Exports/Imports
1981	8,800	1,214,134	0.72%
1982	12,681	928,648	1.37%
1983	15,741	1,159,441	1.36%
1984	10,238	1,191,217	0.86%
1985	8,968	1,064,556	0.84%
1986	8,447	633,187	1.33%
1987	15,841	622,307	2.55%

Note: SITC (Rev.2) code numbers (781-010, 781-031, 782-120, 783-110, 784)
Source: Malaysia Annual Statistics of External Trade, etc.

1-3-2. Imports

A breakdown of the imports in Table V.1-10 for the last three years is shown in Table V.1-11.

The decline in demand for CKD parts is of the same nature as the decrease in automobile production. In 1987, 87% of the CKD imports originated in Japan. There are two types of parts production: 1) processing from original raw materials; and 2) assembly of components (e.g., shock absorbers). In the latter case, many components are imported. The components are included in the "other parts" category of Table V.1-11. About 55% come from Japan, with another 19% originating in West Germany. Currently, automotive parts assembled from imported components are regarded as domestically-produced parts. The expansion of domestic component production has yet to be tackled.

Table V.1-11: **Breakdown of Automotive Parts Imports**

(Unit: M$1,000)

Calendar year	CKD parts	Other parts	Total
1985	895,341	169,215	1,064,556
1986	484,263	148,924	663,187
1987	445,514	176,793	622,307

Source: Malaysia Annual Statistics of External Trade, etc.

In terms of raw material imports, most metal materials come from Japan. Without domestic production, Malaysian firms must depend on imports for their supply of sheet steel and seamless steel pipes. Steel bars are also imported from Japan. It is said that Japanese steel bars are used because those made in other countries suffer from more defects while being cold forged. Parts manufacturers are importing raw materials of similar quality.

As one of the measures for the development of the domestic automobile industry, imports of CBU passenger cars have been controlled through high import duties and quotas. The import duty is fixed at 140% - 300%, and the vehicle import quota is set at 10% of the demand in the preceding year. As shown in Table V.1-12, while new car imports during the last three years have dropped sharply, used car imports have increased, thus indicating the strength of demand. Of all new car imports, 70% came from Japan and 20% from West Germany. 90% of imported used cars came from Japan and 5% from West Germany. New and used-car import trends have not changed significantly during the last three years.

Table V.1-12: **Imports of CBU Passenger Cars**

Calendar year	New cars (units)	Used cars (units)	Total (units)
1985	2,528	6,117	8,645
1986	303	3,714	4,017
1987	158	6,616	6,775

Source: Malaysia Annual Statistics of External Trade, etc.

1-3-3. Exports

A breakdown of the exports in Table V.1-10 for the last three years is shown in Table V.1-13

CKD parts in 1987 include those shipped to Indon sia (used in the assembly of 96 passenger cars) and to Singapore (used in the assembly of two). The largest portion of the "other parts" category goes to Singapore, followed by Japan and Thailand. In 1987, these three countries accounted for 80% of all exports. Statistics classified according to part are not available, but it is clearY that parts such as mufflers are exported to the replacement market abroad.

Table V.1-13: Breakdown of Automotive Parts Exports

(Unit: M$1,000)

Calendar year	CKD parts	Other parts	Total
1985	23	8,945	8,968
1986	5	8,442	8,447
1987	1,620	14,221	15,841

Source: Malaysia Annual Statistics of External Trade, etc.

Taking imports of "other parts" as 100, exports in 1987 were an insignificant 8%. The interviews suggested that, first, products of high quality should be manufactured, and then gradual increases in production and reductions in cost through economies of scale should be made. As for the OEM (original equipment market), however, a parts-supply system has already been established. In these interviews, Japanese parts manufacturers were requested to show more interest in the product market as well as to provide technological assistance.

In order for the automotive parts market to expand, domestic automobile production will have to increase. The PROTON SAGA, of which production began in 1985, is intended not only for the domestic market but also for export. The United States and the United Kingdom are the main destinations. Past exports of passenger cars are shown in Table V.1-14. New CBU car exports have increased dramatically since 1986. Of the new car exports in 1986, 271 units went to Japan and 180 to Singapore. In 1987, 395 units went to Brunei, 216 to Japan, 182 to New Zealand, and 55 to Singapore. On the other hand, used car exports are intended primarily for Australia.

Table V.1-14: Exports of CBU Passenger Cars

(Unit: A vehicle)

Calendar year	New cars	Used cars	Total
1985	27	144	171
1986	491	108	599
1987	925	182	1,107

Source: Malaysia Annual Statistics of External Trade, etc.

1-4. Industry Structure

1-4-1. Assembly Plants

As stated earlier, 10 assembly plants are currently operating. The first of them was established in 1965. PROTON was set up under the national car project in May 1983 and commenced operation in July 1985. Classified by location, seven firms are located around Kuala Lumpur, one in the southern part of the country, one along the eastern coast of the peninsula, and still another in East Malaysia. The firm in East Malaysia produces only commercial vehicles. Some changes of vehicle models to be assembled have taken place among the assembly plants from 1986 to 1987. The changes may be due to the decline in automobile production and have some relation to body painting technology. The survey did not reveal any future plan relative to such changes in the production structure. It is recognised, however, that there are too many assemblers for the number of vehicles produced. The Industrial Master Plan sets forth the idea of integrating the industry into three firms. Rationalization and restructuring will be the largest problems facing the automobile industry in the future.

1-4-2. Parts Manufacturers

(1) General Company Status

As of August 31, 1987, 135 automotive metal parts manufacturers had obtained approval to operate, and 57 of them were in operation. About 65% of the factories belonging to the operating parts manufacturers are located around Kuala Lumpur, where the automakers are concentrated. Some parts manufacturers are located in the north, where no automakers exist. The whole situation cannot be grasped because data such as the time of establishment of individual firms and their number of employees is still incomplete. It was observed in the survey, however, that the major firms vizited generally employed no more than 100 people and that many had started their operation since 1980. This is believed to be true of most firms.

Seen from the viewpoint of cooperative relations with foreign firms, parts manufacturers having no joint venture or technological tieup with foreign counterparts to produce single-body parts such as fuel tanks, bolts and nuts, and pistons for replacement. Assembled parts are produced using imported components with the cooperation of foreign firms, most of which are Japanese.

(2) Transactions

Parts production licenses are given so as not to allow any one firm to monopolize supply of an item. Due to the small volume of production, however, the number of firms producing the same item is limited, most often ranging from one to three. At present, 10 automobile assemblers, including PROTON, are operating. Parts manufacturers, therefore, deliver their products to two or more assemblers. For example, some component manufacturers supply shock absorbers to all but Toyota vehicle assemblers, while others deliver radiators to all but Nissan vehicle assemblers. Although there are some parts manufacturers such as those given in the examples above that avoid transactions outside their affiliations, transactions in general are carried out multilaterally. Between assemblers and parts manufacturers there are no strong group ties. During the survey one assembler remarked, "We refrain from interfering in the affairs of parts manufacturers, even to suggest the correction of defects in their products, because they deliver these products to many assemblers." Creating a system allowing smooth technological guidance under such an environment may be difficult.

One of the benefits of the subcontracting structure is that any firm processing simple parts can receive orders from companies in different industries and raise its operation rate. During the survey, an automotive parts manufacturer was found to be placing orders for press-moulded and press-punched parts with an electric machinery parts processor. Currently, however, there are few such cases. In the case of press working, lack of skill in metal die technology was pointed out. Improving quality and increasing the number of transactions between subcontractors in different industries are expected to lead to the strengthening of the automotive parts industry.

(3) Industrial Groups

One group of parts manufacturers is the Malaysian Automotive Component Parts Manufacturers Association (MACPMA). As of June 15, 1987, the association had 48 member firms. Except for a few motorcycle parts makers, most are automobile component manufacturers. The member firms can be said to comprise the backbone of the industry. MACPMA has six concrete objectives for its activities, aiming generally at expansion of the market for parts manufacturers.

Major groups of related industries include the Malaysian Motor Vehicles Assemblers Association (MMVAA) and the Malaysian Motor Traders Association (MMTA).

2. Actual Production State

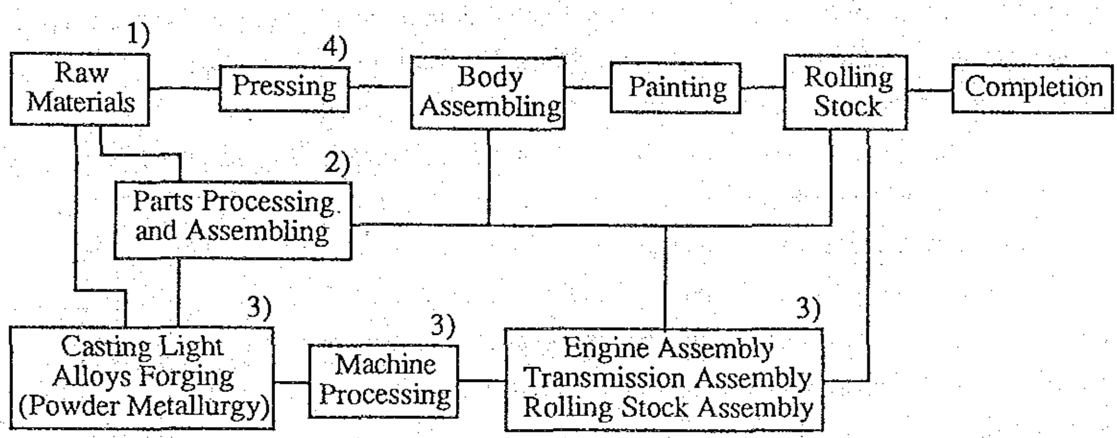
2-1. Manufacturing Process and Specifications

2-1-1. Manufacturing Process

(1) Parts Manufacturers

The manufacturing process in general is shown in Fig. V.2-1.

Fig. V. 2-1 Automobile Manufacturing Process



The following is a general outline of the metal parts manufacturing process in Malaysia.

The raw materials seen in 1) in Fig. V.2-1 are almost all imported from foreign countries such as Japan. The parts shown in 2) can be manufactured with relatively little technical know-how. The parts indicated in 3) are imported at present, although there are plans to initiate production. The car body pressing in 4) is done by PROTON for the PROTON SAGA only. The parts makers in 2) in Fig. V.2-1 were the main targets of the survey. The companies visited are shown in Table V.2-1.

Table V.2-1 Parts Manufacturers Visited During the Survey

	Firm name	Relationship with foreign firms	Major items of products	Remarks
1	United Industries Sdn. Bhd.		Mufflers, exhaust pipes	Has facilities for welding pipes.
2	United Filter Sdn. Bhd.		Oil filters, air filters, air receiver housings	Equipped with small-sized hydraulic presses.
3	United Vehicles Industries Sdn. Bhd.		Fuel tanks, screw jacks, cross members	Equipped with 1500T, 1000T and 500T presses.
4	United Sanoh Industries Sdn. Bhd.	Joint venture	Brake tubes, fuel tubes	
5	United Tools & Dies Sdn. Bhd.			Manufactures jigs and tools for use by the above-stated firms.
6	Nippondenso Capital Sdn. Bhd.	Joint venture	Receiver hoses, evaporators, condensers, compressors	
7	Nippondenso (M) Sdn. Bhd.	Joint venture	Starter motors, regulators, alternators, radiators, windshield wipers	
8	Auto Parts Manufacturers Co. Sdn. Bhd.	Technological tie-up	Leaf springs, shock absorbers	Equipped with hydraulic presses, heat treatment furnaces, load testers.
9	Auto Coil Spring Sdn. Bhd.	Technological tie-up	Coil springs	
10	Kilang Alatganti Bangi Sdn. Bhd.	Technological tie-up	Body side mouldings	Equipped with roll moulders.
11	Sanden International (M) Sdn. Bhd.	Joint venture	Compressors for car air-conditioners, clutches for compressors	QC circles in practice
12	Car Seats (M) Sdn. Bhd.	Joint venture	Seats complete	Removal of factory planned.
13	Oriental Metal Industries (M) Sdn. Bhd.	Joint venture	Wheels	Produced for Proton alone.
14	AAE-ZF Steerings Sdn. Bhd.	Joint venture	Steering gears, lacks and pinions	
15	AAE-TRW Components Sdn. Bhd.	Joint venture	Tie-rod ends	
16	GMPE Sdn. Bhd.			Design and manufacture of tools for AAE firms.
17	NGK Spart Plugs (M) Bhd.	Joint venture	Spark plugs	Equipped with plating facilities, QC circles in practice.
18	Oriental Showa Sdn. Bhd.	Joint venture	Shock absorbers	
19	ISUMI (M) Sdn. Bhd.	Joint venture	Pistons, cylinder liners	
20	Belton Sdn. Bhd.		Wheel studs, wheel nuts, U bolts, shackle ass'y	Equipped with cold forging and heat treatment facilities.
21	Yodoshi Malleable (M) Sdn. Bhd.	Joint venture	Brackets for compressors	Equipped with continuous production line of cast iron for small-sized products.

