As shown in Table 2-2-2, 72 companies out of 109, or 66% are located in Selangor State. Analyzed by type of parts and components, 69% to 100% of companies producing each type are located in Selangor, though the percentage of companies producing electrical systems which are located there is relatively low. Companies producing electrical systems are relatively scattered, being located in seven states. On the other hand, companies producing transmissions and brakes are more concentrated and are located in only two or three states.

Table 2-2-2 Position of Selangor State in Connection with the Location of Automotive Parts and Components Manufacturers

	Number of companies	Number of companies located in Selangor State	Percentage of Selangor State
Engine	30	21	70%
Transmission	8	7	88%
Electrical system	21	12	57%
Brake	9	7	78%
Suspension & Steering	16	11	69%
Wheel	10	7	70%
Body	41	32	78%
Direct Consumables	1	1	100%
Accessories	16	11	69%
Total	109	72	66%

Note: The total number of companies by type of parts and components is not consistent with the total number of companies answered, because some companies produce more than two types and are therefore double counted.
Source: Questionnaire Survey, JICA Study Team, July to August, 1994

2.3. SCALE OF COMPANIES BY TYPE OF PARTS AND COMPONENTS

Table 2-2-3 shows the number of companies classified by paid-up capital, sales amount and number of employees.

Table 2-2-3 Scale of Companies by Type of Parts and Components

	No.of Campany	No.of Campany by Type of Products								
		Engine	Power Transmission	Electrical System	Brakes	Suspention & Steerings	Wheels	Body	Direct Consumables	Accessories
Paid-up Capital										
Less Than RM0.5 Millon	16	4	1	5	1	3	2	6	0	2
RM0.5-2.5 Million	44	13	1	7	3	4	2	18	0	8
Over RM2.5 Million	49	13	6	9	5	9	6	17	1	6
Total	109	30	8	21	9	16	10	41	1	16
Annual Sales Amount										
Less Than RM1.0 Million	4	3	0	2	0	1	2	3	0	0
RM1.0～ 5.0 Million	30	7	1	3	2	3	1	11	0	5
RM5.1～10.0 Million	19	6	3	3	2	1	1	8	0	3
RM10.1～20.0 Million	17	7	2	4	2	2	2	7	0	3
RM20.1～50.0 Million	26	5	2	8	3	5	2	8	0	5
Over RM50 Million	13	2	0	1	0	4	2	4	1	0
Total	109	30	8	21	9	16	10	41	1	16
Number of Employees										
29 Persons or Less	11	4	0	1	0	2	2	4	0	1
30- 49 Persons	15	1	1	3	0	0	1	8	0	3
50- 74 Persons	14	3	1	1	2	2	1	3	0	2
75-99 Persons	26	6	1	1	2	0	1	6	0	0
100-299 Persons	28	13	5	6	3	8	4	11	0	9
300-499 Persons	11	1	0	7	1	2	0	6	1	1
500 Persons or More	4	2	0	2	1	2	1	3	0	0
Total	109	30	8	21	9	16	10	41	1	16

Source: Questionnaire Survey, JICA Study Team, July to August, 1994

2.3.1. Paid-up Capital

Analyzed by the amount of paid-up capital, there are 49 companies which have paid-up capital of over RM 2.5 million, 45% of the total, while there are 60 at less than RM 2.5 million which are classified into small and medium industry, or 55% of the total. The average scale of automotive parts and components manufacturers is relatively large judging from the fact that the percentage of SMI in Malaysia is about 93%.

Especially, the percentage of companies having paid-up capital of over RM 2.5 million that are

manufacturing transmissions, brakes, suspension & steering and wheels is more than 50% which is a very high rate of large industry.

2.3.2. Sales Amount

As for companies which are producing engines, electrical systems and wheels, the industrial structure is rather mixed with both SMIs and large scale companies because their sales amounts range from high to low. On the other hand, the percentage of large scale companies is relatively high in the case of suspension & steering manufacturers, while that of SMIs is relatively high in the case of companies producing body parts and components. The difference of sales amount is relatively small for transmission, brake and accessory manufacturers.

2.3.3. Number of Employees

There are 26 companies which have 75 to 99 employees, 24% of the total, and 28 which have 100 to 299, or 26%. Those two categories above account for more than half of the total.

Analyzed by type of parts and components, body parts manufacturers have relatively many employees in comparison with their relatively low sales amount, and this can be regarded as a labour-intensive industry. On the other hand, companies producing transmissions and wheels have relatively smaller numbers of employees compared with the amount of paid-up capital, and these can be regarded as capital-intensive.

2.4. OUTLINE OF COMPANIES BY PRODUCTION PROCESS

Table 2-2-4 shows the number of companies by production process. The companies have 346 production processes in total and the average number of production processes per company is 3.2 which is derived from the total number of production processes divided by the number of companies. Parts assembling is conducted by 54.1% of the companies, the most common production process.

Twenty-nine bumiputera companies have 64 production processes in total. The average processes per company are about 2.2, derived from the total processes divided by the number of companies. This is less than the total average.

Table 2-2-4 Number of Companies by Production Process

Production Process	Total Companies		Bumiputera Companies	
	No. of Companies	%	No. of Companies	%
Assembly	59	54.1	16	55.2
Casting	14	12.8	3	10.3
Forging	10	9.2	1	3.4
Machining	39	35.8	6	20.7
Presswork	39	35.8	9	31.0
Sheetwork	5	4.6	0	0.0
Rolling Presswork	11	10.1	1	3.4
Welding	31	28.4	4	13.8
Soldering	13	11.9	0	0.0
Plating and Surface Treatment	12	11.0	1	3.4
Heat Treatment	22	20.2	2	6.9
Painting	29	26.6	6	20.7
Plastic Moulding	16	14.7	9	31.0
Rubber Forming	13	11.9	0	0.0
Sintering	1	0.9	0	0.0
Ceramic Coating	1	0.9	0	0.0
Glass Works	3	2.8	0	0.0
Others	28	25.7	6	20.7
Total	346	-	64	-

Source: Questionnaire Survey, JICA Study Team, July to August, 1994

Table 2-2-5 shows the listing for production processes from high percentage to low. Parts assembling, sheetwork, machining and so on are conducted by many companies. On the other hand, rolling presswork and glass works are conducted only by a limited number of companies and sintering and ceramic coating are conducted by few companies.

Table 2-2-5 Classification of Production Process Lined by Reply Rate

Classification	Production Processes	
Conducted by Manufacturers of More than 50%	Parts Assembly	54.1%
Conducted by 15 to 50%	Machining	35.8%
	Presswork	35.8%
	Welding	28.4%
	Painting	26.6%
	Heat Treatment	20.2%
Conducted by 7.5% to 15%	Plastic Moulding	14.7%
	Casting	12.8%
	Soldering	11.9%
	Rubber Moulding	11.9%
	Plating & Surface Treatment	11.0%
	Rolling Presswork	10.1%
	Forging	9.2%
Conducted by 2.5 to 7.5%	Sheetwork	4.6%
	Glass work	2.8%
Conducted less than 2.5%	Sintering	0.9%
	Ceramic Coating	0.9%

Source: Questionnaire Survey, JICA Study Team, July to August, 1994

Table 2-2-6 shows the reply rate of bumiputera companies concerning production processes in comparison with the total. The reply rate for plastic molding is relatively high and that for forging, machining, presswork, welding, heat treatment and plating & surface treatment is much lower. In addition, sheetwork, soldering, rubber molding, sintering, ceramic coating and glass works are not conducted at all.

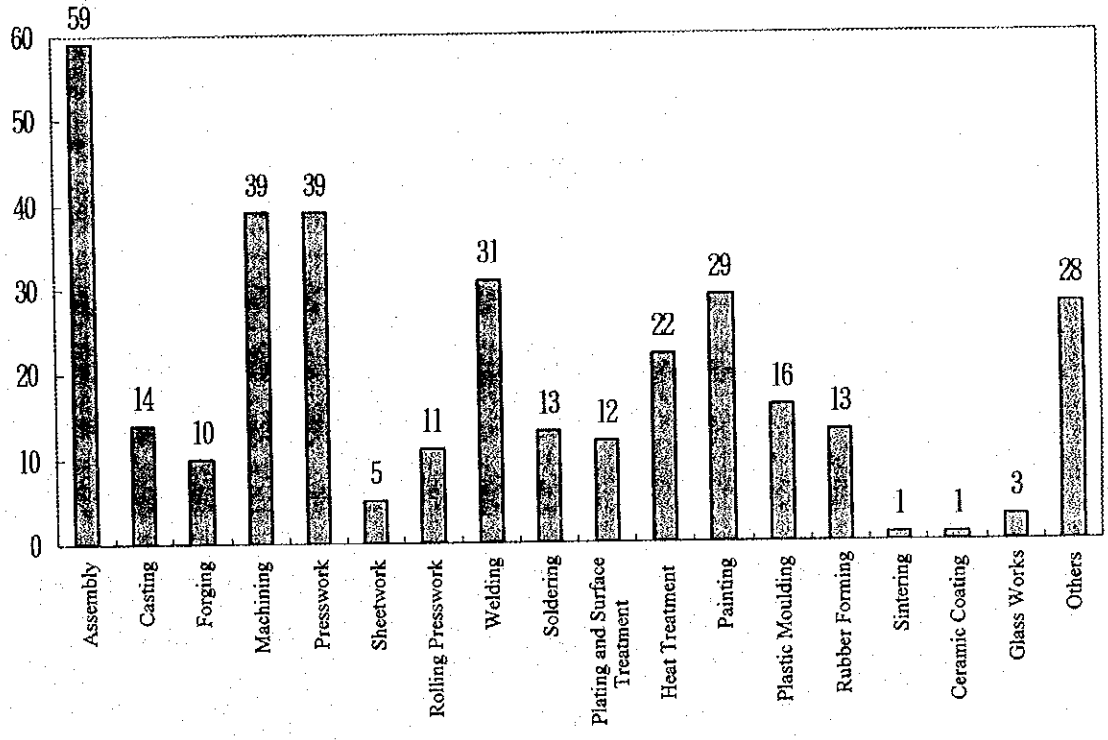
Table 2-2-6 Reply Rate for Production Process of Bumiputera Companies in Comparison with the Total

Classification	Production Processes
Production processes conducted more frequently than the total	Plastic moulding
Production processes conducted less frequently than the total	Forging, machining, rolling presswork, welding, heat treatment, plating & surface treatment
Production processes not conducted at all	Sheetwork, soldering, rubber moulding, sintering, ceramic coating, glass work

Source: Questionnaire Survey, JICA Study Team, July to August, 1994

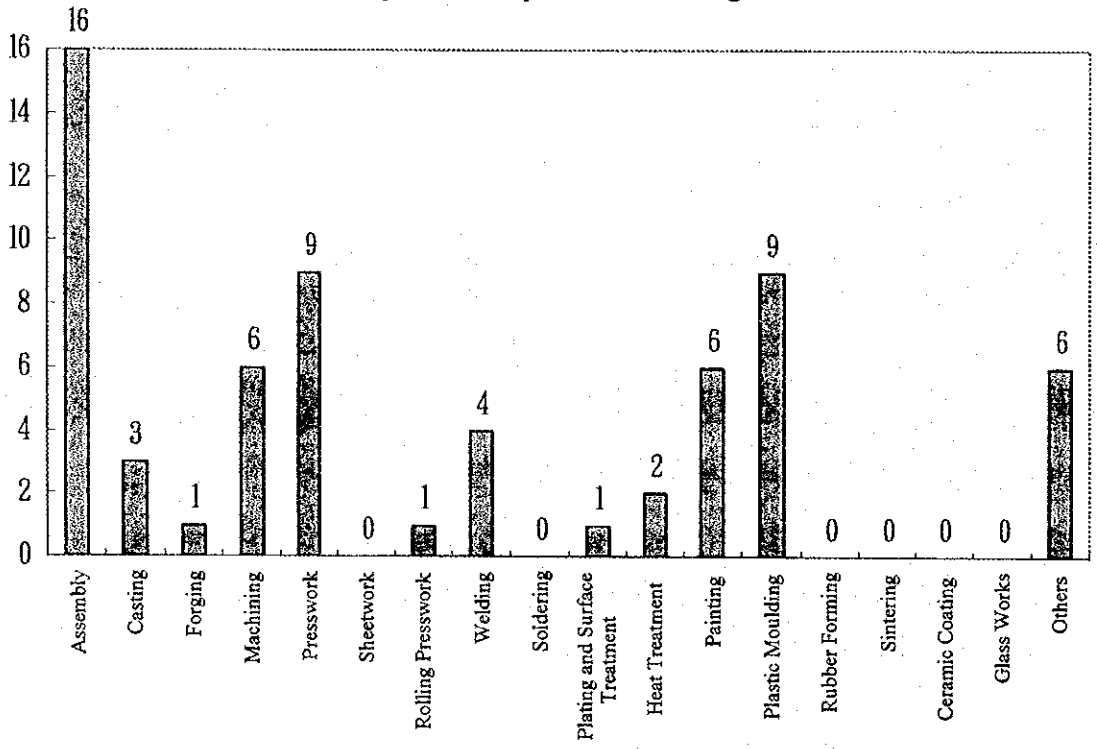
Fig. 2-2-2 shows the number of companies conducting each production process and Fig. 2-2-3 shows that of Bumiputera companies.

Fig. 2-2-2 Number of Companies Conducting Each Production Process



Source: Questionnaire Survey, JICA Study Team, July to August, 1994

Fig. 2-2-3 Number of Bumiputera Companies Conducting Each Production Process



Source: Questionnaire Survey, JICA Study Team, July to August, 1994

2.5. OUTLINE OF COMPANIES BY YEAR OF ESTABLISHMENT

2.5.1 Location

Table 2-2-7 shows the year of establishment of responding companies with their location. 34% of all the companies were established before 1979, 63% were established before 1985 and 90% before 1990.

There is little difference in tendency towards year of establishment among states except that the number of establishments was concentrated in Penang between 1980 and 1985.

Table 2-2-7 Year of Establishment of Companies with their Location

State	Year of establishment				
	~1979	1980~1985	1986~1990	1991~1994	Total
Selangor	20	24	21	7	72
Shah Alam	6	6	9	3	24
Klang	7	4	5	0	16
Others	7	14	7	4	32
Kuala Lumpur	3	3	2	0	7
Perak	5	1	3	1	10
Penang	1	4	0	1	6
Johor	4	0	2	0	6
Kedah	2	0	0	0	2
Melaka	1	0	1	1	3
Negeri Sembilan	1	0	0	0	1
Terengganu	0	0	0	1	1
Total	37	32	29	11	109

Source: Questionnaire Survey, JICA Study Team, July to August, 1994

2.5.2. Ownership

There is a clear difference among years of establishment when they are analyzed by ownership. 69% of other domestic companies and 71% of foreign companies had been established by 1985, while only 45% of Bumiputera companies had been established by 1985 and the rest were established after 1986.