Note: The following five automobile firms were visited.
1. Perusahaan Otomobil Nasional Sdn. Bhd.
2. Associated Motor Industries Malaysia Sdn. Bhd.
3. Asian Automobile Industries $dn. Bhd.
4. Assembly Services Sdn. Bhd.
5. Oriental Assemblers Sdn. Bhd.

(2) Special Features of the Manufacturing Processes at Parts Manufacturers

1) In the case of manufacturers which are joint ventures or which receive technical assistance, the selection of equipment for parts manufacturing is carried out by the foreign counterpart. In the manufacturing process, investigation processes are carefully incorporated to guarantee quality. During visits for the present survey, measurement and maintenance data were collected and analysed. In the manufacturing process, equipment was installed to confirm the functioning of the parts, and tests were carried out on each individual part. Standards in manufacturing work are posted through all steps in the process, and work is carried out in accordance with those standards. In some cases the name of the cooperating foreign counterpart was left on the drawing. When necessary, diagrams were fully utilized.

In the case of manufacturers with only local capital, manufacturing processes are set up based on technologies obtained by traveling abroad for training or through the use of technological knowledge obtained from equipment makers. For this reason, local capital enterprises do not always have satisfactory quality control systems in the manufacturing process.

2) In the industrialized nations, one of the most important matters when the manufacturing process is organized is how to minimize the number of workers. The enterprises visited in this survey, in contrast, all employed a large number of workers. According to an evaluation made by one Japanese-affiliated component manufacturer, productivity in Japan is three times higher than in Malaysia. This is due to the fact that each piece of equipment is operated by one worker, unlike in Japan, where one worker may operate a number of machines (the multi-machine responsibility method) or handle a number of processes (the multi-process responsibility method). Another cause is the low degree of automation, with manual operation being the general rule. Furthermore, transport is often carried out by hand due to inadequate assembly lines.

3) The handling of raw materials and finished products in the parts production process varies remarkably from company to company. At joint ventures and manufacturers with technology cooperation agreements, technical guidance is being carried out even in such areas as product maintenance. At companies with only local capital, there were often no qualms about mixing half-finished products and scrap during the manufacturing process. Since the handling of products plays an important role in quality control and production efficiency, guidance in this area is considered necessary by cooperating enterprises. When such a control system is developed, it becomes possible to

raise the level of control methodology for materials in process during the manufacturing process. Production methods appropriate to small volume production can also be introduced. Such production control should be oriented as a basic principle to large-variety, small-volume production.

2-1-2. Specifications

(1) Automobile Specifications

There are many restrictions on automobile production. For example, when exporting automobiles each country has different criteria for specifications in areas such as exhaust gas emission control and safety requirements. Exports must comply with these specifications. For this reason, each automobile maker promotes its own research. At the same time, it must make decisions on such matters as the structure, shape, thickness, and material quality of components in order to reduce manufacturing costs. Basically, the same can be said of production for the domestic market. In order to protect the reputation of its own vehicles, an automobile maker cannot lower the quality in specifications for basic functions such as driveability and safety. The necessity of maintaining cost competitiveness in the domestic market is equally important in the case of exports. Naturally, these specifications influence parts specifications as well.

(2) Parts Specifications

Since each automobile maker has its own set of specifications, parts manufacturers must work in accordance with different specifications, and it is difficult to cope with the many different automobile models and the low volume of production. In the case of the fuel tank, for example, the sheet metal used for the body ranges from 0.80 mm to 0.75 mm thick depending upon the automobile maker. This not only complicates the procedures for purchasing materials and inventory management but also means that it is necessary to keep a supply of each different thickness in stock. This increases the burden on management. A difference in thickness of only 0.05 mm is very significant from the standpoint of automobile specifications, and the fuel tank is an important part for safety maintenance. Thus, thorough consideration is given by the automobile makers to the tank's design in order to improve durability and reduce weight.

From the standpoint of the parts maker, the question of why standardization cannot be carried out has arisen. In the present situation, in which each new model is an attempt at improvement over a predecessor, it is difficult to come up with specifications common to all makers.

On the other hand, there are components for which specifications can be standardized. Standardized specifications are applied to items not normally considered automobile parts, such as nuts and bolts. Also included in this category are those parts having a function of their own, such as batteries and lamps. At the same time, parts test methodologies are also standardized.

However, these items make up only a very small percentage of automobile components, making it difficult to raise production efficiency. The same situation prevails among domestic automobile makers in Japan, and the problem of standardization has been under serious consideration for some time.

2-2. Technology Standards

2-2-1. Production Engineering

After receipt of design drawings for the products to be made, the production engineering is carried out according to such basic conditions as price, production volume and existing equipment. Production processes are established, equipment selected, and tools designed. Prototypes are then made and mass-production tests are carried out. The term "Production Engineering" encompasses all these activities.

(1) Current Production Engineering Status

The present survey revealed that production engineering perfected by foreign enterprises has been introduced to those parts makers participating in joint ventures or technology provision agreements. Thus, technicians from local work together with foreign technicians to make prototypes. In this manner, local technicians can receive necessary technological training. Among local parts makers, there are some who find it impossible to respond .to changes in automobile design without assistance from cooperating enterprises. It can be said that the level of engineering at those parts makers which do not enjoy such relationships are much lower.

(2) Cost Estimates

During visits for the present survey, it was found that it is impossible for parts makers to draw up total cost estimates because cost breakdowns lack detail. This phenomenon can be viewed as resulting from a lack of such basic concepts as efficiency and yield rate in terms of individual parts and individual manufacturing processes. In other words, standards of management control in the manufacturing processes are insufficient.

In the case of Japanese parts makers, it is a common practice to present written estimates with analyzed details such as processing costs, materials costs, equipment preparation costs, and labor costs. Negotiations based upon such detailed estimates are then carried out. This indicates that they have attained sufficient standards of quality and cost control.

(3) The Case of South Korea

In South Korea, local parts makers are generally capable of meeting orders for the production of press-processed parts. Given product design drawings and necessary advice concerning the shape and precision of parts, many local parts makers have sufficient production engineering processing plans and metal die and mould designs, and can produce high-quality products and prototypes.

As explained above, production engineering consists of many types of technology. South Korean enterprises are making efforts to absorb those technologies and increase their abilities. To take a certain South Korean automobile maker as an example, when the company sends its people to Japan for technological training at the Japanese automobile maker with which it has technological cooperation, it requires its employees to take a Japanese language test, and the employees are not allowed to visit Japan until they have achieved a set level of proficiency. Due to such requirements, most of the technicians who come to Japan for training can speak Japanese and are able to master even high-level technologies very quickly.

2-2-2. Manufacturing Technology

(1) An Outline of Manufacturing Technology

The following is a list of the types of technology necessary for the production of metal parts: casting technology; forging technology; processing technologies such as cutting and bending; heat treatment technology; and quality inspection. There are other necessary techniques in the selection of raw materials, plating and soldering.

These various technologies are utilized in accordance with the different types of parts. But at present, technologies such as hot forging, precision machine processing, and the various tests have not yet been introduced. Thus, parts that require these technologies are not being made. Also, testing is generally carried out by either the cooperating parts makers or the automobile makers. Only a few companies have equipment for testing the life expectancy of their parts.

(2) Manufacturing Technology Today

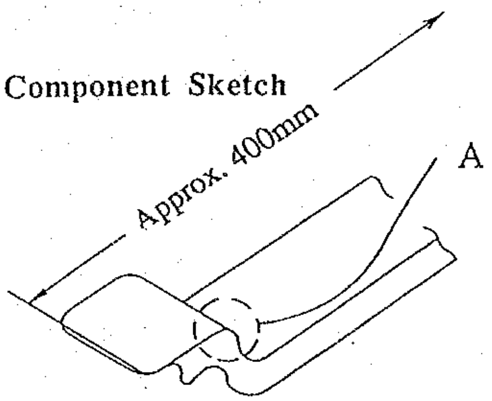
Evaluation of parts manufacturing technology is conducted by automobile makers who decide whether or not to use the parts. Parts makers who make assembly parts evaluate the components of parts in terms of whether or not they can use them. The following standards for individual technologies are viewed from the points of these evaluations and the results of survey visits to the factories of the companies in question.

1) Processing technology

The success or failure of pressing processes depends upon metal mould technology. Considering the fact that PROTON is already producing its own body parts, it can be said that a satisfactory level of domestic production has been reached, but many areas remain in which conditions are unsatisfactory. Some local capital enterprises do not have sufficient design technology to produce the metal dies and moulds necessary for production. In one case a joint venture enterprise ordered the pressed parts seen in Fig. V.2-2 from a local parts maker. The parts maker used metal dies and moulds and produced a prototype, but in the A-part wrinkles and cracks appeared which were impossible to repair satisfactorily even after repeated attempts. Due to scheduling problems, the enterprise which had placed the order was forced to order the moulds from the metal mould department of an electric appliance maker. The parts in question required only folding and bending. Such parts could easily be produced in Japan. In the processing of cup-shaped items, some products were heavily scored. In the case of machine processing, there are very few makers capable of processing brackets, which require processing simultaneous to different portions. In the case of hole-drilling processing, it was found some firms were unable to finish the products in accordance with design tolerances, and there were often significant variations in the finished product.

Thus, it can be seen that basic technical problems being solved by joint ventures and firms with technology provision agreements remain unsolved among those enterprises operating solely on local capital.

Fig. V.2-2 Rough Component Sketch



Radiator Bracket (thickness=0.8mm)

2) Casting Technology

There is a long history of iron casting technology. However, there was no development of large casting technology or precision casting technology until it became necessary for the promotion of the automobile industry. The metal dies and moulds used by PROTON to form body parts are large, and success has been achieved in the production of large mould prototypes weighing about three tons. In the casting of nonferrous metals, pistons were produced with aluminum alloys. However, gravity die casting remains the norm, and no injection molding is conducted. Due to a lack of gas extrusion technology, compressor covers that require an airtight seal are not produced domestically. Also, while there are plans to initiate production of aluminum wheels, these have yet to become a reality. However, hubs for bicycles are already being produced by injection, and it appears that the avoidance of this technology is due more to cost considerations than to technological problems.

3) Forging Technology

As mentioned earlier, hot forging cannot be observed In forging, the most important technical point is the way in which the metal mould is made. At present, these metal dies are all imported, and,complicated shapes are not being made. They have not yet reached the standard of shapes requiring no processing, which should be the aim of cold forging. Since the former is also used in mass production, actual production by moulds with complicated shapes should be backed up by an increase in production volume.

2-3. Technological Development and Improvement

The present production volume of parts is at a low level; there are some parts makers who do not take a positive attitude with respect to production, and the history of production is not long. Because of these problems, technological standards are also quite low. Without an increase in these standards, it will be difficult to develop domestic production of parts.

The following are two possible methods of raising technological standards:

1) Acquisition of basic technology; and

2) Daily efforts to accumulate technology.

Active progress is already being made in this direction through technological transfer in joint ventures and technological cooperation with foreign enterprises. This is an important topic for the future.

However, the acquisition of technology requires a great deal of time and effort, and it is necessary to strive constantly to absorb new technology little-by-little. It is also necessary to educate technicians in a good program and work constantly to raise technological standards. In other words, a program of personnel development is necessary. Finally, it is necessary to improve upon technology already obtained. In order to achieve these goals, the utmost efforts are required at each enterprise.

A review of the parts not being produced domestically is needed to discover what technology is necessary to accomplish this. Examples of such parts are given in Tables V.2-2 to V.2-5.

Table V.2-2 deals with engine parts, and Table V.2-3 with transmission parts. As can be seen from the Tables, these parts require precision not only in cutting and polishing but also in the measurements made after the completion of processing. A large variety of other technologies is also necessary, together with new materials and equipment.

Tables V.2-4 and V.2-5 are concerned with body parts. Parts for car bodies are at present being made only by PROTON. Table V.2-4 indicates the structure of automobile body components, but the parts shown at the bottom of the figure can be produced with the pressing technology indicated in Table V.2-5. As indicated in Table V.2-5, soldering technology will become important in the assembly process for car body parts. Thus, different technologies are required to meet changing product production units.

In order to promote domestic production of automotive metal parts, various technologies will be indispensable.