Table 2-2-8 Year of Establishment of Companies by Ownership

Ownership	Year of establishment				
	~1979	1980~1985	1986~1990	1991~1994	Total
Bumiputera	6	7	11	5	29
Other domestic	17	10	10	2	39
Foreign	14	15	8	4	41
Total	37	32	29	11	109

Source: Questionnaire Survey, JICA Study Team, July to August, 1994

4.5.3. Production Process

Table 2-2-9 shows year of establishment of companies with their production process.

Table 2-2-9 Year of Establishment with Their Production Process

	-1979		1980-1985		1986-1990		1991-1994		Total
	No. of Campany	%	No. of Campany	%	No. of Campany	%	No. of Campany	%	No. of Campany
Parts Assembling	21	35.6	16	62.7	16	89.8	6	100.0	59
Casting	7	50.0	1	57.1	4	85.7	2	100.0	14
Forging	4	40.0	3	70.0	1	80.0	2	100.0	10
Machining	11	28.2	12	59.0	10	84.6	6	100.0	39
Presswork	10	25.6	14	61.5	11	89.7	4	100.0	39
Sheetwork	3	60.0	0	60.0	2	100.0	0	100.0	5
Rolling Presswork	6	54.5	3	81.8	1	90.9	1	100.0	11
Welding	12	38.7	9	67.7	8	93.5	2	100.0	31
Soldering	5	38.5	6	84.6	2	100.0	0	100.0	13
Plating & Surface Treatment	5	41.7	4	75.0	2	91.7	1	100.0	12
Heat Treatment	7	31.8	7	63.6	5	86.4	3	100.0	22
Painting	7	24.1	11	62.1	9	93.1	2	100.0	29
Plastic Moulding	4	25.0	3	43.8	7	87.5	2	100.0	16
Rubber Moulding	6	46.2	3	69.2	4	100.0	0	100.0	13
Sintering	0	0.0	0	0.0	0	0.0	1	100.0	1
Ceramic Coating	0	0.0	0	0.0	1	100.0	0	100.0	1
Glass Works	2	66.7	0	66.7	1	100.0	0	100.0	3
Others	11	39.3	8	67.9	6	89.3	3	100.0	28
Total	121	35.0	100	63.9	90	89.9	35	100.0	346

Note: Percentage in the table shows the rate of the cumulative number of companies which had been established by the year shown.
Source: Questionnaire Survey, JICA Study Team, July to August, 1994

By analyzing changes of cumulative rate in each span and with each production process, relatively earlier or later production processes in comparison to the average can be found. The result is shown in Table 2-2-10.

Table 2-2-10 Classification of Production Process by their Year of Establishment

Classification	Production Process
Production processes started earlier than the average	Casting, Forging, Sheetwork, Rolling presswork, Soldering, Plating & surface treatment, Rubber moulding
Production processes started almost at the same time as the average	Parts assembling, Presswork, Welding, Heat treatment, Painting
Production processes started later than the average	Machining, Plastic molding

Source: Questionnaire Survey, JICA Study Team, July to August, 1994

Table 2-2-11 shows the year of establishment of Bumiputera companies classified by their production process. Though the number of companies which answered is limited, the year of establishment is relatively earlier in the case of companies conducting parts assembling and presswork, while it is relatively later in the case of those engaging in machining.

Table 2-2-11 Year of Establishment of Bumiputera Companies Classified by their Production Process

	-1979		1980-1985		1986-1990		1991-1994		Total No. of Campany
	No. of Campany	%	No. of Campany	%	No. of Campany	%	No. of Campany	%	
Parts Assembling	4	25.0	3	43.8	7	87.5	2	100.0	
Casting	0	0.0	0	0.0	1	33.3	2	100.0	3
Forging	0	0.0	1	100.0	0	100.0	0	100.0	1
Machining	1	16.7	0	16.7	3	66.7	2	100.0	6
Presswork	2	22.2	3	55.6	2	77.8	2	100.0	9
Sheetwork	0	0.0	0	0.0	0	0.0	0	0.0	0
Rolling Presswork	0	0.0	0	0.0	0	0.0	1	100.0	1
Welding	0	0.0	1	25.0	2	75.0	1	100.0	4
Soldering	0	0.0	0	0.0	0	0.0	0	0.0	0
Plating & Surface Treatment	0	0.0	0	0.0	1	100.0	0	100.0	1
Heat Treatment	0	0.0	1	50.0	1	100.0	0	100.0	2
Painting	0	0.0	2	33.3	3	83.3	1	100.0	6
Plastic Moulding	1	11.1	2	33.3	5	88.9	1	100.0	9
Rubber Moulding	0	0.0	0	0.0	0	0.0	0	0.0	0
Sintering	0	0.0	0	0.0	0	0.0	0	0.0	0
Ceramic Coating	0	0.0	0	0.0	0	0.0	0	0.0	0
Glass Works	0	0.0	0	0.0	0	0.0	0	0.0	0
Others	2	33.3	1	50.0	1	66.7	2	100.0	6
Total	10	15.6	14	37.5	26	78.1	14	100.0	64

Note: Percentage in the table shows the rate of the cumulative number of companies which had been established by the year shown.

Source: Questionnaire Survey, JICA Study Team, July to August, 1994

2.6. OUTLINE OF COMPANIES BY TYPE OF PARTS AND COMPONENTS

Analysis in this section is based on the information on 108 companies which consists of companies answering whose product lines are clear and those visited by the study team as shown in Table 2-2-12, because companies whose product lines are unknown or unclear cannot be classified.

Table 2-2-12 Number of Target Companies Analyzed by Type of their Products

Classification	Number of Companies
Companies which responded to the questionnaire	109
Companies whose products can be identified clearly and classified into MITI's parts classificaton (A)	99
Companies visited by the study team	45
Companies responded to the questionnaire	36
Companies not responded to the questionnaire (B)	9
Target companies of the study (A)+(B)	108

Source: Questionnaire Survey, JICA Study Team, July to August, 1994

Table 2-2-13 shows the classification of 108 companies by their products according to the major group of MITI's automotive parts classification. Though each company has several products classified into multiple groups, only the main products are selected and classified to make the characteristics of each part group clear.

Table 2-2-13 Classification of Companies by their Products According to the Major Group of MITI's Automotive Parts Classification

Classification	Number of Companies Responding to the Questionnaire	Number of Target Companies of the Study
Engine	30	27
Power transmission	8	8
Electrical system	21	16
Brake	9	8
Suspension & steering	16	11
Wheel	10	7
Body	41	39
Direct consumables	1	0
Accessories	16	14
Total	109	108
Number of Companies Double-counted	43	22

Note: (1) In the case of companies answering the questionnaire, all the products indicated by them are classified into nine groups of parts and components, while only the main parts and components are analyzed and classified into the categories in the case of the 108 companies. For this reason, the number of companies producing each parts group is more in the case of companies which answered the questionnaire than the target 108 companies, therefore the number of companies which is multiple-counted and shown in parenthesis ( ) in the rows of the total line is more in the case of the former than the latter.

(2) Direct consumables/materials are excluded from the target of analysis.

Source: Questionnaire Survey, JICA Study Team, July to August, 1994

2.6.1. Engines

As shown in Table 2-2-14, more than 40% of the 27 companies which produce engine parts, also produce such metal parts and components as transmission, brake or body parts, because manufacturers can commonly make use of factory facilities for casting, forging, machining, heat treatment and so forth for producing the above mentioned parts and components.

Five companies which produce engine and/or transmission parts and components are relatively large scale with an average of 227 employees, while the scale of 16 companies which produce only engine parts is relatively smaller with an average of 108 employees(calculated from the data of 14 companies whose number of employees is known).

Most of the parts and components classified into MITI's sub-groups of cylinder heads, cylinder blocks or crank cases and manufactured in Malaysia are small and medium ones whose local content points are relatively low. On the other hand, such casting or forging parts or components as cylinder heads, cam shafts, cylinder blocks or crankshafts whose local content points are high are only produced or projected to be localised by PROTON and no manufacturer is producing them.

The number of parts and components which are classified into MITI's sub-groups of fuel system and induction system/exhaust system such as filters, fuel tanks and mufflers, and manufactured in Malaysia is relatively large.

Table 2-2-14 Manufacturers of Engine Parts and Components

Classification of products	Number of Target Companies of the Study
Engine Parts Only	16
Engine + Transmission	1
Engine + Brake	1
Engine + Transmission + Brake	3
Engine + Other Parts than the above	6
Total	27

Source: Questionnaire Survey, JICA Study Team, July to August, 1994

2.6.2. Transmissions

As shown in Table 2-2-15, there are eight companies which produce transmission parts and components. Two companies are only producing transmission parts and components, while six are

also producing engine and/or brake parts and components.

As for parts and components which are classified into gearboxes and rear axles by MITI's sub-grouping, there are not so many manufacturers in Malaysia and locally manufactured ones are very few. On the other hand, parts and components classified under clutches are more often manufactured in Malaysia.

Table 2-2-15 Manufacturers of Transmission Parts and Components

Classification of Products	Number of Companies of the Study
Transmission	2
Transmission + Engine	1
Transmission + Brake	2
Transmission + Engine + Brake	3
Total	8

Source: Questionnaire Survey, JICA Study Team, July to August, 1994

2.6.3. Brakes

As shown in Table 2-2-16, there are eight brake manufacturers, two of which produce only brake parts and components. The other six manufacturers also produce engine and/or transmission parts.

Table 2-2-16 Manufacturers of Brake Parts and Components

Classification of products	Number of companies of the study
Brake parts only	2
Brake + Engine	1
Brake + Transmission	2
Brake + Engine + Transmission	3
Total	8

Source: Questionnaire and interview survey

Table 2-2-17 shows the outline of manufacturers producing engine, transmission and/or brake parts and components.

Table 2-2-17 Outline of Manufactuers Producing Engine, Transmission, and Brake Parts

		Engine Parts														
		A Co.	B Co.	C Co.	D Co.	E Co.	F Co.	G Co.	H Co.	I Co.	J Co.	K Co.	L Co.	M Co.	N Co.	O Co.	P Co.
1.2 CYLINDER HEAD	1.2.6 CAM SHAFT PULLE	O															
1.3 CYLINDER BLOCK	1.3.1 CYLINDER BLOCK ASSEMBLY			Cylinder Liner											Clynder Liner	Clynder Liner	
	1.3.2 ENGINE PISTON	O							O						O	O	
1.4 CRANK CASE	1.4.3 FLYWHEEL																
	1.4.5 CRANKSHAFT PULLEY	O						O									
1.5 OTHER RELATED PARTS	1.5.3 ENGINE MOUNTING BRACKET																
1.6 LUBRICATING SYSTEM	1.6.1 OIL PUMP	Inner&Outer															
	1.6.2 PIPES																
	1.6.3 HOSES																
	1.6.4 OIL FILTER RADIATOR										O	O	O				
	1.6.6 OIL PUMP GEAR SHAFT	O															
	1.6.9 OTHER RELATED PARTS - GASKETS - DISPTICK - CONNECTORS - OIL SEAL - OIL DRAIN PLUG				O Gaskets					O Gaskets							
1.7 FUEL SYSTEM	1.7.3 FUEL PIPE																
	1.7.4 AIR CLEANER										O	O	O				
	1.7.5 AIR CLEANER HOUSING										O		O				
	1.7.6 FUEL TANK																
	1.7.7 FUEL FILTER										O	O	O				
1.8 INDUCTION SYSTEM/ EXHAUST SYSTEM	1.8.3 EXHAUST MANIFOLD																
	1.8.4 EXHAUST PIPE FRONT					O								O			O
	1.8.5 SILENCER FRONT					O								O			O
	1.8.6 SILENCER REAR					O								O			O
	1.8.9 CATALYTIC CONVERTER													O			
1.9 COOLING SYSTEM	1.9.1 RADIATOR MANUAL/AUTO CLAMP																
	1.9.2 RADIATOR HOSES/CLAMP																
	1.9.3 FAN COMPLETE		Fan Belt														
	1.9.6 WATER PUMP						O										
	1.9.8 OTHER RELATED PARTS - CLAMPS - BELTS - BRACKETS																
1.10 ENGINE CONTROLS	1.10.1 FUEL PEDAL																
Owunership	Bumiputera		O			O	O		O 3%		O	–			–	O	
	Other Domestic		O	O					O 14%	O 100%	O	–	O	O	–	O	O
	Foreign	O 100%	O 38%		O 100%			O 100%	O 83%		O	–			–	O	O
Custmer	PROTON	O			O		–	O	O 68%		O 72%				–		O 73%
	Non-PROTON	O	O	O		O	–	O	O		O		O	O	–	O	O
	REM			O			–			O		O 88%			–		
	Export	O 88%	O 28%		O 88%		–		O 18%	O	O 18%	O 28%	O 2%	O 3%	–	O 38%	
Scale of Campany	Paid-Up Capital (Million RM)	10	3	0.69	2	0.4	2.5	15	31.2	0.54	2.4	–	1.3	6.3	–	1.1	3
	Annual Sales (Million RM)	–	20	1	13	1.5	4	15.6	93	5.5	32	–	4.4	20	–	2	33.4
	No.of Employees	96	285	17	89	50	106	123	150	24	158	–	64	143	–	30	173
Nationality of Technical Partner		Japan	Japan		Japan				Taiwan		Japan			Germany, Japan			Japan

Table 2-2-17 Outline of Manufactuers Producing Engine, Transmission, and Brake Parts (Continued)

		Engine, Transmisson & Brake Parts					Engine & Other Parts						Transmisson Parts		Transmission & Brake Parts		Brake Parts	
		A Co.	B Co.	C Co.	D Co.	E Co.	F Co.	G Co.	H Co.	I Co.	J Co.	K Co.	L Co.	M Co.	N社	O社	P Co.	Q Co.
1.4 CRANK CASE	1.4.3 FLYWHEEL	○																
	1.4.5 CRANKSHAFT PULLEY																	
1.5 OTHER RELATED PARTS	1.5.3 ENGINE MOUNTING BRACKET	○		○														
1.6 LUBRICATING SYSTEM	1.6.1 OIL PUMP									○								
	1.6.2 PIPES					○												
	1.6.3 HOSES							○										
1.7 FUEL SYSTEM	1.7.3 FUEL PIPE					○												
	1.7.4 AIR CLEANER																	
	1.7.5 AIR CLEANER HOUSING																	
	1.7.6 FUEL TANK						○		○									
	1.7.7 FUEL FILTER																	
1.8 INDUCTION SYSTEM/ EXHAUST SYSTEM	1.8.3 EXHAUST MANIFOLD	○																
	1.8.4 EXHAUST PIPE FRONT																	
1.9 COOLING SYSTEM	1.9.1 RADIATOR MANUAL/AUTO CLAMP										○	○						
	1.9.2 RADIATOR HOSES/CLAMP							○										
	1.9.3 FAN COMPLETE										○							
	1.9.6 WATER PUMP																	
	1.9.8 OTHER RELATED PARTS - CLAMPS - BELTS - BRACKETS		Water Pump Pulley															
1.10 ENGINE CONTROLS	1.10.1 FUEL PEDAL				○													
2.1 CLUTCH	2.1.1 CLUTCH PLATE	○											○					
	2.1.9 CLUTCH HOUSING		Release Shaft										○		Clutch Assembly			
	2.1.11 CLUTCH PEDAL				○													
2.2 GEARBOX	2.2.3 MOUNTING			○														
	2.2.14 GEAR SHIFT SHAFT		Shift Fork Shaft		○													
2.4 REAR AXLE	2.4.1 DRIVE SHAFT ASSEMBLY													Front Drive Shaft				
	2.4.5 PROTECTIVE PLATES															○		
4.1 WHEEL BRAKE	4.1.1 BRAKE	○													○		○	
	4.1.4 TUBINGS					○												
	4.1.6 MASTER CYLINDER															Brake Hose Bracket		
	4.1.8 BRAKE PAD/SHOES																○	○
	4.1.9 BRAKE PEDAL				○													
4.2 PARKING BRAKE	4.2.1 BRAKE LEVER			○														
	その他部品	9.2.7		6.1.9 7.1.17 7.1.28 7.1.29 7.1.30	6.1.4 7.1.17 7.1.28 7.1.29		7.1.6 7.1.7 7.1.11 7.1.12 7.1.26 7.1.27 7.1.28 7.1.29 7.1.30 7.1.33	7.2.21 7.2.22 9.2.4	5.2.4 7.1.18 9.3.2	3.2.1	3.2.1 3.3.1 3.5.1 7.2.13 7.3.21	7.3.1 7.3.2 7.3.6 7.3.8						
Owunership	Bumiputera	○	○	○45%	○		–			○	○61%		–	○	○			
	Other Domestic		○	○6%	○	○	–	○	○		○9%	○	–			○	○	○
	Foreign		○	○49%		○38%	–	○			○49%		–	○68%	○			
Custmer	PROTON	○88%	○100%	○88%	○	○45%		○	○	○	○62%	○6%		○88%	○88%	○100%		–
	Non-PROTON	○		○		○	○85%	○	○	○	○	○					○	–
	REM												○		○13%		○	–
	Export						○15%	○18%	○2%		○3%	○6%		○12%	○7%		○15%	–
Scale of Campany	Paid-Up Capital (Million RM)	25. 7	10	10	1. 6	1. 5	1	2	6. 8	–	16	8. 5	–	20	18	2	0. 45	10. 5
	Annual Sales (Million RM)	12	10	–	12. 6	10	6~7	7	30	15	108. 7	44	–	30	39	4	4~5	25
	No.of Employees	180	120	580	157	100	80	145	200	170	374	300	–	160	83	60	50	364
Nationality of Technical Partner		Japan	Japan	Japan		France		Denmark, Thailand, Jpn.	Japan	Japan	Japan	Japan		Germany	Japan		Japan	

2.6.4. Electrical Systems and Accessories

The category of electrical systems and accessories includes so many electrical and electronic parts and components that they should be analyzed together.

As shown in Table 2-2-18, according to MITI's classification of major parts and components groups, electrical system and accessory manufacturers are classified as follows:

Table 2-2-18 Classification of Electrical System and Accessory Manufacturers

Classification of Products	Number of Companies Producing Classified Products		Number of Target Companies in the Study
Electrical System Only	Alternators, starters	1	12
	Other electrical parts such as bulbs, meters and plugs	3	
	Wireharnesses, cables	4	
	Batteries	4	
Electrical System + Accessories	Alternators, starters	1	4
	wireharnesses, cables	1	
	Audios, clocks	2	
Accessories Only	Cables	1	10
	Audios	1	
	Aair conditioners	6	
	Other accessories	2	
Total			26

Source: Questionnaire Survey, JICA Study Team, July to August, 1994

To make characteristics of parts and components included in this category clearer, the following six categories are adopted as shown in Table 2-2-19.

Table 2-2-19 Six Categories of Electrical System and Accessory Parts and their Manufacturers

Classification	Production Processes	Number of Target Companies of the Study
Alternators, starters and distributors	Such processing of motor parts as machining, presswork, welding and heat treatment, and parts assembling	2
Wireharnesses and cables	Parts assembling	6
Batteries	Machining, plastic moulding and parts assembling	4
Audios, clocks and alarms	Assembling of electronic parts	3
Air conditioners	Machining, welding, heat treatment and parts assembling	6
Other parts such as bulbs, meters, plugs and other accessories	Parts assembling	5
Total		26

Source: Questionnaire Survey, JICA Study Team, July to August, 1994

Characteristics of manufacturers producing each category of product are briefly summarised as followed:

(1) Alternators, Starters and Distributors

Two manufacturers producing these items have technical collaboration with Japanese manufacturers. Though the structure of parts and components is very complicated and requires higher technology, the rate of local content is relatively high. For example, it is 70% in the case of alternators.

(2) Wireharnesses and Cables

Wireharnesses are produced by manufacturers which are large scale in terms of employees(the average number of employees among four companies is 755). This industry is a typical labour-intensive one because the sales amount is relatively low in comparison with the number of

employees. On the other hand, the manufacturers producing cables are both small scale ones.

(3) Batteries

The market size of REM products is larger than that of OEM ones. High technology is not always necessary to produce batteries and technological collaboration with overseas manufacturers is rare. Only one company out of four manufacturers has technical cooperation.

(4) Audios, Clocks and Alarms

All three of the companies are 100% affiliated ones of foreign manufacturers and are located in Malaysia in line with the global strategy of their principals. They are all large scale and export most of their products to the U.S., Europe and Japan.

(5) Air Conditioners

Manufacturers are classified into two groups: one is a group producing the air conditioner itself and the other is that producing components and repair parts. The scale of companies is relatively small because they mainly produce and assemble condensers and evaporators.

Table 2-2-20 shows the outline of manufacturers producing electrical system and accessory parts.

Table 2-2-20 Outline of Manufactuers Producing Electrical System and Accessory Parts

		Alternator, Distributer, Starter		Other Electrical Parts			Wiring Harness & Cable						Battery			
		A Co.	B Co.	C Co.	D Co.	E Co.	F Co.	G Co.	H Co.	I Co.	J Co.	K Co.	L Co.	M Co.	N Co.	O Co.
3.1 BATTERY	3.1.1 BATTERY												○	○	○	○
3.2 ALTERNATOR	3.2.1 ALTERNATOR	○	○													
3.3 STARTER	3.3.1 STARTER MOTOR	○	○													
3.4 IGNITION SYSTEM	3.4.1 DISTRIBUTOR ASS	○														
	3.4.3 IGNITION CABLES									○						
	3.4.5 SPARK PLUG					○										
3.5 LIGHTING	3.5.4 ROOM LIGHTING				○											
	3.5.7 TRUNK LAMP				○											
3.6 OTHER ELECTRICAL EQUIPMENT	3.6.1 WIPER MOTOR	○	○													
3.7 WIRING AND FUSES	3.7.1 WIRING HARNESS COMPLETE						○	○	○ WIRING LEADS			○				
	3.7.3 CONTROLLER RELAY -FLASHER -FUEL PUMP RELAY -WIPER RELAY -HEAD LAMP RELAY -OVERDRIVE RELAY -CENTRAL LOCK -WINDOW LIFT RELAY															
3.8 INSTRUMENTATION	3.8.1 INSTRUMENT CLUSTER			○												
	3.8.2 FUEL GAUGES			○												
9.1 RADIO SYSTEM	9.1.1 RADIO SET															
	9.1.3 POWER ANTENNA															
	9.1.4 CABLES/CLAMPS						○									
9.2 AIRCONDITIONER COMPLETE	9.2.1 EVAPOLATOR		○ AMPLIFIER													
	9.2.2 ACCUMULATOR															
	9.2.3 COMPRESSOR															
	9.2.4 HOSES															
	9.2.5 COTROL CABLES										○					
	9.2.6 LINKAGES															
	9.2.7 BRACKETS															
	9.2.8 MOUNTINGS															
9.4 ACCESSORIES	9.4.5 ALARM															
Other Parts		1.9.3	1.9.1 1.9.3													
Owunership	Bumiputera		○51%	○	○75%			○				○	○74%	○38%		
	Other Domestic	○	○8%		○25%	○	○		○	○	○		○16%	○42%	○	○
	Foreign		○43%	○66.7%			○						○10%	○30%		
Custmer	PROTON	○	○62%	○47%	○	○30%		○55%			○100%	○	○18%			
	Non-PROTON	○	○		○		○	○	○			○	○	○	○18%	
	REM					○70%				○				○	○42%	○
	Export		○3%	○62%			○18%	○18%		○30%		○	○24%	○1%	○48%	○30%
Scale of Company	Paid-Up Capital (Million RM)	1	16	9	0.07	1.5	2	5.6	0.4	0.25	0.5	5.5	12.3	5	0.8	1.1
	Annual Sales (Million RM)	39	108.7	40	0.6	6	20	44	3.5	1.5	1.2	53.8	38	15.9	27	30
	No.of Employees	88	374	344	41	30	273	1100	100	6	6	1547	330	180	185	300
Nationality of Technical Partner		Japan	Japan	Germany			Japan	Japan				Japan		Japan		

Table 2-2-20 Outline of Manufactuers Producing Electrical System and Accessory Parts (Continued)

		Radio, Clock, Alarm			Airconditioner						Other Accessories	
		A Co.	B Co.	C Co.	D Co.	E Co.	F Co.	G Co.	H Co.	I Co.	J Co.	K Co.
3.1 BATTERY	3.1.1 BATTERY											
3.2 ALTERNATOR	3.2.1 ALTERNATOR											
3.3 STARTER	3.3.1 STARTER MOTOR											
3.4 IGNITION SYSTEM	3.4.1 DISTRIBUTOR ASS											
	3.4.3 IGNITION CABLES											
	3.4.5 SPARK PLUG											
3.5 LIGHTING	3.5.4 ROOM LIGHTING											
	3.5.7 TRUNK LAMP											
3.6 OTHER ELECTRICAL EQUIPMENT	3.6.1 WIPER MOTOR											
3.7 WIRING AND FUSES	3.7.1 WIRING HARNESS COMPLETE											
	3.7.3 CONTROLLER RELAY -FLASHER -FUEL PUMP RELAY -WIPER RELAY -HEAD LAMP RELAY -OVERDRIVE RELAY -CENTRAL LOCK -WINDOW LIFT RELAY		○ FLASHER	○								
3.8 INSTRUMENTATION	3.8.1 INSTRUMENT CLUSTER		○ CLOCK									
	3.8.2 FUEL GAUGES											
9.1 RADIO SYSTEM	9.1.1 RADIO SET	○		○								
	9.1.3 POWER ANTENNA			○								
	9.1.4 CABLES/CLAMPS											
9.2 AIRCONDITIONER COMPLETE	9.2.1 EVAPOLATOR				COMPLETE	COMPLETE	COMPLETE	REPAIR PARTS	COMPLETE	○		
	9.2.2 ACCUMULATOR											
	9.2.3 COMPRESSOR											
	9.2.4 HOSES											
	9.2.5 COTROL CABLES											
	9.2.6 LINKAGES											
	9.2.7 BRACKETS											
	9.2.8 MOUNTINGS											
9.4 ACCESSORIES	9.4.6 ALARM		○								9.3.4	9.3.4
Other Parts												
Owunership	Bumiputera				○	○88%	○57%		−			
	Other Domestic				○			○	−	○	○	○
	Foreign	○100%	○100%	○100%	○	○20%	○43%		−			
Custmer	PROTON			○5~10%	○75%	○82%	○				○	○
	Non-PROTON		○8%		○	○	○		○		○	○
	REM			○				○				
	Export	○100%	○92%	○85~90%			○	○20%		○60%		
Scale of Campany	Paid-Up Capital (Million RM)	130	4.92	−	0.4	15	6.3	0.5	0.5	2	4	0.5
	Annual Sales (Million RM)	−	35	400	46	32	154	6	36	5	16	3
	No.of Employees	−	350	2800	102	112	321	70	150	40	180	32
Nationality of Technical Partner			England		Japan	Japan	Japan			Australia		Japan

2.6.5. Suspension and Steering

As shown in Table 2-2-21, eight of the total of eleven companies are producing only suspension and steering parts and components.

Such large parts and components as shock absorbers, struts, suspension arms, and worms & pinions whose local content points are high are produced in Malaysia and the scale of their manufacturers is relatively large.

Table 2-2-21 Manufacturers of Suspension and Steering Parts and Components

Classification of Products	Number of Target Companies of the Study
Suspension & steering parts only	8
Engine, transmission and brake parts in addition	3
Total	11

Source: Questionnaire and interview survey

Table 2-2-22 shows the outline of manufacturers producing suspension and steering parts and components.