Table V.2-2 Essential Conditions for Parts Manufacturing (Engine Parts)

Item	Processing standards: Big group	Middle group	Small group	Relevant parts (Representative)	Number of parts (per unit)	Main materials	Main facilities	Required technology
Materials	Casting	Ferrous	Big articles	Crankshafts Cylinder blocks	2	Spherical graphite cast iron (FCD65F) Special cast iron (FCH1)	Teeming lines, automatic gate cutting machines, shell molding machines (main mold, core mold), black electrostatic coating lines	Casting technology, molten metal control technology, core center thickness control technology.
			Medium and small articles	Flywheels Exhaust manifolds	9	Special cast iron (FCH1) Spherical graphite cast iron (FCD45F)	Greensand mold AMF molding machines, teeming lines, shot blasts, leaks, shell molding machines (main mold, core mold)	Casting technology, molten metal control technology, core center thickness control technology.
		Nonferrous	Big articles	Cylinder heads Cylinder head covers	2	AC4B ADC10	Low pressure casting machines, core molding machines, sand taking-out devices, gate cutting machines, T-6 furnaces, 800-ton die casting machines.	Low pressure casting, metal mold designing, core manufacturing, heat treatment and die casting technologies, product inspection.
			Medium and small articles	Inlet manifolds Pistons	8	AC2B AC8A ADC10	APS molding lines, sand treatment facilities, core molding machines (shell mold), tilt-type all-mold casting machines, gate cutting machines, T-6 furnaces, 500-ton die casting machines.	Molten metal control, sand treatment, core molding (shell mold die casting) and casting technologies, metal mold design.
	Hot forging		Medium articles					
			Small articles	Connecting rods	4	S43C-V	Press lines	Untempered steel control technology.
	Cold forging	Ferrous	Medium articles	Cylinder head cap bolts	71	SCM435	Headers, rolling machines	Material selection, process design, metal mold design.
			Small articles	Oil pan bolts Valve seat spring upper lifters		SCR430, S45C, S25C SCR430	Headers, rolling machines	Material selection, process design, metal mold design.
		Nonferrous		Blind plugs	1	Aluminum	Headers	Material selection, process design, metal mold design.
	Powder		General parts	Rocker shaft caps	5	I-2-IC	Presses, sintering furnaces	Metal mold design.
			Precision parts	Timing belt pulleys	1	I-2-IB	Presses, sintering furnaces	Metal mold design.

(Engine parts)

Item	Processing standards: Big group	Middle group	Small group	Relevant parts (Representative)	Number of parts (per unit)	Main materials	Main facilities	Required technology
Simple parts	Cutting and grinding	Casting Ferrous	Big articles General					
			Precision	Cylinder blocks Crankshafts	2	Special cast iron Spherical graphite cast iron	Vertical and plain milling machines, M/Cs special machines (drilling and tapping), honing, crankshaft lathes, pin grinding machines, vapor laps, balancers	Milling technology, honing technology, turning and grinding technology, measuring technology.
			Medium and small articles General	Exhaust manifolds	3	Spherical graphite cast iron	NC milling machines, vertical and plain milling machines, multiple spindle drilling machines, tapping machines	Milling technology, drilling technology
			Precision	Flywheels Camshafts	6	Special cast iron	NC lathes, single function machines, multiple spindle drilling machines, heat treatment measuring instruments, cam lathes, screw cutting lathes, cam grinding machines, balansers	Turning technology, drilling technology, heat treatment technology, grinding technology, measuring technology.
		Nonferrous	Big articles General	Cylinder head covers	1	ADC10	Vertical and plain milling machines, multiple spindle drilling machines, tapping machines	Milling technology, drilling technology.
			Precision	Cylinder heads	1	AC4B	Two-headed vertical-plain milling machines, multiple spindle drilling machines, heat treatment furnaces, special machines (drilling, tapping, boring), shrink fitting machines	Milling technology, drilling technology, measuring technology, turning technology, heat treatment technology.
			Medium and small articles General	Inlet manifolds Timing case covers	4	AC2B ADC10	Vertical and plain milling machines, multiple spindle drilling machines, tapping machines	Milling technology, drilling technology.
			Precision	Pistons, Rocker arms	4	AC8A	NC lathes, vertical and plain milling machines, drilling machines, measuring instruments	Turning technology, measuring technology, drilling technology.

(Engine parts)

Item	Processing standards: Big group	Middle group	Small group	Relevant parts (Representative)	Number of parts (per unit)	Main materials	Main facilities	Required technology
Simple parts	Cutting and grinding	Hot forging	General					
			Precision	Connecting rods Caps	4	S43C	Vertical and plain milling machines, boring machines, honing machines, radial drilling machines	Milling technology, turning technology, honing technology
		Cold forging	General	Cylinder head cap bolts Bolts and nuts	69	SCM435 SCR430	Lathes, rolling machines, heat treatment furnaces, surface treatment facilities	Rolling technology, heat treatment technology, surface treatment technology.
			Precision	Piston pins	2	S25C, S45C	Grinding machines, superfinishing devices, heat treatment furnaces, measuring instruments	Grinding technology, heat treatment technology, measuring technology.
		Powder	General	Rocker shaft caps Thrust plates	5	1-2-1C	Lathes, grinding machines	Turning technology, grinding technology.
			Precision	Timing belt pulleys	1	1-2-1B	Lathes, grinding machines, heat-treatment furnaces	Turning technology, grinding technology.
		Bars and pipes	General		5	S45C	Lathes	
			Precision	Rocker arm shafts	5	STKM11A	Lathes, grinding machines, heat treatment furnaces, drilling machines	Turning technology, grinding technology.
		Other	Gear-making	Ring-gears	1	S50C	Lathes, hobbing machines, chamferers, heat treatment furnaces, welding machines	Turning technology, gear cutting technology, heat treatment technology, welding technology.
		Pipe-making		Oil level gauge tubes	9	STKM11A	Bending machines, heat treatment furnaces	Metal mold design technology, pipe bending technology.
		Pressing		Oil pans Pulleys	16	SPC		
	Other		General	Springs, Clips	54			Manufacturing technology (processing, heat treatment, etc.).
		Precision	Kelmets, Piston-rings	12				Manufacturing technology (processing, heat treatment, etc.)
Ass'y components	Functional parts	Machinery processing		Oil pumps, water pumps	35			
		Pressing		Oil strainers Damper pulleys	26			
		Compound processing		Carburetors	21		Processing facilities + function guarantee test facilities	Manufacturing technology (processing, heat treatment, surface treatment, etc.), product development technology, guarantee technology
		Electric equipment parts		Distributors, Starters	15			
		Other	General Precision	Oil seals, Chains	8			

Table V.2-3 Essential Conditions for Parts Manufacturing (Transmission Parts)

Item	Processing standards Big group	Middle group	Small group	Relevant parts (Representative)	Number of parts (per unit)	Main materials	Main facilities	Required technology
Material	Casting	Ferrous	Big articles					
			Medium and small articles	Shift rod end, Shift forks, differential gear cases	6	Spherical graphite cast iron (FCD45N) (FCD45F)	Greensand mold molding machines, teeming lines, shot blasts, heat treatment furnaces, shell molding machines, teeming lines, shot blasts (main and core molds)	Molten metal control technology, heat treatment technology, metal mold design.
		Nonferrous	Big articles	Transmission cases, clutch housings	2	ADC10	1,200-ton die casting machines, trimming devices	Die casting technology, metal mold design, process control technology.
			Medium and small articles	Shifting forks	2	Aluminum (TADC17)	250-350-ton die casting machines trimming devices testing machines ( )	Die casting technology, metal mold design
	Hot forging		Medium articles	Secondary shaft gears	2	SCR420H	Hammer lines	Metal mold design.
			Small articles	First gears	14	SCR420H	Press lines	Confined forging
	Cold forging	Ferrous	Medium articles	Change levers	1	STKM11A S38C	Presses, headers	Material selection, process design, metal mold design.
			Small articles	Bolts and the like	8	SCR430 S45C S25C	Headers, rolling machines	Material section, process design, metal mold design.
		Nonferrous		Synchronizing rings	3	Brass	Presses	Material section, process design, metal mold design.
	Powder							
			Precision parts	Cutches, Hubs	4	I-2-1D	Presses, sintering furnaces	Metal mold design.

Simple parts	Cutting and grinding							
		Casting						
		Ferrous	Big articles General					
			Precision					
			Medium and small articles General	Shift rod ends Guide arm	4	Spherical graphite cast iron	Plain milling machines, Drilling machines, Induction hardening machines	Milling technology, heat treatment technology.
			Precision	Shifting forks	2	Spherical graphite cast iron	Vertical and plain milling machines, drilling machines, MO flame spraying machines	Milling technology, drilling technology, MO flame spraying technology.
		Nonferrous	Big articles General					
			Precision	Transmission cases Clutch housings	2	ADC10	Vertical and plain milling machines, multiple spindle drilling machines, tapping machines, machining centers, measuring instruments	Milling technology, drilling technology, process design, measuring technology, turning technology
			Medium and small articles General					
			Precision	Shifting forks	2	Aluminum (TADC17)	Vertical and plain milling machines, drilling machines	Milling technology, drilling technology.

(Transmission Parts)

Item	Processing standards: Big group	Middle group	Small group	Relevant parts (Representative)	Number of parts (per unit)	Main materials	Main facilities	Required technology
Simple parts	Cuting and grinding	Hot forging	General	Shift rod ends Crank lever shafts	5	SCR420	Plain milling machines, drilling machines, NC single function machines, heat treatment furnaces	Milling technology, turning technology, heat treatment technology.
			Precision	Clutch hub sleeves	1	S30C	NC single function machines, broaching machines, rolling machines, heat treatment furnaces	Turning technology, rolling technology, broaching technology, heat treatment technology.
			Gear-making	Secondary shaft gears, Various kinds of gears	10	SCR420H	NC single function machines, hobbing machines, gear shapers, surface treatment facilities, gear grinding machines, heat treatment furnaces	Turning technology, gear cutting technology, grinding technology, heat treatment technology.
		Cold forging	General	Bolts, nuts and screws	8	SCR430, S45C, S25C	Lathes, rolling machines, heat treatment furnaces, surface treatment facilities	Rolling technology, heat treatment technology.
			Precision	Synchronizer rings	4	Brass	NC single function machines	Turning technology.
		Powder	Precision	Clutch hubs	4	1-2-1D	Single function machines, drilling machines, heat treatment furnaces	Turning technology.
	Bars and pipes	Pressing	General	Reverse idle shafts	6	S45C	Centerless grinding machines, drilling machines, (outside diameter grinding machines)	Grinding technology.
			Precision	Shift rods, differential pinion shafts	22	S45C, SCR420	Centerless grinding machines, drilling machines, heat treatment furnaces, plain milling machines	Grinding technology, milling technology.
	Pipe-making				4			
	Pressing			Baffle plates Shift gate plates	37	SPC SPCC		
	Other		General	Springs, clips and packings	34			Manufacturing technology (processing, heat treatment, etc.).
			Precision	Retaining rings	11			
Ass'y components	Functional parts	Machinery processing		Clutch hub ass'y	13		Processing facilities + Function guarantee test facilities	Manufacturing technology (processing, heat treatment, surface treatment, etc.), development technology, guarantee technology.
		Pressing		Oil baths	2			
		Compound processing		Clutch covers Clutch disks	4			
		Electric equipment parts		Switches	1			
		Other	General	Oil seals	1			
			Precision	Bearings	5			

Table V.2-4 Composition of Body Parts

1st generation	2nd generation	3rd generation	4th generation	5th generation	6th generation	7th generation	8th generation	9th generation
Body complete	Front fender/lid	2 parts	4 parts	12 parts	2 parts			
	Hood	1 part	4 parts	12 parts	4 parts	4 parts		
	Body shell	17 parts	28 parts	99 parts	142 parts	88 parts	51 parts	4 parts
	Front door shell	Front door RH, LH Ass'y	Front door RH, LH Ass'y	Door outer panel				
				Door inner panel Ass'y	Door inner panel			
					Hinge reinforcement Upper			
					Hinge nut			
					Hinge reinforcement Lower			
					Check reinforcement			
					Door reinforcement			
					Door sash			
			Hinge A, Ass'y LH, RH	Female hinge				
				Hinge pin				
				Male hinge				
				Hinge bush				
				Hinge adjusting pin				
				Flange nut				
			Hinge B, Ass'y RH, LH	Female hinge				
				Hinge pin				
				Male hinge				
				Hinge bush				
				Hinge adjusting pin				
				Flange nut				
				Female hinge				
			Spring washer					
		Hinge, shim						
		Hinge, shim						
		Bolt						
	Rear door shell	2 parts	3 parts	7 parts	17 parts	13 parts		
Number of parts: 1	5	27	46	145	172	105	51	4

Table V.2-5 Essential Conditions for Parts Manufacturing (Body Parts)

Item	Processing standards: Big group	Processing standards: Middle group	Relevant parts (Representative)	Number of parts per unit	Main materials	Machinery equipment	Required technology
Simple parts	Pressing	Small parts	Washers, spacers, brackets, clips	87	SPC Galvanized sheet steel SPH SAPH32, 41 Vibration damping sheet steel	Presses, shearing machines, 10-100-ton presses	Pressing technology, metal mold design, manufacturing technology, measuring technology.
		Medium parts	Reinforcements, tanks, cross members, hinges, oil pans, silencers	63	SPC, SPSZ Aluminum SPH HPC35, SS41P, HPC35	Presses, shearing machines, 10-200-ton presses	Pressing technology, metal mold design, manufacturing technology, measuring technology.
		Big parts	Door panels, hoods, roof panel end panels, rear frames	45	SPC, PHC60 HPC35, SPSU	Presses, shearing machines, 300-1,500-ton presses	Pressing technology, metal mold design, manufacturing technology measuring technology.
		Round bars and pipes	Various pipes, silencers, hangers related to engines	13	STKM11A SUS304 Bar steel	Grinders, sawing machines, pipe benders, press benders	Pressing technology, metal mold design, manufacturing technology, measuring technology.
		Cutting and grinding	Engine components, cross members, cutting of flat portions of chassis	43	SAPH32 HPC Galvanized sheet steel SPC Rustproof steel sheet	Bench drills, milling machines, lathes, turret lathes, grinding machines, air drills	Machining technology, jig design, manufacturing technology, measuring technology
Sub ass'y parts	Welding	Spot welding	Cross members, frames, package trays, radiator shroud panels			Spot welding machines (stationary, portable), projection arc spot welding machines	Welding technology, jig design, manufacturing technology, measuring technology.
		Arc welding	Engine members, cross members of chassis, lower arms, etc.			Welding machines (arc, gas)	Welding technology, jig design, manufacturing technology, measuring technology.
		MIG welding and others	Body complete, fuel tanks			Seam welders, MIG welders	Welding technology, jig design, manufacturing technology, measuring technology.
		Machining	Engine members, cross members, lower arms				Machining technology, jig design, manufacturing technology, measuring technology.
Assembly	Assembly of functional parts (Installation)	Small articles	Engine members, oil pans, hinges and the like			Calking machins, drilling machines (multiple spindle)	
		Medium articles	Silencers, cross members, instrument panels.				
		Big articles	Boxes, doors, hoods, assembly of cabin			Sanders, buffs, finishing devices.	
Other	Coating, surface treatment, etc.	Coating, plating	Bumpers, moldings, parts related to various vehicles, service whole cover, main frames			Seizure drying furnaces, plating devices	Coating technology, plating technology.

2-4. Business Administration

2-4-1. Types of Enterprises

(1) Company Categories

According to Malaysia's Companies Act, 1965, companies are classified into four categories: 1) Company Limited by Shares; 2) Company Limited by Guarantee; 3) Company Limited by Shares and Guarantee; and 4) Unlimited Company.

In the first type of company, shareholder liability is limited by the number of shares held. In the second type of company, liability is limited to the guaranteed amount and no more. Shareholders in the third type of company have liability limited by both. In contrast, shareholders of an unlimited company have unlimited liability.

There is also another categorization, i.e., whether a company is listed publicly. In such a classification scheme, there are only two types of companies: public companies and private companies. The main differences lie in 1) the way in which they acquire capital, 2) limitations on the trading of stocks, 3) different regulations concerning the total number of shareholders (that is, a public company should have at least 7 while a private company has 2 to 50), and 4) the public company's obligation to make public its financial statements.

The objective of company visits during this study was to seek ideas and views on development in the metal automotive parts industry. It was not the intention of the team to conduct a detailed investigation of individual companies. Therefore, no inquiries were made concerning company classification, but with one exception all were private companies. The fact that public companies and private companies are designated "Berhad" (Bhd.) and "Sendirian Berhad" (Sdn. Bhd.), respectively, helped to distinguish between the two.

(2) Joint Ventures

Of the 19 automotive metal parts manufacturers visited, 12 were joint ventures with foreign investors. All but one company had been established since the mid-1970s and were operating in the 1980s. Foreign investors took part in the joint ventures in anticipation of increasing domestic demand in the Malaysian auto market, as well as to secure a Malaysian market share in response to Malaysia's local-content requirements.

The only way for a foreign manufacturer to take part in the Malaysian automotive parts business is thorugh participation in joint ventures. Generally speaking, Malaysia's new economic policy requires that equity holdings among foreign, bumiputra and non-bumiputra shareholders are held at a 3:3:4 ratio. From briefs obtained from a few of the companies visited, it was found that one company listed "bumiputra reserve" in the "shareholders" section for potential bumiputra investors (see Table V.2-6). Of the remaining companies, only one possessed foreign equity exceeding 50%.

Table V.2-6 Examples of Equity Distribution

Share Capital, Paid-up	M$4,200,000.-	
Shareholders	Malaysian:	
	XXX Holdings Bhd.	2,400,000.-
	(Public listed: 40%)	
	Bumiputra reserve	0.-
	(Bumiputra: 30%)	
	Foreign:	
	XXX Mfg. Co., Ltd.	1,800,000.-
	(Japanese: 30%)	

However, there are also cases where 100% foreign equity is allowed in the automotive parts industry. To attract foreign investment, the Malaysian government instituted a series of measures in October 1986 aimed at relaxing regulations concerning foreign equity holdings, particularly for export-oriented industries.

According to data published in MIDA (Malaysia Industrial Digest, January 1988), one company -- a manufacturer of hoses for car air conditioners, brakes and power steering units with 75% of the output earmarked for export -- was allowed to operate as a 100% foreign subsidiary.

(3) Malaysian Investors

According to the Annual Companies Handbook Volume XIII 1988 (published by the Kuala Lumpur Stock Exchange), Tan Chong Motor Holdings Berhad has a 98% equity in Auto Parts Manufactures Co. Sdn. Bhd. and a 100% equity in Auto Coil Sdn. Bhd. Both of these companies were visited during the survey.

Apart from these two firms, Tan Chong Motor Holdings Berhad also has a 70% equity in Tan Chong Motor Assemblies Sdn. Bhd. and owns other automotive parts manufacturing subsidiaries as well.

In a similar way, holding companies like UMW Holdings Berhad and Oriental

Holdings Berhad have invested in both automobile assembly and automotive parts companies. In fact, it is through these holding companies that some of the local automotive parts manufacturers keep their ties with automobile assembly companies.

On the other hand, Japan's Nissan Motor Co., Ltd. has a 5.56% equity in Tan Chong Motor Holdings Berhad, and Honda Motor Co., Ltd. maintains a 4% equity in Oriental Holdings Berhad.

(4) Expatriate Staff

When necessary, it is not uncommon for the foreign partner in a joint venture to send its own staff to Malaysia to take charge of management responsibilities. The Malaysian government has laid down clear guidelines for the employment of such expatriate staff. Of the 12 joint ventures visited, nine employed full-time foreign managers or engineers.

In response to queries, opinions seem to be divided over the merits of having expatriate staff. Part of it involves the perception of technology transfer. In the Malaysian automotove parts industry, most companies are dependent on foreign technology. There are at least two effective ways for transfer of this technology, through joint ventures and technological provision agreements. The former involves capital investment; the latter does not.

The biggest objection against employing expatriate staff seems to be the higher overhead, and in particular the higher wages paid to foreign staff. A second reason is the preference for a gradual acquisition of foreign technology through a series of technology provision agreements.

On the other hand, some see the presence of expatriate staff as a necessity for the following reasons. First, their presence makes possible better control over management and, in fact, expatriate expertise is still required for the successful management of a joint venture. Second, the presence of foreign staff makes it easier to acquire up-to-date information. Finally, some believe that the presence of permanent foreign staff faciliates both the placement of orders from the overseas parent company for components required for production and the making of necessary changes in these orders.

(5) Subsidiaries

Business expansion often results in the establishment of subsidiaries. There are various reasons for setting up subsidiaries. One of them is to enjoy preferential tax treatment. Companies operating in Malaysia pay a 40% corporate tax, on top of which a

5% development tax is also levied. However, companies given "pioneer status" enjoy certain tax exemptions as part of a government policy to encourage investment in specific manufacturing industries. Certain automotive parts enjoy such tax holidays. The establishment of a subsidiary firm is considered one of the best methods for distinguishing the accounts related to those products which enjoy such tax privileges.

During the survey, it was not uncommon to find a number of subsidiaries set up within the same compound, or even on the same plant floor. Each building or floor area is partitioned for a separate production line. These subsidiary companies are supposed to be independent but actually come under the integrated control of a parent company. In reality, such divisions sometimes lead to confusion unless great care is taken to ensure the exchange of information from one unit to another. In the case of a small company subdivided into smaller subsidiaries, there is the danger of increased overhead for administration and management. In fact, one company visited had 10 administrative staff out of a total of 60 employees working under its three subsidiaries.

(6) Training

Most joint ventures and companies receiving technological assistance introduce some kind of personnel exchange to facilitate the transfer of technology. Sometimes technicians are sent for training to the foreign parent company or to the affiliate company providing the assistance. In other cases, technical staff from the parent company are sent to the local subsidiary, on a temporary or long-term basis, to assist in the transfer. Other methods for the acquisition of technology include the dispatch for study overseas of managerial successors, or the sending of technical staff to take part in SIRIM or CIAST training programs. When introducing new machinery, it is common practice for local staff to receive on-the-job training from the machinery supplier.

Such training opportunities are not so easily available to local companies without overseas ties. To help workers familiarize themselves with machinery, one company allowed workers to make ashtrays out of used piston after work. This is one example of on-the-job training whose efficiency in improving mechanical processing techniques could be easily evaluated by management.

2-4-2. Labor Relations

(1) Labor Laws

The basic regulatory statute governing employment and job conditions is the Employment Act, 1955. There is also the Trade Unions Act, 1959, which governs the organization of industrial labor unions. The Industrial Relations Act, 1967 and other labor-employment laws govern labor-management negotiations and the resolution of labor disputes.

(2) Employment

To cope with Malaysia's multiracial society, companies operating there are required to observe certain employment codes. In fact, several companies visited made specific reference to the racial breakdown of their work force. In other companies, regulation of the racial proportion also seems to reflect on their employment policy.

(3) Wages

There is no minimum-wage law in Malaysia. The Ministry of Labour compiles a periodic Occupational Wages Survey which includes details about the wage levels for different occupations. The figures used in the latest survey are based on 1983 levels. However, according to information supplied by the companies visited, the minimum salary for a general worker is about M$230 a month, while the figure for supervisiors is M$800. Since general workers' wages are still relatively low compared to those in other occupations, it is advantageous to engage in labor-intensive, low-volume, high-variety production. The wage level in Malaysia, however, is still high when compared to neighboring countries in Southeast Asia. It is said that the average Malaysian worker earns 1.5 times as much as his Thai counterpart and twice as much as similar workers in the Philippines and Indonesia.

The Employment Act, 1955 specifies the fees for overtime work. Payment for overtime work in a normal operating day is one and a half times the ordinary rate of pay.

(4) Working Hours

Working hours are set either at eight hours per day or a maximum of 48 hours per week. Since overall production volume is still relatively low, most companies visited operate on a one-shift-a-day basis.

In deciding the actual hours of work, special considerations are given to religion and local customs. For instance, lunch time on Fridays lasts for one hour and 45 minutes to accommodate Muslim employees.

Table V.2-7 Typical Working Hours

Working hours at one-shift company:		
Operation	--	8:15 a.m. to 4:45 p.m.
Lunch time	--	1:00 p.m. to 1:40 p.m.
Breaks	--	10:30 a.m.to 10:40 a.m.
		3:30 p.m. to 3:40 p.m.
Working hours at two-shift company:		
First shift	--	7:00 a.m. to 3:00 p.m.
Second shift	--	3:00 p.m. to 11:00 p.m.

(5) Welfare and Fringe Benefits

Since most of the companies we visited are relatively small in size, welfare and fringe benefits are limited.

Most companies, however, provide uniforms or other workclothes such as T-shirts. Others have company canteens on the plant site. For the benefit of Muslim workers, some companies have set aside special areas for praying, so that workers do not have to travel to mosques. Large firms like PROTON have their own housing and sports facilities.

2-4-3. Procurement of Raw Materials and Equipment

(1) Materials

Most metal materials used for making automotive metal parts are imported. At the companies visited, steel is imported primarily from Japan and also from South Korea and other countries. Aluminum ingots are also imported.

Dependence on imported raw materials creates several problems:

1) Large order lots are required.

2) Cargo delivery takes too long.

3) The strong yen drives up the cost of materials imported from Japan.

For these reasons, some companies have to keep stocks for two to four months. Transportation costs skyrocket when a firm is forced to airfreight urgently required components due to sudden changes in the production schedule.

Automobile parts manufacturers are increasingly obtaining their supply of non-metal materials such as rubber and plastics from local suppliers, but remain dependent on imports for items such as spark-plug insulators and seat covers.

(2) Mechanical Equipment and Tools

Almost all machinery is imported. Japanese products are usually used for high-technology items, but some companies buy machinery from Taiwan, where prices for comparable machinery are said to be as little as one-third those in Japan.

Tools are imported mainly from Japan. Importing casting moulds can be a major financial burden for small-volume producers. (The factors affecting production costs will be discussed in detail in a later section, but the limited profit margin resulting from a small scale of production makes some companies rather reluctant to import moulds.)

2-5. Sales Strategy

2-5-1. Market Categories

Generally speaking, automotive parts manufactured in Malaysia can be divided into two major categories: Original Equipment Market (OEM) items and Replacement Market (REM) items. According to the definition outlined in MIDA's "Revised Guidelines for Mandatory CKD Deletion," OEM products are those manufactured to the required specification of motor vehicle assemblers; REM refers to parts for the replacement market. Another common market distinction refers to whether a product is for domestic use or for export.

2-5-2. The Domestic Market

(1) OEM Products for the Domestic Market

As far as sales strategy is concerned, manufacturers of automotive metal parts actually have very limited choices. To ensure appropriate competition and development in the automotive parts industry, the Malaysian government has intentionally limited the number of manufacturing licenses to a few companies for a particular line of products. Therefore, the number of licensed manufacturers for OEM items is limited, and their marketing strategies are very limited due to the limited applicability of their products.