Table 2-2-22 Outline of Manufacturers Producing Suspension & Steering Parts

		A Co.	B Co.	C Co.	D Co.	E Co.	F Co.	G Co.	H Co.	I Co.	J Co.	K Co.
5.1 SUSPENSION	5.1.1 FRONT SHOCK ABSORBER			O		O						
	5.1.2 REAR SHOCK ABSORBER			O		O						
	5.1.3 SURUT					O						
	5.1.4 FRONT STABILIZER							O				
	5.1.5 REAR STABILIZER							O				
	5.1.6 BUSHING/BEARING						O					
	5.1.7 COIL SPRING/ LEAF SPRING		O		O			O		O		
	5.1.8 SHACKLE PINS	O			O							
	5.1.9 FRONT SUSPENSION ARM										O	
	5.1.13 U-BOLTS	O			O							
5.2 STEERING	5.2.1 WORM AND PINION GEAR								O			
	5.2.4 COLUM											O
	5.2.10 OTHER RELATED PARTS -PULLEY -HOSES -BRAKET -PROTECTION KNOB						O Steering Bellow					
Other Parts					6.1.3						1.5.3 7.1.17 7.1.28 7.1.29 7.1.38	1.7.6 7.1.18 9.3.2
Owuner-ship	Bumiputera		O30%	O9%		O	O	-		O30%	O45%	
	Other Domestic	O80%	O70%	O61%	O	O		-		O70%	O6%	O
	Foreign	O20%		O38%		O	O	-	O		O49%	
Custmer	PROTON					O50%		O92%	O94%		O60%	O
	Non-PROTON	O	O	O	O	O	O	O		O	O	O
	REM											
	Export	O5%	O30%	O2%	O20%	O12%	O52%		O6%			O2%
Scale of Campany	Paid-Up Capital (Million RM)	1	1	31.7	18	8.8	5.3	6.13	18.24	1	10	6.8
	Annual Sales (Million RM)	2	30	77	17.5	75	4	10	25	30	-	30
	No.of Employees	120	60	700	240	333	177	104	194	60	580	200
Nationality of Technical Partner			Japan	Japan		Japan			Germany		Japan	Japan

2.6.6. Wheels

As shown in Table 2-2-23, seven companies produce products included in this category. Six companies manufacture only wheel parts and components, while one also manufactures various kinds of bolts and nuts.

Table 2-2-23 Manufacturers of Wheel Parts and Components

Classification of Products	Number of Target Companies of the Study
Tyres	2
Valves	2
Wheel rims	2
Nuts	1
Total	7

Source: Questionnaire and interview survey

This category is highly localised. The outline of manufacturers producing tyres, valves or wheel rims is as follows:

(1) Tyres

Goodyear and Dunlop occupy about 80% of the total market and the remaining 20% is shared by other domestic manufacturers and imports.

(2) Valves

One of the two target companies(Auto Ancillary Manufacturers) mainly produces valves.

(3) Wheel Rims

One of the two target companies(Oriental Metal Industries) mainly produces steel wheel rims for the automotive industry.

Table 2-2-24 shows the outline of manufacturers producing wheel parts and components.

Table 2-2-24 Outline of Manufacturers Producing Wheel Parts

		A Co.	B Co.	C Co.	D Co.	E Co.	F Co.	G Co.
6.1 WHEELS	6.1.1 TYRE & VALVES	O Tire Valve	O Tire Valve	O				O
	6.1.2 RIM				O		O	
	6.1.3 NUT					O		
Other Parts						BOLT&NUT		
Owuner-ship	Bumiputera	O28%		O	O			O34%
	Other Domestic	O22%	O			O	O75%	O66%
	Foreign	O49%	O28%	O51%	O20%		O25%	
Custmer	PROTON	O	-	O45%		-	O90%	O
	Non-PROTON	O	-	O	O	-	O	O
	REM		-			-		
	Export	O70%	-	O10%	O95%	-		O50%
Scale of Campany	Paid-Up Capital (Million RM)	0.3	1	10.8	18	8	7	84
	Annual Sales (Million RM)	6	3	210	30	25	24	140
	No.of Employees	54	40	730	176	170	120	750
Nationality of Technical Partner			Taiwan	USA	Ausuralia		Japan	England

2.6.7. Body

Though this category is divided into three groups of body complete, exterior components and interior components, it is also classified into metal, plastic, rubber, glass, seat/carpet and seat belt by materials and production processes as shown in Table 2-2-25.

Table 2-2-25 Classification of Manufacturers Producing Body Parts and Components by Materials and Production Process

Sub Group Parts Classification of MITI	Classification by Materials and Production Process	Number of Target Companies of the Study
Body Complete Parts	Press parts	8
Exterior Components & Interior components	Plastic moulding parts	14
	Rubber moulding parts	7
	Glass parts	2
	Seats and carpets	5
	Seat belts	3
	Other parts and components	1
Total		39

Note: The sum of companies included in each category and total number is not consistent, because one manufacturer that produces both plastic and rubber parts and components is double-counted.

Source: Questionnaire and interview survey

(1) Body Press Parts

Three companies of all the eight companies producing body press parts are also producing metal parts and components relating to engines, transmissions, brakes and suspension.

Eight companies are classified into the following three groups:

i. 3 manufacturers mainly produce panels

ii. 2 manufacturers mainly produce hinges and related items

iii. 3 manufacturers produce other press parts such as brackets and so on

PROTON produces large-sized panels by itself and procures only limited parts from manufacturers classified into category 1). On the other hand, manufacturers classified into categories 2) and 3) produce products mainly for supplying to PROTON.

The companies are generally small in size except for a few, because unit prices are very low though production volume is large in the case of such small parts and components as hinges and brackets, and because production volume is very limited being manufactured only for non-PROTON assemblers in the case of such large items as panels.

(2) Plastic Parts

The sizes of companies are very different because this category includes a manufacturer producing large size parts (HICOM-Tech See), a large-scale one producing small and medium size parts which are also supplied to the home electrical industry and SMIs producing small and medium size parts. Many of them have technical collaboration with overseas (especially Japanese) manufacturers.

(3) Rubber Parts

Many companies are small and medium scale producing relatively small parts, though the rubber parts industry originally has the characteristic of being facility-oriented.

(4) Glass Parts

Manufacturers of glass parts are facility-oriented. One of the two target companies (i.e., Malaysian Sheet Glass) occupies 75 to 80% of the market and is very large.

(5) Seats, Carpets and Seat Covers

One of the three target companies producing seats (i.e., Car Seat(M)) is mainly supplying to PROTON, while each of the other two is supplying to Toyota and Nissan in due order. The size of the companies is relatively large.

There are several manufacturers producing carpets other than the one target company.

Manufacturers of seat covers are producing REM products for export.

(6) Seat Belts

Three companies are producing seat belts though they mainly assemble them.

Table 2-2-26 shows the outline of manufacturers producing body parts.

Table 2-2-26 Outline of Manufacturers Producing Body Parts

		A Co.	B Co.	C Co.	D Co.	E社	F社	G社	H社
7.1 BODY COMPLETE	7.1.3 FRONT PANEL		Press Parts	Press Parts		Press Parts	O		
	7.1.6 FRONT FENDER	O					O		
	7.1.11 TRUNK LID ASSEMBLY	O							
	7.1.12 TRUNK LID	O							
	7.1.16 TAILGATE								
	7.1.17 HOOD HINGES							O	O
	7.1.22 ROOF PANEL	O							
	7.1.25 DOOR ASSEMBLY	O							
	7.1.26 FRONT DOOR				O		O		
	7.1.27 REAR DOOR				O		O		
	7.1.28 FRONT DOOR HINGES							O	O
	7.1.29 REAR DOOR HINGES							O	O
	7.1.30 FUEL FILLER PANEL							O	
	7.1.32 BONNET ASSEMBLY	O							
	7.1.33 BONNET	O					O		
その他部品			3.1.4 7.3.6 7.3.18 9.1.2 9.2.7		7.3.26			1.5.3 2.2.3 4.2.1 5.1.9 5.1.10	1.10.1 2.1.11 2.2.14 4.1.9 6.1.4
Owuner-ship	Bumiputera	-	O100%		O	O		O45%	O
	Other Domestic	-					O	O6%	O
	Foreign	-		O			O	O49%	
Custmer	PROTON		O50%	O80%	O	O95%		O60%	O
	Non-PROTON	O85%	O	O	O	O		O	
	REM								
	Export	O15%					O		
Scale of Campany	Paid-Up Capital (Million RM)	1	1.02	0.4	0.1	2.4	2	10	1.6
	Annual Sales (Million RM)	6~7	2.8	2.4	3.5	5.3	4	36	12.6
	No.of Employees	80	65	43	45	77	70	580	157
Nationality of Technical Partner								Japan	

Table 2-2-26 Outline of Manufacturers Producing Body Parts (Continued)

		Plastic Parts													Plastic & Rubber Parts
		A Co.	B Co.	C Co.	D Co.	E Co.	F Co.	G Co.	H Co.	I Co.	J Co.	K Co.	L Co.	M Co.	N Co.
7.2 EXTERIOR COMPONENTS	7.2.1 REAR WINDSHIELD GLASS								Plastic Parts	Plastic Parts					
	7.2.2 FRONT WINDSHIELD GLAS														
	7.2.3 FRONT SIDE GLASS														
	7.2.4 REAR SIDE GLASS														
	7.2.13 WINDSHIELD WASHER CONTAINER/HOSE														○
	7.2.14 WIPER BLADE/ARM														
	7.2.15 EMBLEMS										○		○		
	7.2.16 BODY SIDE TRIM MOULDING	○						○							○
	7.2.17 WINDSHIELD MOULDING														○
	7.2.18 REAR WINDOW MOULDING														○
	7.2.19 FRONT DOOR MOULDING														
	7.2.20 REAR DOOR MOULDING														
	7.2.21 MUD FLAPS							○			○				○
	7.2.22 WEATHER STRIP														○
	7.2.23 BUMPER FRONT					○									
	7.2.24 BUMPER REAR					○									
	7.2.25 RADIATOR GRILL					○									
	7.2.26 AIR INLET GRILL					○									
7.3 INTERIOR COMPONENTS	7.3.1 FRONT DOOR PANEL			○										Door Inside Handle	
	7.3.2 REAR DOOR PANEL			○											
	7.3.3 FRONT DOOR ARMREST							○							
	7.3.4 REAR DOOR ARMREST							○							
	7.3.5 SEAT ASSEMBLY										○Plastic Parts				
	7.3.6 FRONT SEAT BELT														
	7.3.7 REAR SEAT BELT														
	7.3.8 CARPETS														
	7.3.10 COAT HUNGER			○											
	7.3.11 SUNVISOR		○												
	7.3.12 REAR VIEW MIRROR														
	7.3.13 DASHBOAD INCL. GLOVE BOX					○									
	7.3.14 DEFROSTER NOZZLE			○								○			
	7.3.15 DEFROSTER DUCT			○											
	7.3.18 CONSOLE											○			
	7.3.19 SOUND PROOFING						○								
	7.3.20 BOOT TRIMS/MOULDINGS				○										
	7.3.21 HEATER/EVAPORATOR										○Plastic Parts				
	7.3.24 SPARE WHEEL COVER														
	7.3.25 RUBBER MATS														
	7.3.26 REAR PARCEL SHELF														
	7.3.27 ASHTRAY				○										
Other Parts				1.5.5 4.1.7	3.5.5 3.5.6 3.5.7 3.8.1 3.8.5 3.8.6 3.8.7 8.4.2 8.4.3			2.2.7 5.2.7 9.4.3							
Owunership	Bumiputera	○30%	○	○	○	○	○		○		○	○	○	○	
	Other Domestic	○70%				○	○	○		○	○				○
	Foreign														
Custmer	PROTON	○70%	○78%	○60%	○80%	○80%			○100%	○	○	○70%	○	○	–
	Non-PROTON	○	○	○	○	○	○	○40%		○	○	○	○		–
	REM														–
	Export	○3%						○60%							–
Scale of Campany	Paid-Up Capital (Million RM)	1	0.6	0.5	0.5	18	3	0.25	0.3	20.1	30	2	0.4	0.1	1
	Annual Sales (Million RM)	21	3	6	28	60	7	8	3	101.7	150	13	1.5	1.4	7
	No. of Employees	–	49	80	300	340	6	160	70	600	620	400	35	20	120
Nationality of Technical Partner		Japan	Japan	Japan	Japan	Japan		Taiwan, France	Japan		Japan	Japan			Taiwan, Japan

Table 2-2-26 Outline of Manufacturers Producing Body Parts (Continued)

		Rubber Parts						Glass Parts		Other Parts
		A Co.	B Co.	C Co.	D Co.	E Co.	F Co.	G Co.	H Co.	I Co.
7.2 EXTERIOR COMPONENTS	7.2.1 REAR WINDSHIELD GLASS	Rubber Parts				Rubber Parts		○	Safty Glass	
	7.2.2 FRONT WINDSHIELD							○		
	7.2.3 FRONT SIDE GLASS							○		
	7.2.4 REAR SIDE GLASS							○		
	7.2.13 WINDSHIELD WASHER CONTAINER/HOSE									
	7.2.14 WIPER BLADE/ARM						○			
	7.2.15 EMBLEMS									
	7.2.16 BODY SIDE TRIM MOULDING									
	7.2.17 WINDSHIELD MOULDING									
	7.2.18 REAR WINDOW MOULDING		○							
	7.2.19 FRONT DOOR MOULDING		○							
	7.2.20 REAR DOOR MOULDING		○							
	7.2.21 MUD FLAPS			○	○					
	7.2.22 WEATHER STRIP		○	○						
	7.2.23 BUMPER FRONT									
	7.2.24 BUMPER REAR									
	7.2.25 RADIATOR GRILL									
	7.2.26 AIR INLET GRILL									
7.3 INTERIOR COMPONENTS	7.3.1 FRONT DOOR PANEL									
	7.3.2 REAR DOOR PANEL									
	7.3.3 FRONT DOOR ARMREST									
	7.3.4 REAR DOOR ARMREST									
	7.3.5 SEAT ASSEMBLY									
	7.3.6 FRONT SEAT BELT									
	7.3.7 REAR SEAT BELT									
	7.3.8 CARPETS									
	7.3.10 COAT HUNGER									
	7.3.11 SUNVISOR									
	7.3.12 REAR VIEW MIRROR									
	7.3.13 DASHBOAD INCL. GLOVE BOX									
	7.3.14 DEFROSTER NOZZLE									
	7.3.15 DEFROSTER DUCT									
	7.3.16 CONSOLE									
	7.3.19 SOUND PROOFING									○
	7.3.20 BOOT TRIMS/MOULDINGS									
	7.3.21 HEATER/EVAPORATOR									
	7.3.24 SPARE WHEEL COVER									
	7.3.25 RUBBER MATS				○					
	7.3.26 REAR PARCEL SHELF									
	7.3.27 ASHTRAY									
Other Parts				1.6.3 1.9.3 9.2.4						
Owunership	Bumiputera		○				○	○38%		○
	Other Domestic	○		○	○	○		○21%		○
	Foreign			○				○49%	○	
Custmer	PROTON		○100%	○		○	○90%	○69%	○65%	○72%
	Non-PROTON	○		○	○		○	○	○	○
	REM									
	Export			○18%	○	○3%			○5%	
Scale of Campany	Paid-Up Capital (Million RM)	0.1	4	2	0.7	0.25	1.05	81	5	2
	Annual Sales (Million RM)	0.34	10	7	0.5	7	5	280	18	5.4
	No.of Employees	9	80	145	8	150	42	1600	243	38
Nationality of Technical Partner			Japan				Korea	Japan	Japan	Japan