Table V.2-8 shows the position of the automotive parts manufacturers. In the case of parts manufacturers in which Malaysian shareholders also have equity in the assembler (i.e.,categories (i), (ii) and (iii)), there should be very little problem with sales to the related car assemblers. In the case of manufacturers in categories (iv) and (v), there is also a good chance that ties with a foreign partner would guarantee sales to related Malaysian auto assemblers. For automotive parts manufacturers without any of these links (e.g., type (vi)), great efforts would be needed to break into the local OEM market.

Table V.2-8 Framework of Marketing Strategies at Automotive Parts Suppliers

	Type of Relationship with Foreign Manufacturer		
	Joint Venture	Technical Assistance	No Tieup
Malaysian investor with equity in auto assembler	(i)	(ii)	(iii)
Malaysian investor without equity in auto assembler	(iv)	(v)	(vi)

Table V. 2-9 Examples of Transaction

Parts Manufacturers			Assemblers				
			a	b	c	----	Proton
Shock Absobers							
	A	(ii)	○	×	—	----	○
	B	(i)	×	○	—	----	○
	C	(i)	×	×	○	----	
Radiators							
	A	(ii)	○	×	×	----	○
	D	(i)	×	○	○	----	○
Seat Complete							
	A	(ii)	○	×	×	----	×
	E	(iv)	×	—	○	----	○

1. ○: Supply — : Information was not available
×: No Supply
2. (i), (ii) and (iv) corresponds to Table V.2-8
3. A and a, B and b, C and c, D and Proton have relationship through their share holders.
4. Table is prepared based on interview and other data sources.

Table V.2-9 shows the sales relationship between automotive parts manufacturers and assemblers.

In the case of shock absorbers, it is clear that companies in categories (i) and (ii) would supply to their affiliated car assemblers. In the case of radiators, supplier D -- a joint venture in which HICOM has an equity participation -- sells to car assembler b, which assembles car models for the Japanese firm, as well as to PROTON.

On the other hand, finished seat manufacturer E fails to sell to car assembler a, despite common ties with Japanese carmaker N which supplies CKD parts to assembler a. The main obstacle lies in manufacturer A, which has a tieup with another foreign parts supplier.

The most crucial factor facing OEM manufacturers is a possible drop in auto demand. At present, their survival depends very much on whether a manufacturer is able to contract sales with PROTON, which maintains a hold on over 70% of the Malaysian car market. Despite such realities, some manufacturers tend to stick with PROTON and make little effort to explore other sales possibilities if the parts in question are used in small-volume models.

Prospects for 1988 seem very bright. After a negative growth rate in 1985, the Malaysian economy has expanded steadily, recording growth of 1.2% in 1986 and 4.7% in 1987. There was a further economic upswing beginning in the second half of 1987, and estimates for car production in 1988 have been revised upward from the original 35,000 - 40,000 units to 50,000 - 60,000 units. Many manufacturers may possibly set out to develop new products and beef up marketing efforts in anticipation of increasing sales to PROTON and other car assemblers.

(2) The Domestic Replacement Market

For parts suppliers making parts with large replacement demand such as spark plugs, exhaust systems, and shock absorbers, it is not necessary to target products exclusively to car assemblers. This makes it easier for manufacturers to penetrate the local market even without tieups with local car assemblers. But competition is very severe in the replacement market, in terms of both quality and pricing, since suppliers must compete with imports. Indeed, there is complain from some domestic manufacturers against imported parts, even though they already enjoy protection through import tariffs. The long-term strategy must be based on increasing competitiveness obtained by cutting costs and improving quality.

Generally speaking, OEM products are priced lower than parts targeted for the replacement. One reason is the prestige value of winning an OEM order. Another is that the use of parts in the finished vehicle generates REM demand.

(3) Overseas Market

Bearing in mind that Malaysia has a population of around 16.5 million (1987 estimate), it is highly unlikely that car demand will exceed the IMP projections. Indeed, most consider it unlikely that sales will meet the IMP target. Consequently, automotive parts manufacturers must look to exports for expansion of sales. Penetrating the overseas market, however, is not easy. Quality, price, and an ability to meet delivery schedules are all important. Other relevant factors include the market structure for parts supply in the targeted country, as well as government policy regarding local content.

With regard to quality, generally speaking, there are few problems at joint-venture manufacturers or firms receiving foreign technological assistance. For manufacturers intent on exploring the export market, it is necessary to keep in mind that specifications for the same model could be different for different markets. For instance, some parts used in a Malaysian model might not be compatible with a U.S. or European model. Thus, PROTON SAGAs for export to a certain country carry a different type of seat belt from the Malaysian model, and those targeted for the U.S. have an exhaust system and stronger door panels that meet the more stringent American pollution and safety requirements.

Thus, parts manufacturers wanting to tap the export market must be prepared to make changes in specifications. While such adaptations inevitably drive up costs, export has many merits, since it would help raise plant operating rates and secure a constant flow of orders through diversified sale outlets.

Most observers have serious doubts about the price competitiveness of Malaysian-made car components, mainly because the current level of demand is still relatively low, thus pushing up production costs. Two additional factors should also be considered: first, whether it is possible to enhance competitiveness at a time when the strong yen is driving up the costs of raw materials and components; and second, whether the value added in processing an item in Malaysia from imported raw materials and components justifies the additional transportation costs incurred.

The appreciation of the yen is pushing up imported component prices. One company visited reported a 40% price increase in imported frame components during 1987 and a 15% increase in January 1988. This was followed by yet another 17% price hike after April 1988. Many other companies reported that the cost of importing parts from Japan and exporting the finished product to Singapore would be higher than if the product were exported directly from Japan to Singapore.

Concerning delivery to overseas markets, there are various disadvantages involved in long-distance shipment. In the case of components for an overseas car manufacturer, for example, it is often necessary to have a delivery center in the destination countries to make final adjustments before delivery.

A number of companies visited complained about the difficulty of exporting to Japan. The "just-in-time" system of parts delivery, in particular, makes exports to Japan particularly complicated. Generally speaking, there are three routes by which imported parts find their way to the assembly line: one is that the imported items are further processed before they are delivered to the carmaker; another is that the imported items are used as assembly components for bigger components at affiliated parts manufacturers before delivery to the automaker; and a third is direct delivery to the automaker for use on the assembly line. To accommodate the automakers' "just-in-time" system, it is essential for the overseas supplier to maintain a quality control and depot center in Japan to ensure delivery and to check for and eliminate defective items that were damaged during transportation.

The major problem for prospective exporters in the overseas automobile parts market is not unlike the one restricting sales expansion in the domestic OEM, as described in Section (1). In most cases, the conditions of sales are stipulated in the original joint venture or technology assistance contract, so that the supplier cannot sell to any market other than the indicated one. In any case, the foreign partner in a joint venture or technology provision agreement usually has already established an exclusive sales network in the major markets.

Theoretically speaking, parts suppliers not tied up in such deals are free to pursue any market possibility. Yet, such suppliers must keep in mind that they will face severe competition in the international market with all its stringent demands on quality, pricing, and delivery. They must exert a great deal of effort in order to meet such standards without any prospect of the protection that they may enjoy in the Malaysian market.

Despite such difficulties, many suppliers have managed to gradually expand exports. Indeed, one locally-owned parts manufacturer has won overseas orders through participation in trade fairs and marketing research through an affiliated overseas marketing firm.

Another development comes from cooperation with foreign partners who arrange export deals to Singapore and Brunei from their Malaysian subsidiaries or cooperation with technology provision partners who help firms to meet Malaysian government export quota requirements. Others made strong export efforts by taking advantage of external conditions such as the strong yen and internal conditions like low plant operating rates. A number of other automotive parts manufacturers which had production facilities in Singapore before being established in Malaysia now use their Malaysian units to produce sub-parts for assembly in Singapore.

One company visited has established a regional complementation system within the region and is working towards the further reduction of production costs before moving into the export market. The company is recognized as a participant in the ASEAN Industrial Joint Ventures system.

Limitation of the size of individual ASEAN markets makes similar regional complementation systems highly recommendable. The trouble is that in most cases the decision lies not with parts makers but with the corporate strategy of individual carmakers. Ideally, a horizontal division of labor might be the best way to produce high-quality, reasonably-priced cars. This ideal, however, comes into conflict with the local-content policy which individual governments have implemented for their domestic automotive parts industries.

The Mitsubishi ASEAN operation is a case in point. The ASEAN summit meeting held in December 1987 took up the proposal of allowing Mitsubishi automotive parts products manufactured by the Japanese automaker's production plants in Malaysia, the Philippines, Thailand, and Indonesia to cross national borders duty-free. This project was considered under the ASEAN Industrial Complementation framework, which has produced a similar arrangement for motorcycle parts. Further negotiations at regional working-level talks have, so far, failed to produce a concrete agreement. Opposition from affected sectors remains strong and leadership on the part of governments and automakers will be needed before the project can be implemented.

2-6. Relation to Periphery Industries

2-6-1. General Situation

As described in a previous section, the Malaysian metal automobile component industry is highly dependent on imports for its supply of raw materials, components, plant equipment, and production tools. Another feature is the high percentage of in-house production, from raw material to the finished product: subcontracting is rare. As a result, the metal automotive parts industry is more or less self-contained, with very little interdependence with other industrial sectors.

The appearance of affiliated companies and subsidiaries, each charged with a different stage of the production process, is confusing. In reality, all these "subsidiaries" are nothing but separate divisions of the same company, except for accounting and tax purposes.

2-6-2. Relations with Major Industries

(1) The Iron and Steel Industry

There are 11 major steel mills in Malaysia making small iron rods, wire rod for general applications, small and light shaped steel, galvanized plates, welding wire, etc. About 60% of the iron and steel products are used in the local construction industry, with only 1% of the output going to the automobile industry, most of this for use in exhaust pipes.

Aubomobile parts makers buy their steel mostly from five special dealers for processed steel products. They include two foreign-owned companies and three Malaysian firms. A Japanese subsidiary, which imports steel products and processes them to customer specification, is said to be getting many orders from automotive parts suppliers. This company also undertakes the processing of imported steel provided by customers.

(2) Equipment Manufacturers

The companies visited were observed to have different arrangements for maintenance and repair of imported machinery and equipment. Some have machinery maintenance departments of their own; others rely on in-house engineers or foreign suppliers to handle maintenance work. For ancillary equipment, most automotive parts companies appear to rely on outside maintenance companies.

(3) Tool Manufacturers

The cost of press moulds is one major problem facing the Malaysian auto industry. Since production volume is low, the relative cost of imported moulds from Japan and other countries is quite high. Recently, some companies have started using Malaysian moulds. PROTON, for instance, now procures 45 different types of press moulds either from its own machining department or from outside local suppliers working from basic designs provided by PROTON under its technical supervision.

Another source of moulds is a specialized mould-maker affiliated with a Japanese electrical appliances maker.

(4) Subcontractors

With the low volume of automobile parts production, it is more efficient for parts suppliers to consider subcontracting some of their work out to machine processing subcontractors. Instead of trying to acquire equipment for the entire process, a company can line up a number of subcontractors to do part of the work while it concentrates on getting more orders. Some of the companies are already using outside subcontractors for press work with moulds provided by the orderer. Eventually, it will be necessary to give greater emphasis on the nurturing of a subcontracting industry. Another method of raising the volume of work for automotive parts manufacturers with equipment for more general use is to branch out into non-automotive parts manufacturing.

3. Cost Analysis

Because it is thought that the parts now under domestic production require analysis that is based on specific and realistic numerical values, studies were made from the following two viewpoints.

(1) The level of selling prices should be understood, and to what extent they have price competitiveness should be clarified.

(2) If they lack price competitiveness, the reasons should be analyzed and what measures there are to gain price competitiveness should be considered.

The parts not under current domestic prodution were left untouched, given the following considerations:

(1) It is surmised that in the future, parts which can be produced under a small- or medium-scale production system, if they are domestically produced, can be similarly viewed as those now under domestic production.

(2) As for parts requiring a large-scale production system, such as engines for example, casting and forging projects have already been under detailed consideration.

3-1 Cost Level of Domestically Produced Parts

(1) Method of Deriving Cost

Data on the manufacturing costs of each item produced by individual firms is of such a character that it cannot be understood from surveys. During the latest survey, therefore, approximate cost levels were derived by gathering rough figures of the selling prices for major parts from the firms visited. Then, with the cooperation of automakers, unit purchase prices of domestically-produced and imported parts were figured. In addition, the unit purchase prices of imported parts were checked against the domestic selling prices in Japan of the same parts.

The component ratio of cost by item of expense was obtained from respondents to a separately conducted questionnaire.

(2) Method of Comparison

The unit prices of domestically-produced parts used for comparison are the unit purchase prices of automakers. Regarding imported parts, the unit prices should be reckoned at the point of time when automakers put them to use. The unit prices of imported parts, therefore, include import duties and expenses related to transport ("Import Open Market Value") in addition to CIF prices. The rates of import duties are 40% for passenger cars and 5% for commercial vehicles. The unit prices of imported parts for comparison are converted into Malaysian dollars at exchange rates prevalent at the point of time when the comparison was made.