Table 2-2-26 Outline of Manufacturers Producing Body Parts (Continued)

		Seat, Seat Cover, Carpet					Seat Belt		
		A Co.	B Co.	C Co.	D Co.	E CO.	F Co.	G Co.	H Co.
7.3 INTERIOR COMPONENTS	7.3.1 REAR WINDSHIELD GLASS		O	O	Car Seat Cover, Car Body Cover				
	7.3.2 FRONT WINDSHIELD GLAS			O					
	7.3.4 REAR DOOR ARMREST								
	7.3.5 SEAT ASSEMBLY	O	O	O					
	7.3.6 FRONT SEAT BELT						O	O	O
	7.3.7 REAR SEAT BELT						O	O	O
	7.3.9 CARPETS					O			
	7.3.9 ROOG LINING		O	O					
	7.3.11 SUNVISOR		O						
	7.3.12 REAR VIEW MIRROR							O	
	7.3.24 SPAR PARCEL SHELF		O						
Other Parts		5.2.7		1.3.2 1.6.1					
Owuner-ship	Bumiputera	O				-	O	O	O60%
	Other Domestic		O	O	O	-			O40%
	Foreign	O			O	-			
Custmer	PROTON	O70%		O5%		O90%	O76%	O90%	O50%
	Non-PROTON	O	O100%	O		O		O	O50%
	REM								
	Export			O5%	O80%				
Scale of Campany	Paid-Up Capital (Million RM)	0.5	0.75	8.5	0.6	19.9	1.5	8	0.2
	Annual Sales (Million RM)	162	21.4	44	3	20	24	11	13
	No.of Employees	302	52	300	35	200	100	95	100
Nationality of Technical Partner		Japan	Japan	Japan	Japan		Sweden	Germany	Japan

3. ESTIMATE OF MARKET SIZE

3.1. DOMESTIC PRODUCTION AMOUNT OF AUTOMOTIVE PARTS AND COMPONENTS

3.1.1. Present Situation of Domestic Production (Market Size)

There is no information or data available which explains comprehensively about the past trend and present situation of motor vehicle parts and components production in Malaysia. Table 2-3-1 and Table 2-3-2 are some examples of available data but they only cover 28 to 75 enterprises. Since there are said to be more than 300 companies in the industry, it is not appropriate to depend solely on this data and therefore an independent estimate on the market size of the industry in 1993 has been carried out.

(1) OEM Market

In order to estimate the present OEM market size, total domestic sales amount of motor vehicles in 1993 has first been calculated based on available data such as the number of new vehicle registrations and net selling price(NSP), then the usage ratio of domestic parts and components against NSP was estimated and finally these two factors were multiplied by each other.

As shown in Table 2-3-3, the production amount of domestic parts and components for OEM of motor vehicles sold in the domestic market in 1993 is estimated as approximately RM1,500 million. Of that amount, 78.4% was for motor vehicles with engines less than 1,850 cc. The amount was approx. RM1,100 million. Local content regulations were still not so strict for larger size passenger vehicles and commercial vehicles as for motor vehicles of with smaller than 1,850 cc engines. Therefore, production of smaller cars, especially PROTON, had the decisive influences on production of domestic parts and components. Although sales of assembled smaller motor vehicles dropped in 1993, the usage ratio of domestic parts for smaller motor vehicles was raised and PROTON's sales grew as they start marketing new models. Production of domestic parts and components also recovered from a slowdown in 1992.

As to the OEM market, motor vehicles for export should be taken into account. As most of the 20,000 units exported in 1993 were PROTON, the same assumption as used in Table 2-3-3 was applied to calculate the amount of the domestic parts and components used for those cars exported and the result was RM214.1 million. The size of the OEM market is estimated at RM1,709.8 million by adding both parts and components for motor vehicles sold in the domestic market and for motor vehicles exported.

Table 2-3-1 Manufacture of Motor Vehicle Parts and Accessories, Peninsular Malaysia

Year	Number of Establish-ments	Gross Value of Output (RM1,000)	Cost of Input (RM1,000)	Value Added (RM1,000)	Total Number of Persons Engaged during December of the Last Pay Period (Persons)	Salaries and Wages Paid (RM1,000)	Value of Fixed Assets Owned as of 31st, December (RM1,000)
1984	39	151,356	77,076	74,340	3,575	23,567	108,802
1985	40	178,326	96,817	81,509	3,632	26,767	123,097
1986	44	126,560	76,636	49,923	2,923	23,844	136,601
1987	50	182,159	115,764	66,395	3,513	23,457	137,087
1988	49	279,356	182,673	96,663	3,882	28,067	125,687
1989	53	453,004	293,067	159,937	5,412	39,481	158,232
1990	57	686,476	434,497	251,979	7,423	55,228	218,110
1991	75	951,231	609,976	341,255	9,273	76,235	283,715

Note: * Establishments employing 30 persons or more only among those who returned the questionnaire.
Source : Department of Statistics Malaysia

Table 2-3-2 Principal Statistics of Manufacture of Motor Vehicle Parts and Accessories

Period	Number of Establishments*	Ex-factory Value (RM1,000)	Total Persons Engaged	Salaries and Wages Paid
1986	29	106,606	2,402	18,482
1987	28	127,438	2,445	16,407
1988	29	189,574	2,582	18,084
1989	28	279,864	3,465	24,345
1990	28	418,741	4,323	32,431
1991	29	608,846	4,940	45,110
1992	36	529,933	5,191	47,605
1993	45	830,649	9,202	78,868
1994 1-4	45	336,743	9,603	31,549

Note: * Establishments employing 30 persons or more only among those who returned the questionnaire sent by Department of Statistics.
Source : Monthly Manufacturing Statistics Malaysia, Department of Statistics, November, 1989 & April, 1994

Table 2-3-3 Market Size of Locally Made Parts and Components, 1993

	Motor Vehicles Sales Amount *1 (Based on Approved Net Selling Price) (RM1,000)		Ratio to Approved NSP*2 (%)	Amount of Locally Made Parts & Components used (RM1,000)		-Ditto- (For Sabah & Sarawak) *3 (RM1,000)	Total Amount of Local Made Parts & Components Used (RM1,000)
Passenger Vehicles							
Below 1,850 cc	2,976,224.1	61.62%	×37.11	1,104,550.9	78.39%		
1,851 - 2,580cc	676,480.3	14.01%	×19.61	132,689.0	9.42%		
Above 2,851cc	48,896.6	1.01%	×16.86	8,244.6	0.59%		
(Sub Total)	(3,701,601)		×33.65	(1,245,484.5)		(64,828.0)	1,310,412.5
Commercial Vehicles	(857,724)	17.76%	×14.39	(123,429.8)	8.76%	(21,702.5)	185,302.4
4 W D	(270,380)	5.60%	×14.86	(40,170.0)	2.85%		
Total	4,829,709	100.00%	×29.18	1,409,084.4	100.00%	86,630.5	1,495,714.9

Note : *1 Peninsular Malaysia only.
*2 Ratio of locally made parts and components against NSP were estimated at 41% for PROTON and 24% for other best selling passenger vehicles: 24% based on the results of the study. Based on the above figures and estimated LCP points, ratios for other passenger vehicles were estimated by three engine groups. Those for Truck, Van and 4WD are 15 %(Est),for Buses 11%(Est).
*3 Calculated by applying the ratio of shipment number to Sabah & Sarawak against the registration number in Peninsular to "Amount of Locally Made Parts & Components used"in the above Table.
Source : Vehicle Registration VS Production Achievement - Total Year to Date, MMVAA & MMTA, December 1993.
Shipment to Sabah & Sarawak, 1993.
Date of Approved Net Selling Price, MMTA, 1st Quarter, 1993.

(2) REM Market and Export Market

The ratio of the REM market to the OEM market varies from one country to another. In Europe where the motor vehicle market is said to have matured, the ratio is presumed to be 60:40. As explained in 2.1.2-(2)-3), Chapter 1, motor vehicle life is generally longer there and more frequent repairs may be required. In Japan, the ratio is said to be 80:20 because the average years in use of passenger vehicles was 4.5 years in 1992.

In the case of Malaysia, motor vehicle life is even longer than in Europe. Many of those are well over 10 years old and naturally the price of motor vehicles is rather cheap. In this case, the prices of repair parts and components need to be cheaper as well. REM parts manufacturers tend to be small in size and able to supply parts at lower price although their technology is comparatively inferior. In terms of production amount, the ratio in Malaysia is estimated at around 70:30.

The sales values of standard accessories of new cars can be assumed at RM5,800/set for passenger cars and at RM3,000/set for commercial vehicles, and their ex-factory costs can be estimated at 70% of above sales prices.

Therefore, the production of REM parts for the domestic market can be estimated at RM 641.0 million and that of accessories for the domestic market at RM611.8 million in 1993.

The export of parts and components amounted to RM1,273.9 million in 1993, as explained in the next clause. Details are RM924.0 million of car stereos and radios, RM123.5 million of tyres and RM226.4 million of other parts and components.

(3) Overall Market Size for Domestic Parts and Components

Overall market size for domestic parts and components in 1993 was as follows;

Table 2-3-4 Domestic Produciton of Automotive Parts and Components in 1993

For Domestic Market	
OEM parts and components	RM1,495.7 million
REM parts and components	RM641.0 million
Accessories	RM611.8 million
Total	RM2,748.5 million
For Export Market	
Parts and components exports	RM1,273.9 million
OEM parts and components for exported cars	RM214.1 million
Total	RM1,488.0 million
Overall Market Size	RM4,236.5 million

Source: Estimate by JICA Study Team

3.1.2. Transition of Domestic Market

According to the "Index of Industrial Production" published by the Statistics Department of Malaysia, the growth index of the domestic parts and components manufacturing industry between 1985 and 1993 is as summarised in Table 2-3-5. Based on the estimate of Total Domestic Market of 1993, applying the growth index, and adding the actual figures of export, the transition of overall domestic market size can be indicated as shown in Table 2-3-5 and 6.

Table 2-3-5 Production Indices of Motor Vehicles Parts and Components (With Related Data)

Year	Annual Index of Industrial Production		Bank Negara Report	Localisation Requirements	Production of Motor Vehicles (Unit)			
	Index	Increase			Passenger Vehicles	Commercial Vehicles	Total	Increase
1986	19.4(45.6)	-54.4%	NA	MDP Items	42,180	19,814	61,994	-44.56%
1987	46.9 (110.3)	141.7%	61.4%	|	33,685	15,295	48,980	-20.99%
1988	100.0 (235.0)	113.2%	113.1%	|	61,338	23,787	85,125	73.80%
1989	112.1	12.1%	-61.9%	|	81,873	48,772	130,645	53.47%
1990	137.2	22.4%	34.0%	|	116,526	75,054	191,580	46.64%
1991	172.1	25.4%	25.4%	|	137,029	81,099	218,128	13.86%
1992	139.8	-18.8%	-18.9%	↓	141,985	35,054	177,039	-18.84%
1993	150.6	7.7%	7.5%	20/30%	130,176	34,929	165,125	-6.73%
1994				30/40%				
1995				35/50%				
1996				40/55%				
				45/60%				

Note: Production Indices/1988: 100. Figures in ( ): 1985 =100

Source: Index of Industrial Production, Malaysia, Department of Statistics, December, 1989 and April, 1994

Bank Negara - Annual Report, 1986 - 1993

Table 2-3-6 Trends of Market for Automotive Parts and Components (Including Stereo and Radio, and Tyres)

(Unit: RM million)

Year	Total Domestic Market	Export Market	Overall Market Size
1985	837.9	NA	873.9
1986	382.1	NA	382.1
1987	923.5	NA	923.5
1988	1,968.9	279.6	2,248.5
1989	2,207.1	409.4	2,616.5
1990	2,701.5	539.8	3,241.3
1991	3,387.7	858.6	4,246.3
1992	2,750.8	1,070.5	3,821.3
1993	2,962.6	1,273.9	4,236.5

Note : Export data before 1987 were not available at this time because of changes in the code system.

Source: Estimate by JICA Study Team

Among exports, stereos, radios and tyres are overwhelming. In order to figure out the amount of ordinary parts and components, if these three items are deleted from export figures, then the transition of the overall market size becomes as follows;

Table 2-3-7 Trends of Market for Automotive Parts and Components
(Excluding Stereo and Radio, and Tyres)

(Unit: RM Million)

Year	Total Domestic Market	Export Market	Overall Market Size
1985	837.9	NA	837.9
1986	382.1	NA	382.1
1987	923.5	NA	923.5
1988	1,968.9	43.7	2,012.6
1989	2,207.1	69.7	2,276.8
1990	2,701.5	121.5	2,823.0
1991	3,387.7	177.2	3,564.9
1992	2,750.8	196.4	2,947.2
1993	2,962.6	226.4	3,189.0

Note : Export data before 1987 were not available at this time because of changes in the code system.
Source: Estimate by JICA Study Team

According to the report of the Japan Automobile Parts Manufacturers Association, there were 63 member companies which launched business in Malaysia either in the form of a joint venture or through technical collaboration by the end of 1992, and 42 companies out of the 63 did so after 1985. A sharp rise in production of parts and components after 1985 is quite understandable even based on this fact only. 1985 was the year POTON launched its first car in the market and after that year, significant growth of the industry commenced.

Taking the example of car stereos, the growth of which doubled each year from 1988 to 1991 and another 50% between 1991 and 1993, foreign enterprises played important roles for developing the parts and components industry in Malaysia.

Concerning the future of the industry, the first thing to be pointed out is that the assembled cars are now facing the biggest problem ever. While local content ratio will be increased to 50% by the end of 1994, it is quite doubtful whether makers can sell enough cars after raising the selling

price to compensate for the heavy investment which will be required to fulfill the local content regulations. As has already been mentioned several times, the difference of on-road price with PROTON is going to be wider and, if assembled cars can not meet the local content regulation, it will be wider still because of the penalties. In any case, makers will have to raise the selling price of their cars and this will result in decreasing sales. Although assembled motor vehicles are much less than half of the total domestic parts market, PROTON and PERUDUA would not be able to fill the vacancy at once if assembled car sales really decreased.

Since PROTON is now going to raise production capacity to 150,000 units per year by the end of 1994, so-called PROTON Vendors' future seems to be promising. In addition, PERUDUA is commited to go with many of the PROTON Vendors, which makes the situation even brighter for them. As PROTON is one of the partners in a joint venture for the Third National Car, PROTON vendors will be sure to be in a secure position as parts suppliers for the project, especially as the project is expected to be materialised within a year.