(3) Results of Comparison

The results of comparison of the specific items of parts under the latest survey are shown in Table V.4-1. The comparison involved quality rating as well as price. This is because quality is a very important factor for automotive parts and the fact that price appraisal alone will bring about a biased view.

Table V.4-1 Comparison of Unit Price of Specific Parts

Parts	Domestic Price/Import Price		Quality Evaluation
	A Company	B Company	A～C Company
Fuel Tank	401 — 526%	525%	O
Brake & Fuel Pipe	194		O
Radiator	129 — 131	134	O
Shock Absorber	117 — 161	131	O
Electric Horn	124 — 132		Δ
Coil Spring	112		O
Exhaust Pipe	77 — 209		O
Exhaust System	74 — 95	97	Δ
Muffler	71 — 83		O
Air Filter	71		Δ
Wiper Mote & Braket	130 — 150		O
Starter Motor	137	109	O
Alternator	77	91	O
Damping Sheet	131		O
Mud Flap		140	O
Seat Belt	87	132	O
Wiring Harness		99	O
Glass		80	O
Carpet		80	O
Seat Pad	52	55	X

Note: O ; No Problem
Δ ; Sometimes Poor
X ; Poor

Table V.4-1 shows that the level of unit prices of imported parts almost exhibits the same trend, though it differs somewhat according to firm. As compared with imported parts, characteristics of domestic products may be cited as follows:

a) Metal parts generally cost more than parts made of other materials

b) Among metal parts, simple parts manufactured at facilities for volume production cost more

c) The cost of metal parts made from single large-sized and expensive metal moulds is high

d) The cost of assembled parts which require many pieces of equipment to produce generally is high

e) The cost of parts which wear out easily and are also shipped to the replacement equipment market generally is low

f) Generally, there is no problem with quality.

The appointed time limit of delivery of products to automakers is well observed, causing no specific problems.

(4) Needed Cost Level

It may be said that the needed cost level should be price competitive. From this point of view, the unit price levels of domestic products cannot be said to be price competitive, even if they are lower than those of imports, as shown in Table V.4-1 by percentages of less than 100. In the case of Company A in the Table, customs duties and other expenses make the prices of imported passenger car parts about 68 percentage points higher. In order to make the unit price levels of domestic automotive parts equal to those of imports, therefore, they have to be lowered to around 60% of the current level. In other words, costs will have to be reduced by approximately 40%. These figures are based on the assumption that the comparison value shown in Table V.4-1 is 100. If the comparison value is more than 100, the required rate of cost reduction will be correspondingly higher.

3-2 Analysis of Factors for the Higher Cost of Domestically Produced Parts

3-2-1 Cost Penalty

(1) General Considerations

When an import substitution industry such as metal processing is newly developed, raw materials and facilities often have to be imported and operation should start while the size of the market is still small. In such a case, costs will generally be higher than in countries where the industry has already been developed. In other words, prices of domestic products will be higher than imports. This is what is called the "cost penalty" arising from domestic production. This phenomenon is said to be common in developing countries and is not limited to Malaysia alone.

(2) Promotion of Domestic Production and Cost Penalty

It goes without saying that it is most desirable to have domestic production progress without cost penalty. As a matter of fact, however, the unit prices of domestic products are high as shown in Table V.4-1. Therefore, various protection measures have been taken, as stated earlier. One such measure to actively protect domestic production is the Mandatory Deletion Program (MDP). Viewed in relation to cost, it works as follows:

Parts manufacturers request an application from the Mandatory Deletion Program once they are able to produce parts which they desire to have deleted from the status of approved CKD parts. Based on the request, automakers test the parts for use in individual models to consider the advisability of adopting them. MDP status is applied to one part after another found usable. Generally, however, a time limit is set for consideration before one can apply. In concrete terms, when MDP status is applied, 80% of the models are assured coverage by the program. Once an MDP status is applied, imports are not permitted unless there is a specific technological reason and parts manufacturers consent This means a substantial ban on imports.

The procedures stated above include technological considerations but no cost studies. Under such protection measures, therefore, a reduction of costs will not be easy unless the principle of competition works among parts manufacturers with price competition occurring.

3-2-2 Factors for the High Cost of Domestically Produced Parts

(1) Qualitative Consideration of Structural Elements of Cost

On the basis of the views of managers of firms obtained through the latest survey and what has been learned on visits to factories, factors considered responsible for the high costs have been classified by the main structural elements of cost. The results are shown in Table V.4-2.

As for the factors in Table V.4-2, many managers emphasized the yen's appreciation in relation to raw materials, and small volume of production and high purchasing costs for facilities. Similarly, they cited small volume of production and high unit cost of purchases for metal moulds as well.

Table V. 4-2. Major High Cost Causes

Item	Major Causes	Ancillary Causes	Phenomenon
Raw materials	Dependence upon imports	Appreciated yen	Rise in unit purchase price
		Small volume use	
		└ Bulk purchasing	Increase of raw material stock
		Long lead time	Increase of raw material stock
	Insufficient technology	Occurrence of defects	Lower yield
	Insufficient production methods	Insufficient maintenance of works	
		└ Occurrence of losses	Lower yield
		Large lot production	Increase of work in process
			Increase of product stock
Equipment	High priced metal processing equipment	Dependence on Japan for high quality equipment	
		└ Appreciated yen	Price rises
		Production decreases	Increase of fixed cost burden
		└ Lower level automation	Lower productivity
Mould & die	Import dependency for materials	Dependency on Japan for high quality materials	
		└ Appreciated yen	Price rises
	Original high price	Production decrease	Increase in cost per unit
Jigs	Technology not yet obtained	No possibility of producing locally	
		└ Visits of foreign technicians	Temporary expenditures
Personnel	No labour saving policies	Low automation level	Lower productivity
		Lack of workers able to handle different machines and processes	Lower productivity
Electricity	Occurrence of power failures	Ownership of in-house power plants	Increase of fixed cost burden
		Storage of cushion stocks	Increase of product stock
		Occurrence of defects	Lower yield

(2) Quantitative Consideration of Structural Elements of Cost

Table V.4-3 shows a breakdown of cost of Japanese parts manufacturers with which the data obtained during the latest survey are juxtaposed.

Table V.4-3 Cost Price Structure Ratios

Item	Japan	A	B	C	D
Raw Materials	47	30	45	66	75
Labor Costs	23	10	7	3	12
Equipment and Others Costs	30	60	48	31	13
TOTAL	100	100	100	100	100

Notes: Companies A and B, raw material processing companies that produce such items as bolts. Companies C and D, companies that assemble such items as air conditioners.

Source: Japan, Small and Medium Enterprise Agency, 1988 cost price indexes for small and medium enterprises. Companies A, B, C, and D, response to questionnaire.

Broadly speaking, Table V.4-3 indicates the high component ratio of expenses for facilities and other items for material processing firms such as Companies A and B. This coincides with the statements of the managers interviewed. It is surmised that the lower volume of production has raised the component ratio of fixed expenses for facilities, metal moulds and other items.

Table V.4-4 shows the result of a trial calculation using the data of Table V.4-1 and Table V.4-3. In drawing up Table V.4-4, reference was made to Table V.4-1 and the level of 120% of unit prices of domestic products, as compared with those of imports, was regarded as a representative value. Incidentally, the level corresponds to about 200% of domestic unit prices in Japan. From Table V.4-3, on the other hand, component ratios in Japan and Company A were taken as representative values. The comparison is made on the assumption that the unit price in Japan equals 100 yen.

Table V.4-4 Cost Price Ratios and Their Relationship to Cost Standards

Item	Japan		Company A		Company A unit price/ Japan unit price
	Unit price	Ratio	Unit price	Ratio	
Raw Materials	¥47	47%	¥60	30%	128%
Labor Costs	23	23	20	10	87
Equipment and Other Costs	30	30	120	60	400
TOTAL	100	100	200	100	200

Table V.4-4 shows that the expenses for domestic raw materials are higher than those of Japanese products while personnel expenses are lower. Expenses for facilities and other items, however, are four times as much as those of Japanese products.

Although a trial calculation, it may be said that Table V.4-4 still represents a model of the current cost structure.

Unlike facilities, metal moulds cannot be used in common for various products. When production volume is small, therefore, the cost is high per unit of product. During the latest visits to firms, opinion was heard at one firm that domestic production of new parts was considered but found to be impossible because dies alone would cost M$300,000. With a view to finding the level of dies prices, in Japan we conducted an estimation of the cost of dies for processing several parts we had sketched at places under survey. The gist of the results is shown in Table V.4-5.

Table V.4-5 Results of Die Cost Estimate

Processed Parts and Die Classifications			Die Costs (Unit: M$1,000)
1) Outer diameter: about 70mm	thickness: 2.3mm	press-punch die	90
2) Outer diameter: 120mm	thickness: 4.5mm	press-punch die	148
3) 1,350x1,219mm	thickness: 0.8mm	sheet die	157
4) Outer diameter: 380mm	thickness: 3.5mm	punching die	165
5) Same as above			190
6) Same as above			230
7) Same as above			333

Notes: Finished shape is different for 4) and 5), and 6) and 7); 4) and 5) are the same type of parts, but they have different manufacturing processes. 6) and 7) are the same type of parts, but they have different manufacturing processes.
Cost is calculated on a scale of M$1 = ¥50.

Malaysian dies are not particularly high priced as can be found in the level of dies cost shown in Table V.4-5. It may be said the problem is with an inability for volume production despite the use of dies.

3-2-3 Consideration of Price Competitiveness

Measures to strengthen price competitiveness will be considered from two aspects.

(1) Unitary Aspect

From the unitary aspect, it may roughly be said to be necessary to strengthen the following two points:

a) Establishment of basic technology

It may be said that manufacture of quality products is a prerequisite for becoming price competitive. In interviews during the latest survey with automakers who use domestic products, we heard that domestically manufactured parts in general had become good. The results are shown in V.4-1. But many made the appraisal that durability was low although there were no immediate problems with their use, or that the same part could be used in some models but not in others. While visiting parts manufacturers, we heard complaints that the quality standards for automotive parts were too rigid. But it may be said that manufacture of quality products is an essential condition for establishing price competitiveness. Such an improvement of technological ability will allow a solution to the high cost factors shown in Table V.4-2 as well as the expansion of sales.

b) Perfection of control technology

It may be said that in Japan, many firms have gained great results from efforts to eliminate waste. As for quality, the ability to manufacture a few good products is one thing and the ability of continuously putting out hundreds of thousands of good products is another. During the latest survey, a remarkably wide gap appeared to exist in the production management and quality control systems among firms. Rationalization through the perfection of control technology can be accomplished only over time. According to the manager of a firm we visited, he received a lot of detailed advice from a technological expert dispatched from Japan, and the results were good. He also explained that it took three years for the advice to take root to some degree in his firm. Another firm said that men of talent who can be entrusted with production control had not been nurtured yet. Among the high cost factors shown in Table V.4-2, there are some such as the reduction of work in process that cannot be solved without perfection of control technology. It is surmised that steady progress of activities for improvement will lead to cost reductions.

(2) Structural Aspect

To what extent can a unit selling price be cut by a rise in production volume? Or, conversely speaking, what extent of production volume is necessary to reduce unit selling price? This point may be said to be a structural problem which parts manufacturers cannot solve alone.

The relationship between a reduction of unit selling price and a rise in production volume on condition that no change in profit and loss is brought about is shown in Fig. V.4-1. The premise of the figure is the assumption that the cost structure remains as it is despite any increase in production volume. Also, parameter R represents the current ratio of variable and fixed expenses.

As found in Fig. V.4-1, a 25% cut in unit selling price under the cost structure of R = 1.0 would keep profits at the same level as they are currently if production volume doubled. Again, if unit selling price had to be cut by 40% to establish price competitiveness, profits would be affected unless production volume rose 5 times as much as now under the cost structure of R = 1.0.

The ratio of variable expenses/fixed expenses, or parameter R, found from the data in Table V.4-3 is shown in Table V.4-6.