Thus, the trend of the domestic parts and components industry in the near future will depend very much on the assembled cars' behavior, existing National Car sales situation, and progress of the new National Car projects.

It will still be a question whether Malaysia's parts and components industry can grow up as a really competitive industry as sales increase with the progress of the National Car Projects.

Another obstacle is that there are too many models of motor vehicles being produced in such a limited market, which prevents the improvement of productivity. Even PROTON, although it is the best selling car manufacturer, manufactured 11 models for the domestic market of less than 90,000 units in 1993. The biggest sales volume for one model was 21,500 units and the smallest was less than 1,700 units. Presumably common use of parts are being carried out separately among 50,000 units of older models and 40,000 units of newer models but there are still many major and minor differences of specification among models which make it difficult to raise productivity and improve quality by automation. Although it is quite desirable for car manufacturers to have a certain product range to compete with other car makers and attract consumers' attention, it is also an important role of car manufacturers to cooperate with parts manufacturers for

rationalisation of production by reshuffling manufacturing models.

PROTON is recently claiming that they may be in need of global sourcing of parts and components for cost reduction. However, if they are not satisfied with the price of domestic parts and components, they should first cooperate with their suppliers to try to bring down the cost by rationalising their own production. This is very important because to foster the domestic parts and components industry as a base for other manufacturing industries is one of the major purposes for the establishment of the National Car Projects.

3.2. EXPORT/IMPORT QUANTITY AND AMOUNT

3.2.1. Quantity and Amount of Imports by Type of Parts and Components

(1) Transition of Import Quantity

Transition of import quantity of parts and components between 1988 and 1993 is as shown in Table 2-3-8. Since final adjustment has not been done yet for 1993 trade statistics, figures in the 5 years from 1988 to 1992 shall be the object of examination.

The items which kept decreasing in this period are of four categories, namely drive axles, suspension, shock absorbers, radiators, and steering wheels, steering columns and steering boxes. Local manufacturers both of local capital and of Japanese joint ventures are increasing production and succeeding in import substitution.

Although Tyres, Leaf Springs, Helical Springs, some Electrical Parts for Internal Combustion Engines, Safety Seat Belts, Silencers, Exhaust Pipes, etc., have been included in Mandatory Deletion Items, the import quantity of them has been fluctuating every year but not always decreasing. The import quantity of them, except for Tyres, has not been large for the size of the domestic motor vehicle market of 3 million units but since the Mandatory Deletion Items Scheme was introduced for the sake of import substitution, more efforts of those manufacturing the above-mentioned items to fulfill the market needs are called for.

In terms of import quantity, the biggest is electrical bulbs such as Halogen, Sealed Beam and Filaments but as the unit price of these is rather low and above all the market is much too limited in Malaysia, localisation does not necessarily have to be sought. Total import amounts are also limited as described later and the growth rate of import amount is less than average.

Electrical parts for internal combustion engines are also large in quantity and the ratio of starter motors, starter generators, distributors and glow plugs are relatively high among them. Conspicuous items here are starter motors and starter generators. About 9 million pieces have been imported, amounting to about RM53 million in 1993 and also to more than 40% of imported amount of all electrical parts for internal combustion engines.

Table 2-3-8 Import Quantity of Automotive Parts by Type (1988-1993)

		1988	1989	1990	1991	1992	1993
Tyres	Unit	305,468	275,901	244,893	383,024	443,475	510,686
Brake lining/Pads	Unit	NA	NA	NA	NA	NA	NA
Leaf springs, Helical springs	Ton	1,544	2,277	4,462	1,704	1,335	NA
Engine (Exd. 1000cc Others)	Unit	69,978	147,354	142,573	141,574	NA	NA
Engine Parts	Unit	NA	NA	NA	NA	NA	NA
AirConditioners and Parts	Unit	1,330	3,125	5,216	4,326	2,408	4,672
Radio, Stereo, Cassettle Deck	Unit	102,648	130,676	177,725	205,630	160,223	NA
Halogen, Sealed, Filament Lamps	Unit	201,382,087	409,375,000	401,315,492	303,301,400	379,662,854	197,863,861
Electric Parts for engine	Unit	31,038,268	35,725,834	7,769,365	111,076,309	26,164,440	51,598,196
Lighting, sound signalling, etc	Unit	4,973,898	5,176,502	7,156,994	6,782,330	6,344,372	10,282,986
Chassis and Body	Unit	782	2,020	652	942	1,044	1,170
Bumpers and Parts	Unit	92,331	76,351	142,568	133,485	64,044	71,980
Safety Seat Belts	Unit	6,378	3,170	11,228	1,798	19,351	NA
Other Parts	Unit	272,219	94,190	136,567	127,510	78,494	NA
Mounted Brake Linings	Unit	44,755	31,915	45,745	217,735	31,664	NA
Brakes, Servo Brakes, and Parts	Unit	3,284	497,326	699,328	893,802	762,931	NA
Gear boxes	Unit	80,429	335,077	851,178	NA	104,176	325,904
Drive-Axles	Unit	84,374	51,577	53,793	33,774	25,097	NA
Non-driving Axles, parts	Unit	2,871	9,496	11,985	13,866	13,382	5,510
Road wheels and Parts	Unit	126,472	503,495	910,184	681,092	591,806	787,543
Shock Absorbers	Unit	3,580,849	1,399,540	484,128	386,977	328,778	281,561
Radiators	Unit	93,555	106,097	55,124	56,972	31,787	NA
Silencers and Exhaust pipes	Unit	82,845	82,087	222,198	179,952	83,601	157,214
Clutches and Parts	Unit	287,266	470,282	588,363	430,578	466,275	NA
Steering wheels, Steering Columns and Steering boxes	Unit	297,444	257,491	185,232	103,730	40,762	NA
Other Parts	Unit	NA	NA	NA	NA	NA	NA
Seat for Motor Vehicles	Unit	NA	64,879	43,694	NA	NA	NA

Source : "Trade Statistics", Department of Statistics,1988-1993

(2) Transition of Import Amount

Transition of import amount of motor vehicle parts and components between 1988 and 1993 is as shown in Table 2-3-9. Though total import amount in 1988 was approximately RM500 million, it had constantly grown except for the year of 1992 when the sales of motor vehicles decreased and finally reached RM950 million in 1993. The growth rate in five years is 192% and the followings are items of which the growth rate in the same period exceeds this average.

Item	Growth Rate
Safety Seat Belts	4,016%
Drive Axles	1,028%
Gear Boxes	580%
Brakes,Servo Brakes, & Parts	574%
Engines	554%
Steering Wheels,etc.	281%
Seats	265%
Radiators	264%
Lighting, Sound,Visual Signalling, etc.	234%
Tyres	219%

The import amounts of Seat Belts and Drive Axles had been rather stable until 1992 but in 1993 they jumped by 47 times and 7 times as much as the previous year, respectively. Imports from Australia and the UK for seats belt and from Spain for drive axles were the main reasons for the sharp rise in impots in 1993. As to drive axles, one manufacturer expressed their plan for drive axle imports from Spain and it seems that this was reflected in the figures. The import of brakes from Japan also went up to RM11.76 million, an increased by RM9.3 million over 1992.

There seem to be constant demands for foreign made steering wheels, steering columns, steering boxes, seats and radiators, looking at past trends of import. As import amount and quantity of those items are limited, there is little significant meaning in these figures.

Lighting, Sound, Visual Signalling equipment import is thought to be mainly of parts for lighting equipment and signal unit. This seems to be the result of localisation of finished components.

Import of Tyres has gradually increased in the past three years both in amount and quantity.

Locally made tyres, except for special tyres for large vehicles, etc., for example, are believed to be not inferior in quality to foreign made tyres so that their competitiveness in price might be the factor to be improved.

Engines, mainly those above 1000cc, had only a 4.8% share in total import amount in 1988 but increased every year and finally in 1993 rose to a 13.9% share, or RM134 million in amount. The import quantity is also large, amounting to more than 140,000 units per year in the three consecutive years of 1989, 1990 and 1991. Although quantitive statistics in 1992 and 1993 are not complete, it is certain by looking at the figures of import amount that the import quantity of engines had to have kept increasing. Because the localisation of engines has not been completed yet, there may not be any effective countermeasures to prevent the import of engines as at least the supply of engines is needed in the REM market to support 3 million motor vehicles. Until complete engine manufacturing in National Car projects including PROTON is attained and at the same time newer cars, mainly National Cars, substitute for aged cars, the present situation of engine import may not be improved.

Table 2-3-9 Import Amount of Automotive Parts by Type (1988-1993) (CIF Basis)

(Unit: RM)

	1988	1989	1990	1991	1992	1993
Tyres	17,411,113	22,409,053	22,619,612	31,802,865	34,844,968	38,091,567
Brake Linings/Pads	1,502,526	2,163,485	2,261,887	2,683,935	2,491,465	2,795,968
Leaf Springs, Helical Springs	6,339,722	10,490,912	12,608,873	10,765,097	9,702.734	9,570,753
Engines (Exd. 1000cc Others)	4,173,443	44,238,632	78,238,417	102,203,189	107,639,693	134,017,884
Engine Parts	127,495,736	182,633,916	217,809,210	194,840,642	138,341,281	104,162,181
Airconditioners and Parts	4,253,764	7,098,814	12,924,539	12,080,560	7,074,227	7,265,379
Radios, Stereos, Cassettle Decks	17,121,121	29,009,841	43,185,938	35,201,921	28,160,697	21,646,448
Halogen, Sealed, Filament Lamps	13,650,423	21,922,714	17,209,824	15,405,251	18,976,456	18,283,820
Electric Parts for Engines	72,629,880	103,304,953	118,429,591	160,242,571	117,383,340	126,372,982
Lighting, Sound Signalling, etc.	30,057,859	37,865,138	57,817,934	64,300,377	60,929,874	70,463,368
Chassis and Body	24,203,699	11,365,369	11,852,163	34,080,060	34,021,351	30,660,388
Bumpers and Parts	2,124,713	2,483,909	2,949,321	2,965,360	2,688,988	2,351,492
Safety Seat Belts	295,277	419.949	518,480	95,233	248,499	11,858,359
Other Parts	2,046,257	2,160,900	1,877,898	1,641,287	2,592,750	9,360,752
Mounted Brake Linings	1,028,252	566,290	2,263,376	1,013,994	864,050	1,651,326
Brakes, Servo Brakes, and Parts	98,484	2,736,937	3,807,674	4,711,984	4,629,437	15,701,452
Gear Boxes	1629,124	3,833,056	5,249,366	6,231,420	3,765,042	9,449,626
Drive-Axles	1,557,751	2,280,767	2,812,857	2,360,729	2,305,388	16,017,183
Non-Driving Axles, Parts	158,745	426,218	399,707	633,596	543,576	242,750
Road Wheels and Parts	2,408,971	7,300,689	11,770,901	12,451,076	11,937,139	19,179,963
Shock Absorbers	10,720,953	14,609,452	14,613,489	14,691,838	11,920,108	13,179,924
Radiators	4,861,261	7,978,270	10,793,766	9,888,175	5,726,286	12,829,394
Silencers and Exhaust Pipes	3,071,601	4,012,800	5,776,194	5,584,714	3,840,308	5,401,515
Clutches and Parts	8,065,659	10,612,718	15,210,470	14,346,501	15,349,370	14,974,788
Steering Wheels, Steering Columns and Steering Boxes	3,408,254	5,738,952	5,171,263	2,384,377	1,788,642	9,577,986
Other Parts	112,970,609	151,502,080	199,286,850	234,575,538	217,319,110	237,905,811
Seats for Motor Vehicles	4,758,075	8,086,964	10,28,870	9,876,206	11,167,699	12,597,120
Total	498,043,272	697,252,778	882,089,546	987,088,476	856,252,478	955,610,179
% Over Previous Year	-	140.0	126.6	111.8	86.7	111.6
Increase %(1988:100)	100	140.0	177.3	198.2	171.9	191.9

Source : "Trade Statistics", Department of Statistics,1988-1993

Electrical Parts for Internal Combustion Engines such as Starter Motors • Starter Generators, Distributors and other parts relating to starting engines had a 13% share(RM126 million) of total import amount in 1993. Spark Plugs, as one of the Mandatory Deletion Items, decreased to only RM5 million of import but the import of Starter Motors and Starter Generators, although they are also among Mandatory Deletion Items, still amounted to RM53.6 million. This may be because of the delay of localisation of Starter Generators.

(3) Major Imports by Country

Table 2-3-10 shows major of imports of motor vehicle parts and components in 1993 by country. In total import amount of 11 major items, RM817 million in value, imports from Japan were RM500 million or 60.8%, followed by Germany's RM83.5 million or 10.2%.

This is quite natural as PROTON, whose origin was a Japanese car, and other Japanese assembled cars have overwhelming market share and thus most of foreign related parts and components manufacturers have tie-ups with Japanese. However, this is also a main factor in making the manufacturing costs of the domestic parts industry higher because of the recent evaluation of the Japanese currency. Although global sourcing has been sought by local manufacturers of parts and components, they have been forced to import materials, parts and components from Japan mainly because of the lack of a technologies base.But they have at last begun serious trials to look for other sources of supply than Japan, partly because they have become more confident about their technology and mainly because they have been forced to keep or reduce their product prices by motor vehicle manufacturers. As technology transfer progresses and the attitudes of motor vehicle manufacturers towards the procurement of parts and components changes, there should be some change in the make-up of major countries of origin of imports.

Table 2-3-10 Country of Origin of Major Imports in 1993

(Unit : RM '000)

	Total Import Amount		Country of Origin									Note
			First			Second			Third			
	Amount	%	Country	Amount	%	Country	Amount	%	Country	Amount	%	
Other Parts	237,906	100	Japan	163,180	68.6	Germany	23,328	9.8	Brazil	4,290	1.8	
Engines (Exceeding 1,000cc, Others for M.V)	134,017	100	Japan	108,933	81.3	Thailand	18,629	13.9	Germany	3,303	2.5	
Electrical Parts for Engines	126,373	100	Japan	87,291	69.1	Germany	8,299	6.6	USA	8,089	6.4	
Engine Parts	104,162	100	Japan	47,918	46.0	Germany	15,813	15.2	USA	11,526	11.1	
Lighting,Sound,Visual Signalling Equipment, etc.	70,463	100	Japan	15,184	21.5	Germany	13,648	19.4	Taiwan	9,759	13.8	
Tyres	38,092	100	Japan	14,937	39.2	Thailand	4,327	11.4	India	3,612	9.5	Germany 2.090
Radios, Stereos, Casettle Decks	21,646	100	Japan	10,207	47.1	ROK	4,337	20.0	Singapore	2,052	9.5	Germany 1.136
Chassis and Body	30,660	100	Japan	18,287	59.6	Germany	10,126	33.0	Italy	995	3.2	
Road Wheels and Parts	19,179	100	Japan	14,586	76.1	Italy	1,101	5.7	Indonesia	611	3.2	Germany 585
Halogen, Sealed Beam, Filament Lamps	18,284	100	Japan	6,769	37.0	Germany	4,288	23.5	China	2,868	15.7	
Drive-axles	16,017	100	Spain	9,408	58.7	Japan	2,050	12.8	Philippines	1,905	11.9	Germany 923
Total	816,79											

Note: Total Japan RM500,673,000
Total Germany RM83,539,000
Source: Trade Statistics, Department of Statistics,1988-1993

(4) Comparison of Parts and Components Import by Type (Malaysia/ Japan)

The comparison of parts and components import structure by type in 1993 between Malaysia and Japan is shown in Table 2-3-11.