Table V.4-6 Variable Costs and Fixed Costs

Item	Japan	Company A	Company B
Variable Cost Ratios	60.4%	51%	57%
Fixed Cost Ratios	39.6	49	43
TOTAL	100	100	100
Variable Costs/Fixed Costs	1.53	1.04	1.33

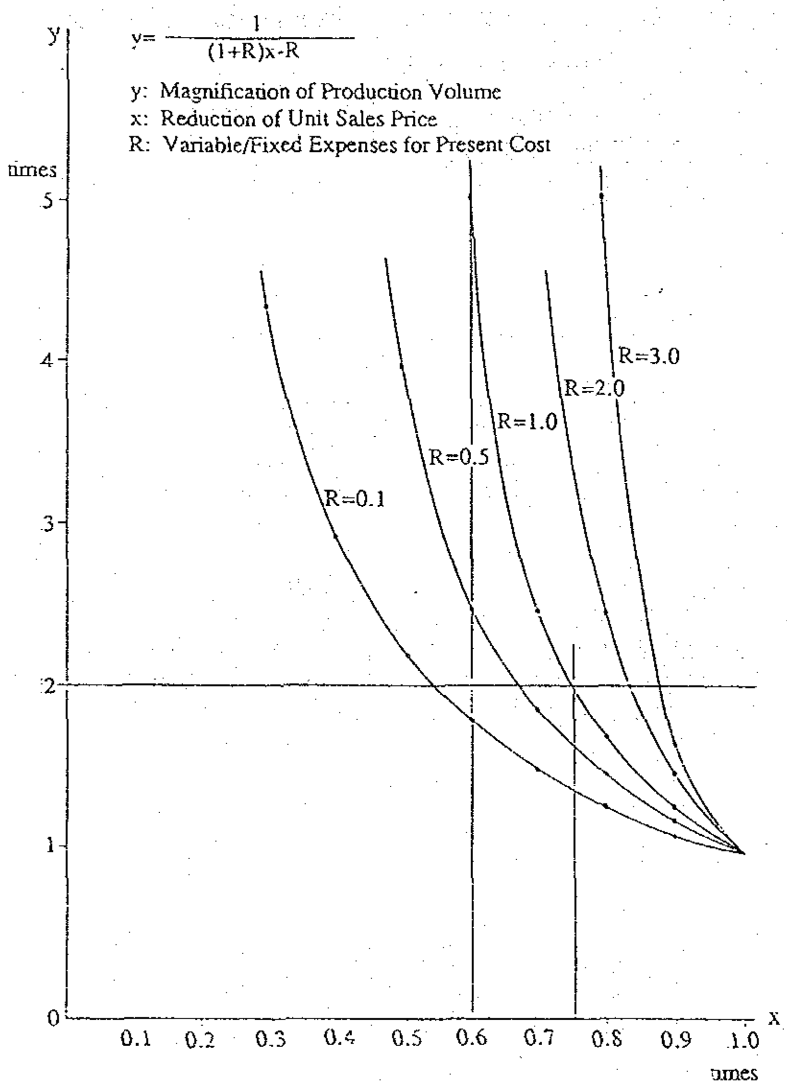
Note: Breakdown of variable costs is direct materials cost, purchased parts cost, indirect materials cost, outside order processing cost, cost for fuel such as crude oil, and other direct costs

It is found from Table V.4-6 and Fig. V.4-1 that Company A with an R of 1.04 could compete by cutting its unit selling price by about 25% and doubling its production volume.

Table V.4-1 shows the unit selling price of fuel tanks are particularly high. The necessity of large-sized presses and metal moulds for production has lowered their parameter R below 1.0. Therefore it may be said that increased volume of production will contribute greatly to a reduction of cost and a cut of unit selling price.

In the production of metal parts which requires large fixed expenses, generally it may be said that increased volume of production will contribute greatly to a reduction of cost, allowing a rise in price competitiveness.

Fig. V.4-1 Correlation Between Reduction in Unit Sales Price and Increase in Production Volume



IV. CHINAWARE

IV. CHINAWARE

1. Overview of the Industry

1-1 Product Items

In this report, chinaware is defined to include both ceramic tableware and ceramic artware, which are available in such various types as porcelain, semi-porcelain, bone-china, stoneware and earthenware.

Heading No.		Description	Unit of Quantity	Import	Sales Tax
69.11		Tableware, kitchenware, other household articles and toilet articles, of porcelain or china.			
6911.10	000	– Tableware and kitchenware	kg	30% or $1.20 w.i.t.h	10%
6911.90	000	– Other	kg	30% or $1.20 w.i.t.h	10%
6912.00	000	Ceramic tableware, kitchenware, other household articles and toilet articles, other than of porcelain or china	kg	30% or $1.20 w.i.t.h	10%
69.13		Statuettes and other ornamental ceramic articles.			
6913.10		– Of porcelain or china:			
	100	cigarette boxes, ash trays and other smokers' accessories	Value	30%	10%
	900	other	Value	20%	10%
6913.90		– Other:			
	100	cigarette boxes, ash trays and smokers' accessories	Value	30%	10%
	900	other	Value	20%	10%

1-2 Supply and Demand

1-2-1 Consumption

Because of the lack of exact production data of chinaware in Malaysia, the estimation of the size of the domestic market is difficult. Approximately, it is estimated that the total consumption of chinaware in Malaysia was in the range of M$60 million - M$70 million annually over the past 5 years.

Table VI. 1-1 Demand and Supply Flow of Chinaware in Malaysia

(Unit: M$ million)

Year	Production	Import	Export/ Re-export	Apparent[1] Consumption
1981	53.4	21.3	5.6	69.1
1982	47.7	18.5	5.6	60.6
1983	54.3	25.0	10.0	69.3
1984	47.3	26.7	14.6	59.4
1985	60.8	27.4	22.0	66.2
1986	80.0[2]	19.7	34.0	65.7

1. Apparent consumption is measured as:
   Production + Import - Export/Re-export
2. Estimate based on field interviews:

Source:Industrial Surveys 1981-1985
Malaysia Annual Statistics of External Trade 1981-1986

1-2-2 Production

According to "Industrial Surveys 1985" published by the Department of Statistics, the total production of pottery, china and earthenware was M$60.8 million, and the total number of establishments was 20 in 1985. This production value is underestimated because figures of those firms having less than 30 employees in W. Malaysia and those having less than 5 employees in Sabah and Sarawak are excluded. However, it is overestimated as a production estimate of chinaware because it would include some ceramic items other than chinaware. On balance, the production figures of Industrial Surveys are judged to be acceptable for use in the estimation of chinaware production in Malaysia.

Table VI. 1-2 Manufactures of Pottery, China and Earthenware in Malaysia

	1982	1983	1984	1985
W. Malaysia				
No. of establishment	19	11	9	10
Total production ($ mil)	48.0	52.8	45.9	59.2
Sabah & Sarawak				
No. of establishment	8	8	9	10
Total production (M$ mil)	1.6	1.5	1.4	1.5

Source: Industrial Surveys 1982-1985

1-2-3 Exports and Imports

Exports of chinaware showed a rapid annual average increase rate of 40.5% during the period 1983-1986 in value terms, while imports showed a slight decline during the same period. As a result, Malaysia has changed from a new importer of chinaware to a net exporter in 1986. (Refer to Table VI. 1-3, Table VI. 1-4, and Fig. VI. 1-1)

The major items of the exports are statuettes and other ornaments, which occupied around 78.2% of the total chinaware imports of Malaysia in recent 5 years, and played the major role in the recent rapid export expansion of chinaware. This owes largely to the start of operation by a large-scale foreign subsidiary firm which directs 100% of their products to export markets. Major markets are the U.S. (share 76.3%), the Netherlands (11.0%), Australia, Canada Singapore, Japan and the U.K. Because the firm has a further expansion plan at present, the export of these items is expected to continue to grow. As for tableware, the exports showed a sudden increase in 1987. The share of tableware exports to the total chinaware exports reached 23.4% to 1987, a jump from 13.5% in the previous year. Another Japanese investor is planning to start operation of a tableware factory. Thus, the exports of tableware would also increase after 1989.

After reached the peak at 1985, the imports of chinaware is steadily decreasing. The major item of the imports has been tableware of porcelain. However, the imports of this tableware of porcelain has been decreasing in recent 5 years. The largest supplier country of the item is China, followed by Japan and W. Germany. The share of these three countries to the total import of tableware of porcelain occupy up to 86.6%.

Among chinaware imports, the largest item is ware of porcelain, occupying around 65% of the total chinaware import. The import of tableware of porcelain showed a small but steady decline tendency after 1983.

The major countries/areas exporting porcelain tableware are China, Japan and Taiwan.

Table VI. 1-3 Import Flow of Chinaware in Malaysia

(Unit: M$1,000)

Item	1983	1984	1985	1986	1987
(Tableware)					
Tableware of porcelain	17,480	15,118	14,794	12,823	11,444
Tableware of stoneware	1,536	1,650	2,587	1,728	1,486
Tableware of other kinds	944	1,275	2,909	999	602
(Artcraft)					
Cigarette Accessories	107	298	110	143	52
Lamp and light fittings	50π4	856	538	636	344
Statuettes and other ornaments	4,488	7,473	6,463	3,343	3,031
TOTAL	25,059	26,670	27,401	19,672	16,959

Source: Malaysia Annual Statistics of External Trade, 1982-1987

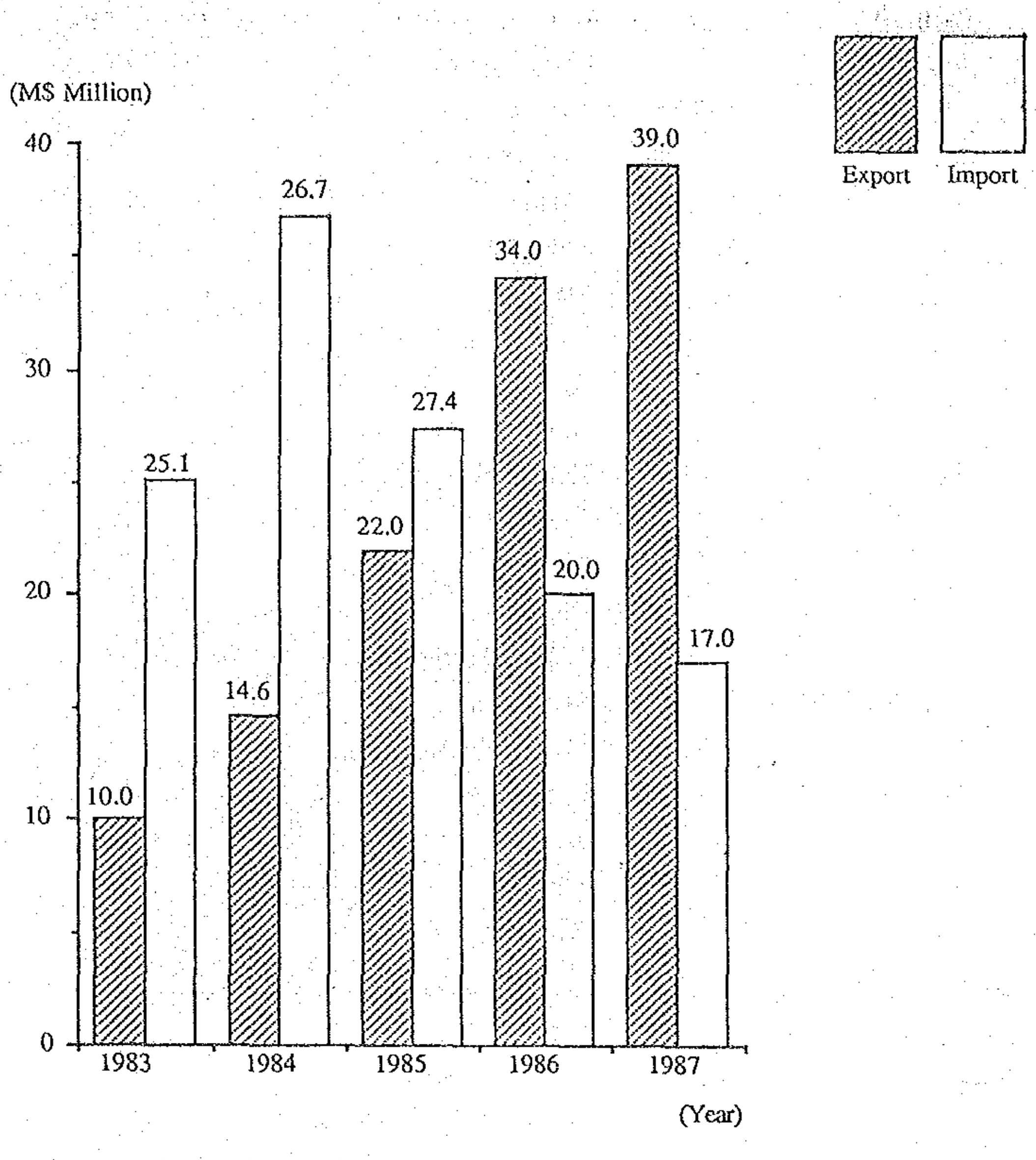
Table VI. 1-4 Export Flow of Chinaware in Malaysia

(Unit: M$1,000)

Item	1983	1984	1985	1986	1987
(Tableware)					
Tableware of porcelain	571	271	365	294	1,888
Tableware of stoneware	2,875	2,758	2,387	2,781	4,910
Tableware of other kinds	681	1,001	1,072	1,534	2,319
(Artcraft)					
Cigarette accessories	19	16	8	78	7
Lamp and light fittings	18	29	49	55	3
Statuettes and other ornaments	5,825	10,583	18,094	29,236	29,830
TOTAL	9,989	14,613	21,975	33,978	38,957

Source: Malaysian Annual Statistics of External Trade, 1982-1987

Fig. VI. 1-1 Export and Import Trend of Chinaware in Malaysia



1-3 Industry Structure

Although there are no exact figures available, there are a relatively large number of family-management type of small-scale ceramic ware manufacturers in Malaysia.

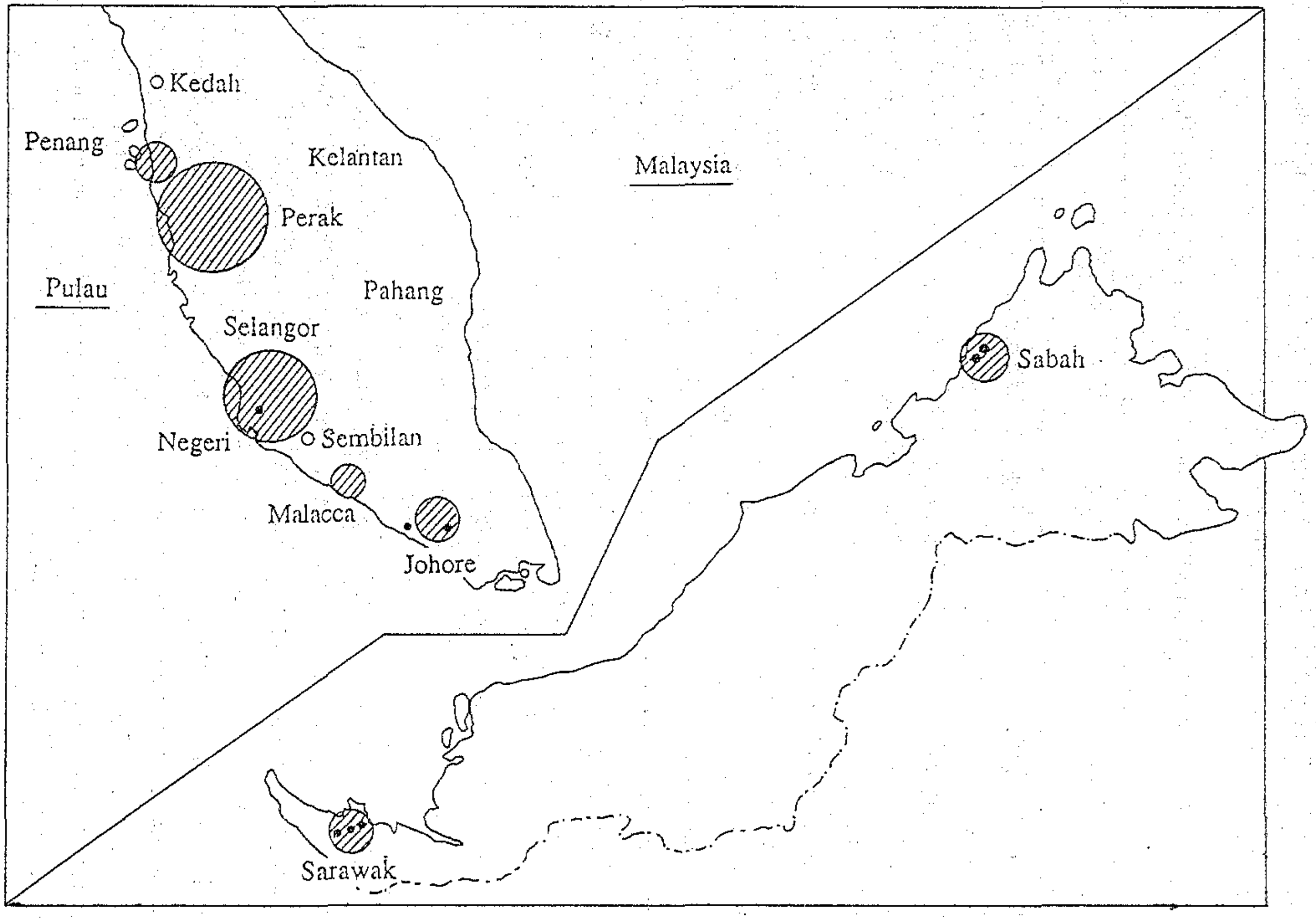
According to :"Industrial Mineral Assessment Report 1984" published by the Geological Survey Department of Malaysia, the number of ceramic ware manufacturers in Peninsular Malaysia is estimated at 114, and "Craft Directory" published by Malaysian Handicraft Development Corp. show those number in East Malaysia at 6. The location of the firms by state is summarized in Table VI. 1-5.

Table VI. 1-5 Location of Ceramicware Manufacturers

State	City	No. of Firms
KEDAH	Kuala Muda	1
	Kuliam	1
PENANG	Seberang Prai Utara	4
	Timor Laut	1
PERAK	Kuala Kangsar	2
	Kerian	5
	Batang Padang	1
	Kinta	43
	Dinding	2
SELANGOR	Kuala Selangor	6
	Gombak	1
	Petaling	3
	Ulu Langat	7
	Federal Territory	24
NEGERI SEMBILAN	Seremban	3
MALACCA	Melaka Tengah	5
JOHORE	Batu Pahat	1
	Kluang	3
PAHANG	Kuantan	1
SABAH	Kota Kinabalu	3
SARAWAK	Kuching	3
TOTAL		120

Source: W. Malaysia Malaysian 1987 Yearbook
Industrial Mineral Assessment Report
1984 Directory on the clay, sand and rock-based industries in Peninsular Malaysia (Geological Survey Department).
E. Malaysia Malaysian Handicraft Development Corporation

Fig. VI.1-2 Geographical Location of Ceramic Ware Manufacturers in Malaysia



Further, "Industrial Mineral Assessment Repot 1984" estimate the production volume of major ceramic products, except for bricks, as follows:

Table VI. 1-6 Production Volume of Major Ceramic Products 1984

	Type of Product	Major States of Production	Production Volume/year
1.	Wall/floor tiles	Selangor, N. Sembilan	3,826,000 m^2
2.	Mosaic tiles	Johore, Selangor	552,000 m^2
3.	Sanitary wares	Selangor, Johore, Kedah	675,000 pcs.
4.	Tablewares	Johore, Selangor	6,828,000 pcs.
5.	Roofing tiles	Selangor & F.T.	1,330m,000 pcs.
6.	Sewage and subsoil pipes	Perak	7,312,000 pcs.
7.	Flower pots	Penang, Perak	2,703,000 pcs.
8.	Latex cups	Melaka, Perak	5,742,000 pcs.
9.	Cooking pots	Selangor and F.T., Perak	167,000 pcs.
10.	Cooking stoves	Perak, Selangor	222,000 pcs.
11.	Saving boxes	Selangor & F.T.	218,000 pcs.

Source: Industrial Mineral Assessment Report
"Production Statistics on Clay, Sand and Rock-based Industries in Peninsular Malaysia for 1984" by N.K. Ang
(Geological Survey Department of Malaysia)

In practice, however, above estimated number of firms is considered to be still underestimated. According to the survey conducted by SIRIM in 1981, the number of ceramic ware manufacturers in Peninsular Malaysia would reach around 350.

Most of these ceramic ware manufacturers in Malaysia do not necessarily specialized in the production of a specific item. Many firms, for example, produced those kinds of products as sewage pipes, flower pots or ornaments in the same factory at once. For this nature of the factory, it is very difficult to estimate the number of firms which produce the targeted product items of tableware and ceramic artware. But the number would become the one which is rather limited.

From their management characteristics, however, chinaware manufacturers in Malaysia could largely be grouped into the following four categories:

A) Tableware manufacturers

B) Decorative manufacturers

- B-1 High-class decorativeware manufacturers
- B-2 General decorativeware manufacturers in W. Malaysia
- B-3 General decorativeware manufacturers in Sabah and Sarawak

At present there is only one specialized tableware manufacturer in Malaysia. This is a joint venture between Japanese and local firms. Their production capacity is around 1.0 million pcs of tableware per month, and the number of employees is about 450 in 1988. Their products are directed both for domestic and for export markets. Another Japanese firm is now preparing to start tableware production in Malaysia.

There are 2 high-class decorative manufacturers presently operating in Malaysia. One firm is a U.S. and another is a Japanese wholly owned subsidiary. Their operation scales are relatively large with the total number of employees around 1,200 and 480, respectively. Their products are all directed into foreign markets.

Most of other chinaware manufacturers are small-scale firms which produce such various kinds of products as flower pots, tableware of earthenware or ceramic artware.

2. Present State of Production

2-1 General

In the field interview survey over 10 chinaware manufacturers were covered, including both tableware and artware manufacturers, located both in W. Malaysia and in Sabah and Sarawak. The names of the companies interviewed and a brief summary of the findings are shown in Table VI.2-1.

General decorativeware manufacturers in W. Malaysia are relatively small in scale. The number of employees of these firms is usually between 30 and 60. They produce various kinds of novelty items such as ash-trays, lamp fittings and statuettes. They produce a limited number of tableware of earthenware. Some of their products are often exported.

Decorative manufacturers in Sabah and Sarawak are mostly the producers of traditional pottery. Most of their products are sold at their own shops located near their factories. Their employees are usually very small in number ranging from 20 to 30.

Table VI.2-1 Summary of Field Interview Survey

		Name of Companies Interviewed	Export Ratio ($)	Number of Employees (No.)	Sales Strategies	Production Process & Specifications	Technical Level	Prodcut Product Development	Relationship with Periphery Industries
West Malaysia	Tableware	Oriental Ceramics	30	450	Export products to Japan, the U.S., Singapore, etc. through their parent company in Japan and its subsidiaries.	Commonly used production process applied for hard earthenware production. Domestic clay materials are used.	High as a manufacturer of hard earthnware	The type of products is to be up-graded to stoneware or further to porcelain.	Local clay material supplier should be developed. Superior quality of packaging materials are needed.
West Malaysia	High-class Decorativeware	Marulee Franklin Porcelain	100 100	480 1,200	All of the products are exported through their parent companies overseas.	Both designs of the products and the specifications for production are decided in the headquarters of their parent companies.	Very high level of quality control measures are taken	Most R&D activities especially in new product development are conducted in the headquarters of their parent companies.	Domestic suppliers which could supply clay materials fit for porcelain production are needed.
West Malaysia	General Decorativeware	Aw Pottery Asian Pottery Hong Pottery	60 20 30	70 30 60	Domestic sales are conducted at shops beside the factories. Except for one firm, others export products based on ad-hoc inquiries.	Major method of forming is slip casting, but jigger forming is also used. Many facilities are already obsolete.	Inferior compared with the technical levels in major competing countries such as China, Taiwan, or Thailand.	Their first concern seems to be more on sales rather than on production.	Various kinds of supportive measures are needed in order to breeding them up to export oriented firms.
East Malaysia		Wong Sian Hup (Sabah) Siner Pottery Wong Sian Hup (Sarawak) Hua lian Pottery	0 0 0 0	23 20 20 25	Products are all sold as souveniors at shop beside the factories.	Most of the factories follow the same traditional production process.	No systematic production control or quality control measures are taken.	For the production of other artware than traditional pottery, the directly imported foreign technologies are used.	Most of them are presently independent from other industries.

2-2 Tableware Manufacturer

There is only one specialized tableware manufacturer operating in Malaysia at present. This company is a joint venture between a Japanese and a local firm. Established in 1973, they presently produce around 0.83 million pcs of tableware per month and export about 30% of their products.

2-2-1 Production process and specifications:

Their production process is basically as follows:

Forming --> Biscuit Firing --> Glazing --> Glost Firing

This process is most commonly used for the production of hard earthenware in Japan and in other major chinaware producing countries. For decoration both the Under Glaze Decoration method, decorating before glost firing, and the Over Glaze Decoration method, decorating after glost firing, are used.

As for raw materials domestic clay minerals are used, but feldspar for glazing is imported. They make good use of kaolin clay produced in Johore.

2-2-2 Technical level

The key production technologies for tableware production are that of raw material formulation and that of firing. The raw material formulation technology includes the quality testing of mineral raw materials, production of well-formulated materials and glazing chemicals. The firing technology is the one to produce a constant quality of ceramic products by proper temperature control.

The tableware manufacturer now operating in Malaysia is a joint venture with a Japanese manufacture, which has over 50 years of tableware production experience, and has enough technical background both in knowledge and experience comparable with other competing countries.

2-2-3 Production development

The product development could be divided into the following two directions; one is the development of new type of products which are produced from different materials through different production processes, and another is the development of new designs or shapes of the existing type of products. For the first type of development, very high level of technology is needed. The latter type of development must be continued day by day and every year.

As for the tableware manufacturer presently operating in Malaysia, it is planning to start the production of tableware of vitreous china, which is a kind of stoneware of high value. They are planning to target these products for the domestic institutional market, in particular, the hotel market.

2-2-4 Sales strategies

They export products to Japan, the U.S., Singapore, Australia and the Middle East through their parent company in Japan and its subsidiaries overseas.

For domestic sales, they have a couple of shops directly under their control. Due to the inflow of a large volume of tableware both of high and medium qualities from competing countries, the domestic competition is very severe.

They are going to penetrate the hotel market with tableware of vitreous china as described above.

2-2-5 Relationship with periphery industries:

For the development of high-value tableware production for the export market, the development of supporting industries has to be achieved in Malaysia. Particularly important is the supply of domestic clay minerals. They are at present supplied in as-mined conditions, which creates inconsistent product quality. According to the tableware manufacturer in Malaysia, they would have to be dependent on imported clay minerals for the production of vitreous china. Further, the development of those firms which could supply superior quality packaging materials for high premium products would be needed.