Total import amount of Malaysia was about RM756 million and equivalent to 18% of total Japanese import of 210.8 billion yen (nearly RM5,270 million at 40 per Ringgit). Total production of motor vehicles and total registration in Malaysia in 1993 were 0.158 million units and 3 million units, whereas those in Japan in 1992 were 12.5 million units and 60 million units, respectively.

Malaysian figures are 1.26% and 5% of Japanese amounts, respectively. The difference between the ratio in parts import and the ratio in motor vehicle production/registration is one of the indices showing the degree of progress of localisation in domestic production of parts and components in Malaysia. The difference in import would be much larger if CKD parts import were included in the figures in the Table.

As to import structure, the items which are more like luxury goods, namely tyres and such components and attachments as bumpers, road wheels, steering wheels, etc,. held a relatively high share in Japanese import. On the other hand, key parts and components such as engines, engine parts, electrical parts for internal combustion engines, signalling related parts and components, electrical bulbs, etc., held a higher share in Malaysia. This may be a phenomenon appearing in the transitional period proceeding to localisation.

Table 2-3-11 Comparison of Parts Import by Type (Japan - Malaysia, 1993)

	Japan		Malaysia	
	Million Yen	%	MR '000	%
Rubber Tyres	58,236	27.6	38,092	4.0
Brake Linings/Pads	1,063	0.5	2,796	0.3
Leaf and Herical Springs of Iron/Steel	840	0.4	9,571	1.0
Piston Engines and Parts	35,986	17.1	238,180	24.9
Air Conditioners and Parts	2,783	1.3	7,265	0.8
Electrical Parts for Engines	5,416	2.6	126,373	13.2
Lighting, Sound, Visual Signalling Equipment, etc.	6,547	3.1	70,463	7.4
Radios, Stereos, Casette Decks	9,806	4.7	21,646	2.3
Electrical Bulbs	387	0.2	18,284	1.9
Chassis and Body	615	0.3	30,660	3.2
Other Automotive Parts and Accessories	89,155	42.2	392,280	41.1
Total	210,834	100.0	955,610	100.0

Source: Trade Statistics, Ministry of Finance, Japan, 1994
Trade Statistics, Department of Statistics, Malaysia,1994

3.2.2. Quantity and Value of Exports by Type of Parts

(1) Trends in Export Quantities and Values

The trends in exports of parts from 1988 to 1993 are shown in Tables 4-3-12 and 13. The final figures for the quantity of exports for 1993, as with imports, are still not known, so the figures here are for reference only. A look at the growth in the period shown in the table by comparison of the figures for the start and end of the period shows that the value of overall exports grew 7-fold. There was rapid growth shown in many individual parts as well.

Particularly noteworthy growth in quantity was shown by the following parts (comparison of 1988 and 1992):

Brakes, servo-brakes, and parts	857 times
Radiators	66 times
Bodies	44 times
Halogen, sealed beam, filament lamps	20 times
Clutches and parts	11 times

Particularly noteworthy growth in value was shown by:

Brakes, servo-brakes, and parts	3,027 times
Brake lining and pads	20 times
Bodies	16 times
Air-conditioners and parts	15 times
Steering wheels, steering columns and Steering Boxes	14 times
Radiators	13 times
Other body parts and accessories	13 times
Bumpers	10 times

Brakes, servo-brakes, and parts exhibited an exceptional 867-fold growth in quantity and 3027-fold growth in value. This is because the export of the item was quite small in 1988 (only 2,000 ringgit to Singapore) and epoch-making growth was recorded in 1989.

(2) Export Destinations

Looking at export destinations for the three main product groupings of radio receivers and radio receivers with sound recorders; tyres; and others, the situation differs distinctively for each (Table

2-3-14). The U.S. and Europe are the main destinations for radio receivers and radio receivers with sound recorders, the Netherlands and U.K. for tyres, and ASEAN countries and Japan for others.

Leaving aside radio receivers and radio receivers with sound recorders and tyres, automotive parts exports to the four ASEAN countries other than Brunei account for 46.5 percent of the total value. This may be considered to show the start of an increase of regional trade. However, the export value of "Others" is only about one-quarter of the import value of the same product grouping in 1993.

(3) Main Products

A look at the value of products shows that the structure of exports is extremely lopsided. First of all, radio receivers and radio receivers with sound recorders account for an extremely large 73 percent of the total value. In second place, tyres account for 10 percent. Among other products, no items exceed 3 percent of the total value.

1) Radio receivers, radio receivers with sound recorders

Radio receivers, and radio receivers with sound recorders are electrical and electronic products at the same time as being automotive parts. The high figures for these items shows the high competitiveness of Malaysia in this field. However, when considering Malaysia's trade in automotive parts, it is necessary to separate these items from other products. The main export destinations are the U.S., Germany and Singapore.

2) Tyres

Truck tyres used to be a major item of tyre exports, but exports of passenger car tyres grew rapidly in 1991 and 1992 and the situation is now reversed. A look at the trends in exports of new passenger car tyres shows that there was major growth in exports to the Netherlands, the Middle East, Australia, and Japan in 1991. These growth markets continued to grow in 1992 and there was a remarkable increase in exports to the U.S. as well.

3) Lighting and Signaling Equipment

A great portion of this item is shared by parts. There was a major decline in exports from 1992 to 1993 and the situation changed then, but in 1992 parts accounted for 85 percent of the value of exports. A look at the period from 1988 to 1992 shows that exports of these items soared 37-fold. The year 1990 was a particular watershed. In that year, exports to Germany, which had traditionally been Malaysia's biggest customer, jumped about 6.6-fold all at once. They rose 2.5-fold in the following year as well. Note that the decline in 1993 was due to plummeting exports to Germany.

4) Airconditioners and Parts

With airconditioners as well, Malaysia mostly exports parts rather than finished products. Parts accounted for 96 percent of the total export value of this item in 1993. Most of the exports go to Singapore, followed by Japan and Australia. No particularly remarkable trends are seen in the growth of exports or export destinations.

5) Brakes, Servo-Brakes, and Parts

Brakes, servo-brakes and parts do not constitute major export items in terms of scale, but deserve special mention as typical examples of items in which there has been rapid growth.

Exports to Japan, Australia, Singapore, and other areas,. soared in 1989, up 830-fold (value basis) compared with the previous year. While exports declined in 1991 and 1992, they again rose 3.3-fold in 1993. The biggest export destination in 1993 was Australia, at 27 percent (value basis), followed by Japan and Singapore. Note should be taken here that exports to ASEAN and Taiwan together account for 43 percent of export value.

Table 2-3-12 Exports of Automotive Parts (Quantity Basis)

Item	Unit	1988	1989	1990	1991	1992	1993
Tyres	Unit	1,188,146	1,036,510	830,129	2,040,760	3,329,947	4,212,634
Brake Linings & Pads	Unit	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Leaf Springs and Helical Springs	Ton	456	732	700	767	1,253	7,277
Engines Of a Cylinder Capacity Exceeding 1,000 cc and Others For Motor Vehicles	Unit	1,977	2,205	1,066	439	955	14,782
Engine Parts	Unit	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Air Conditioners & Parts	Unit	165	160	80	194	104	823
Radio Receivers, Radio Receivers with Sound Recorders	Unit	1,971,343	2.533,943	3,416,502	4,264,001	5,393,390	7,251,783
Halogen, Sealed Beam, Filament Lamps	Unit	69,984	918,355	1,511,901	556,097	1,372,830	7,764,032
Electric Parts for Engines (Plugs, Dynamos, etc.)	Unit	2,678,102	4,000,775	2,490,269	2,287,109	5,998,957	142,814,554
Lighting or Signalling Equipment	Unit	363,052	470,675	1,354,440	1,058,294	1,043,877	2,278,216
Bodies	Unit	12	18	276	389	525	79
Bumpers	Unit	2,991	6,978	16,113	14,565	18,520	42,855
Safety Seat Belts	Unit	4,074	5,628	22,348	2,152	21,082	20,077
Other Body Parts and Accessories	Unit	39,438	9,134	78,482	149,226	96,694	286,867
Mounted Brake Linings	Unit	1,605	151,950	71,540	89,377	19,799	24,553
Brakes, Servo-Brakes, and Parts	Unit	160	186,334	439,260	342,814	137,126	513,963
Gear Boxes	Unit	599	1,869	7,442	11,808	758	859,247
Drive-Axles With Differential	Unit	300	476	1,639	795	697	9,175
Non-Driving Axles	Unit	423	102	192	61	97	27
Wheels & Parts	Unit	101,822	89,211	37,783	21,716	5,749	104,185
Suspension Shock-Absorbers	Unit	16,497	7,381	3,781	19,792	57,005	102,291
Radiators	Unit	1,223	6,698	13,240	83,876	80,841	3,408,064
Silencers & Exhaust Pipes	Unit	28,088	42,750	39,227	32,462	34,071	65,677
Clutches & parts	Unit	7,898	15,044	29,560	27,493	86,996	62,765
Steering Wheels, Steering Columns & Steering Boxes	Unit	6,835	609	5,418	39,849	8,223	45,825
Seats	Unit	7,322	13,282	28,807	25,256	9,781	24,343
Other Parts	Unit	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.

Source: Malaysia External Trade Statistics, Department of Statistics, 1988-1993

Table 2-3-13 Exports of Automotive Parts by Type (Value Basis)

(Unit: RM)

Item	1988	1989	1990	1991	1992	1993
Tyres	20,590,580	22,899,065	22,874,665	56,093,302	103,271,596	123,483,301
Brake Linings & Pads	2,087,194	1,795,798	2,023,395	5,425,075	12,240,884	13,064,351
Leaf Springs and Helical Springs	1,303,721	2,469,522	2,417,207	2,528,809	5,045,183	10,007,387
Engines of a Cylinder Capacity Exceeding 1,000 cc and Others for Motor Vehicles	1,001,264	1,021,813	756,616	772,097	1,015,302	4,183,346
Engine Parts	2,113,705	3,339,207	5,419,485	8,645,216	9,102,134	8,005,823
Air Conditioners & Parts	2,039,480	9,057,632	7,123,735	12,975,783	23,450,455	31,233,665
Radio Receivers, Radio Receivers with Sound Recorders	215,256,923	316,805,320	395,447,322	625,311,085	770,867,830	923,966,817
Halogen, Sealed Beam, Filament Lamps	136,896	767,993	395,164	397,052	932,556	1,114,135
Electric Parts for Engines (Plugs, Dynamos, etc.)	7,244,823	8,935,895	6,774,648	5,222,406	8,765,437	16,257,404
Lighting or Signalling Equipment	9,973,284	14,994,067	49,944,480	97,176,646	76,569,107	31,766,487
Bodies	179,554	112,439	1,232,754	3,429,845	3,056,443	2,955,319
Bumpers	145,561	378,830	542,098	450,911	1,117,605	1,510,678
Safety Seat Belts	84,379	215,417	505,108	71,215	645,139	414,185
Other Body Parts and Accessories	773,259	191,462	307,390	651,987	3,608,092	10,093,699
Mounted Brake Linings	50,172	1,341,205	787,850	752,674	407,828	1,063,406
Brakes, Servo-Brakes, and Parts	2,000	1,664,269	3,880,502	3,672,135	1,806,478	6,055,925
Gear Boxes	100,318	228,540	193,486	344,491	210,900	314,266
Drive-Axles with Differential	36,373	97,776	85,785	103,899	58,764	95,968
Non-Driving Axles	28,527	6,791	20,242	19,454	42,782	30,419
Wheels & Parts	1,440,378	1,099,066	322,845	341,156	271,375	2,998,970
Suspension Shock-Absorbers	610,438	348,484	197,178	377,312	2,510,324	5,796,394
Radiators	289,040	490,359	1,009,069	1,061,585	1,511,519	3,824,800
Silencers & Exhaust Pipes	671,766	1,067,326	1,060,042	818,692	969,521	1,751,573
Clutches & Parts	287,957	307,672	860,959	831,514	853,029	1,670,930
Steering Wheels, Steering Columns & Steering Boxes	539,283	32,744	68,323	440,071	1,316,554	7,629,929
Seats	197,333	352,052	649,089	636,870	396,499	1,500,655
Other Parts	12,402,788	19,334,572	34,888,799	30,062,301	40,502,441	63,064,518
Total	279,586,996	409,355,316	539,788,236	858,613,583	1,070,545,777	1,273,854,350
Growth Rate (%)	-	46	32	59	25	19

Source: Malaysia External Trade Statistics, Department of Statistics, 1988-1993

Table 2-3-14 Export Destinations for the Three Major Product Groupings of Malaysian Automotive Parts (FOB Basis)

(Unit: RM '000)

Order	① All Items			② Radios, Radios with Sound Recorders		
	Importer	Amount	%	Importer	Amount	%
1	U.S.A.	343,560	27.0	U.S.A.	328,588	35.6
2	Germany	244,422	19.2	Germany	234,589	25.4
3	Singapore	157,963	12.4	Singapore	74,807	8.1
4	Japan	91,898	7.2	Japan	56,512	6.1
5	U.K.	69,012	5.4	France	38,229	4.1
6	Australia	47,430	3.7	U.K.	28,116	3.0
7	Netherlands	47,278	3.7	Belgium	26,607	2.9
8	France	39,486	3.1	Australia	22,031	2.4
9	Taiwan	33,579	2.6	Taiwan	20,797	2.3
10	Belgium	26,905	2.1	Netherlands	19,496	2.1
	Other	172,321	13.5	Others	74,194	8.0
	Total	1,273,854	100.0	Total	923,967	100.0

Order	③ Tyres			①-(②+③)		
	Importer	Amount	%	Importer	Amount	%
1	Netherlands	27,376	22.2	Singapore	69,352	30.6
2	U.K.	22,712	18.4	Japan	34,016	15.0
3	Singapore	13,804	11.2	Thailand	20,467	9.0
4	Australia	10,441	8.5	U.K.	18,184	8.0
5	Philippines	8,113	6.6	Australia	14,958	6.6
6	Taiwan	6,973	5.7	U.S.A.	14,505	6.4
7	Papua New Guinea	4,213	3.4	Germany	9,679	4.3
8	Kuwait	2,730	2.2	Philippines	8,744	3.8
9	Pakistan	2,451	2.0	Indonesia	6,816	3.0
10	UAE	1,996	1.6	Hong Kong	5,843	2.6
	Others	22,675	18.4	Others	23,841	10.5
	Total Amount	123,483	100.0	Total Amount	226,404	100.0

Source: Malaysia External Trade Statistics, Department Of Statistics, 1988-1993

4. RELATIONSHIP BETWEEN AUTOMOTIVE ASSEMBLERS AND PARTS MANUFACTURERS

4.1. ASSEMBLERS' POLICY FOR VENDOR DEVELOPMENT

The production of automotive parts is divided into two categories by the type of manufacturer; those parts made by subcontracted vendors and those made in-house. Vendors are further classified between specialised parts manufacturers and assembler affiliated parts manufacturers. In Malaysia, there are few affiliated parts manufacturers. Because the production volume of any individual assembler is too small and none of the assemblers conducts its own development, there is no need for assemblers and parts manufacturers, which in most cases are affiliated parts manufacturers in Japan, jointly to develop new parts and components.

On the other hand, in Malaysia, policies for local parts production differs widely between PROTON and non-PROTON assemblers.

4.1.1. PROTON

(1) PROTON Vendor Development System

PROTON was established in 1983 as a national car project set up by the Government in response to the Malaysian Industrial Policy. As a national car assembler, PROTON is expected to increase its localisation of parts and components through the development of automotive parts and components manufacturers, and the expansion of supporting industries. In line with this policy, further sourcing of parts and components from local vendors and in-house production of critical components such as engine and transmission parts is to be implemented.

PROTON's vendors comprise roughly two groups. One group is foreign affiliated companies and those who have technical agreements with foreign companies. The other group is Malaysian local companies. The former is supported by foreign companies both in technology and management, and does not necessarily need support from PROTON. In contrast, the latter, most of which are small in size, lack competent people and technology, and thus do not have product development

capability.

To achieve its purposes, PROTON has established the so-called PROTON Vendor Development System (PVDS) in order to develop vendors efficiently through human and technical support. As the outline of the PVDS summarised below shows, this programme is designed to develop excellent parts vendors rather than to develop affiliated parts manufacturers.

Table 2-4-1 Outline of PVDS

i. Identification of Parts - Annual master plan - Long range product plan - Engineering cost estimates - Cost estimate review based on cost table
ii. Identification of Vendors - 4M's assessment (Man, Machine, Material, Method) - Vendor evaluation (Strength, Weakness, Opportunity, Threat) - Matchmaking programme - Plan, do, check, action concept (PDCA)
iii. Selection of Vendors (Secured market) - PROTON policy (Single sourcing, Bumiputera vendor preferred, etc.) - Appointment of vendors
iv. Ongoing Assistance - QC audit - Close monitoring - Advance information to vendors on LRPP - Offshore market penetration - Special programme (PPP, Matchmaking programme, Governmental grant, etc.)
v. Long Term Objective - QCD - Management - Technical

Source: PROTON Vendor Development System, PROTON, March 1994

(2) Vendor Development Programme

The VDP scheme in cooperation with MITI is one of the most important vendor supports under the PVDS. Focussing on Bumiputera companies, the aim of VDP is to nurture SMIs which have

potential but lack technical, financial and managerial support to become reliable manufacturers and suppliers of automotive parts and components. The VDP is comprised of three forms of assistance as summarised below.

Table 2-4-2 Form of Assistance through the VDP

i. Financial Assistance - Soft loans - Commercial loans - Credit - Insurance guarantee - Advances against payments ii. Technical Assistance - Automation and modernisation of machinery - Upgrading of tooling and equipment - Facilitating technical agreement for technology transfer - Other relevant assistance for SMI's development such as technical training and quality improvement through ITAF iii. Other Related Assistance - Technical management - Financial management - Information technology system

Source: Vendor Development Programme, MITI

(3) PROTON Vendor Association

In 1992, the PROTON Vendors Association (PPP) was launched to organise the vendors of PROTON so that closer relationships among member companies, as well as between members and PROTON, can be maintained. As of July 1994, the number of members is 128.

The PPP is managed by a management committee, which is composed of three sub-committees; technical sub-committee, business sub-committee, and study sub-committee. Each member belongs to one of these sub-committees, and participates in various activities offered by the committee. Some examples of the activities are the holding of productivity improvement seminars, visits to excellent parts and components factories, education on 4S, and support for QCD activities.

The establishment of PPP is meaningful to give vendors various sorts of support relating to

automotive parts and components production. However, compared with the similar association in Japan, the PPP is much more relaxed where the relationship among vendors, or between PROTON and vendors, is not so strong.

(4) NPC-PROTON Joint Programme

NPC (National Productivity Corporation), in cooperation with PROTON, provides PROTON vendors with QCC seminars, quality improvement consultancy, and productivity improvement consultancy aiming at the development of the automotive parts industry. The joint programme in 1994 is shown in Table 2-3-3.

Table 2-4-3 NPC-PROTON Joint Programme

i. Training - Module 1: 5S Practices - Module 2: ISO 9000 - Module 3: QCC for Group Leader - Module 4: QCC Tools & Techniques Workshop - Module 5: QCC for Facilitators - Module 6: Workshop on Managing QCC's ii. QCC Convention & Camp Quality iii. Productivity Measurement for Automotive Component Industry iv. Consultancy v. National Seminar for Automotive Component Industry

Source: SMIs, FMM Business Guide, FMM, July 1993

4.1.2. Non-PROTON Assemblers

In 1993, eight non-PROTON assemblers in Malaysia jointly produced 27,338 passenger cars and 34,929 commercial vehicles. The production of non-PROTON passenger cars has declined dramatically after the introduction of PROTON into the market in 1985. For non-PROTON assemblers, the relatively small scale of production volume, where output of even the most produced car model reaches no more than 1,000 units per month, considerably affects the production costs and the product quality of each company. Due to these small production volumes, non-PROTON assemblers have common problems in the procurement of local parts and components. These

problems are summarised as follows:

i. cannot seek the economy of scale production
ii. have little bargaining power against parts and components vendors
iii. costs of most localised parts are higher than equivalent imported ones
iv. cannot afford to make costly investments such as moulds and dies
v. difficult to find vendors which can meet assemblers' own specifications
vi. difficult to adopt the Just-in-Time delivery system
vii. quality of parts is neither good nor even
viii. cannot increase car models so that MDP and LMCP can be met

For these reasons, non-PROTON assemblers are not willing to increase the localisation of parts and components beyond the 30 items which are designated by the MDP programme. One of the interviewed companies pointed out that the average cost of local parts was approximately 30% higher than that of imported parts even after very high import duties (42%) were paid.

The major reasons for the high production costs are thought to be as follows:

i. most raw materials are imported
ii. cannot utilise low-cost mass-production technology because of small production volumes
iii. poor quality control system creates defective parts
iv. depreciation of production facilities have not been completed

The numbers of vendors dealing with non-PROTON assemblers are much lower than those of PROTON as shown below. In addition, most of these vendors are also PROTON vendors.

Table 2-4-4 Number of Vendors of Major Non-PROTON Assemblers

Assembler	Number of Vendor
PROTON	128
Oriental Assemblers	31
Assembly Services	86
Tan Chong Motor Assemblies	63
Swedish Motor Assemblies	30
AMI (Auto Vabaria)	51
Automotive Manufacturers	52

Source: Interview Survey, JICA Study Team, March, July, 1994

Some assemblers have begun to organise vendors' associations, but the degree of affiliation between assemblers and vendors is very low principally due to the small size of demand for the automotive parts.

Under this situation, non-PROTON assemblers are working to meet the LMCP requirement although some of them have failed to satisfy it. Because they procure a relatively small volume of parts compared with PROTON, it would be very costly to produce critical parts locally. In addition, non-PROTON assemblers lack design and engineering capabilities since they are mainly engaged in the assembly of vehicles from imported CKD parts and components. Most of the assemblers are not even equipped with testing inspections. Thus most functional tests on procured parts and components are conducted by their overseas principal companies except for some simple ones. For these reasons, most locally manufactured parts and components are trimming parts which are not regarded as being critical.

According to the interview survey conducted by the JICA Study Team, criteria for non-PROTON assemblers to select parts and components to be replaced by local ones are summarised as follows:

i. already produced in Malaysia, perhaps by PROTON vendors
ii. requires small amount of investment (jigs, tooling, mould dies, press dies, etc.)
iii. can obtain high LMCP points

iv. lower cost compared with equivalent imported CKD parts and components

Overseas principal companies are requested to transfer technology quickly, hire more local personnel, and increase localisation. Concerning technology transfer among them, foreign companies are often complained about by Malaysian companies for being unwilling to provide core technology. However, foreign companies recognise that the technology transfer cannot be made alone but should be made together with the transfer of management and control, which takes time. In this respect, the present situation of Malaysia, involving such factors as the chronic shortage of labour force, especially middle-level engineers, high level of job hopping, and soaring wages, discourages foreign companies from transferring technology quickly or from increasing the level of technology.

On the other hand, foreign affiliated companies are focussing their attention on the adaptation of their human development and having their management style fit in with the Malaysian way. Therefore, they have not yet focussed on the development of local vendors. One way in which they might support local vendors may be by providing technical instruction through the engineering specifications issued when the purchase agreements for the parts are made.

4.1.3. Multi-sourcing

Objects of the establishment of PROTON include (i) the development of the Malaysian automotive industry and related industry through the acquisition of technology, skills and know-how relating to automobiles, (ii) the offer of automobiles, which are developed locally to meet the needs of the Malaysian market, at an affordable price, and (iii) the participation of Bumiputera companies in the automotive industry. In line with these objects, PROTON used to adopt a so-called single sourcing policy in which one vendor was designated for each part, and was nurtured through the procurement of parts. However, most local vendors have a relatively short history as OEM parts vendors, and this caused various problems in quality and delivery. Therefore, in order to avoid risks of insecure delivery, PROTON has changed its procurement policy so that multi-sourcing, where multiple vendors supply the same parts, is now employed for critical parts instead of single sourcing.

Although multi-sourcing may avert the delivery risks encountered with single sourcing, it is likely to bring about the deterioration of quality and the increase of costs because of the small production volumes of parts, consequently affecting the quality and the price of finished automobiles.

Non-PROTON assemblers mainly adopt the single sourcing policy despite the delivery risk since multi-sourcing costs too much except for some standard parts and components. Especially, those parts which need costly moulds and dies are basically procured from a single vendor. Another reason is that the number of vendors is too small for assemblers to compare one with another as to costs, quality, and delivery, and therefore assemblers cannot help but purchase parts from a single vendor for each part. Actually, assemblers procure parts from vendors which supply other assemblers with similar parts.

4.2. ASSEMBLERS' EVALUATION OF THEIR VENDORS

Table 2-4-5 shows the evaluation by non-PROTON assemblers of their vendors.

Table 2-4-5 Assemblers' Evaluation for Vendors

	Quality	Production Capacity	Techno -logy	Delivery	Manage- ment	Cost	Entre- preneurship
Engine	169	185	130	146	138	153	138
Suspension, & Steering parts	186	186	171	157	157	85	129
Electric parts	177	183	162	158	158	123	130
Body parts	144	192	128	140	104	140	140
Other	164	191	136	155	118	145	127
Average	162	188	141	144	127	134	134

Source: Questionnaire Survey, JICA Study Team, July 1994

As shown in Table 2-4-5, "production capacity" was evaluated the highest, with weighted points of 188. Since it got high points in all categories of parts vendors, assemblers were thought to be

satisfied with their vendors in terms of production capacity. The "quality" factor followed that of "production capacity." By category, the quality of vendors which manufacture suspensions and steering parts was evaluated the highest.

On the other hand, "management control" was evaluated lowest, followed by "entrepreneurship" and "cost." Most vendors are behind in the improvement of management activities, and few companies except for foreign affiliated companies and a handful large-scale companies have introduced modern management systems. Talking about "cost," the competitiveness of suspensions and steering parts was evaluated the lowest, followed by "electric parts." Those parts which require a high level of technology with high added value are thought to lack cost competitiveness. Also, parts which are mass produced with a large amount of investment do not have a competitive edge.

5. BUSINESS OPERATIONS OF MALAYSIAN AUTOMOTIVE PARTS MANUFACTURERS AND THEIR PROBLEM AREAS

The steady recovering trend of the automotive industry since 1988 has led to the growth of the automotive parts and components industry. However, the automotive parts and components industry has various problems because its history is not so long. In this section, these problems are examined.

5.1. MANAGEMENT

5.1.1. Overall Management

(1) Diversification

There are many companies which are diversified although their main businesses are the production of automotive parts. The manufacture of motorcycle parts and components is a major diversified field. Among 51 vendors which deal with motorcycle manufacturers, twenty five, approximately 50% of the total, also supply to automobile assemblers.

Some examples of other diversifications by automotive parts and components manufacturers are as follows:

- Press parts manufacturers also supply their products to the telephone industry and the furniture industry.
- Bolt manufacturers sell to the electric machinery industry and other various manufacturing industries
- Rubber parts and glass products manufacturers supply their products to the construction industry

Some automotive parts and components manufacturers subcontract to other automotive parts and components manufacturers, for example, for the process of painting and making dies for die-casting.

Automotive parts and components manufacturers are making efforts to diversify their businesses

under the small market for automotive parts and components due to the small production volume of automobiles in Malaysia. However, except for the business with the motorcycle industry, their businesses with other industries have not yet grown to be another pillar to support them.

(2) Management Plan

A few companies are managed with a medium term perspective which extends to 2 to 3 years in the future, for example, with the management plan to shift production to less labour-intensive products. Many companies have a relatively short sighted management. They tend to consider that their major problem is a limited scale of market, not technology because they can buy technology any time. Taking into consideration the current situation of labour supply in Malaysia, it can be said that they have been faced with the necessity of establishing a medium and long term point of view in their management.

The results of the questionnaire survey conducted by the JICA Study Team relating to consulting services and seminars, which are effective in changing management style, are summarised below.

Table 2-5-1 Evaluation of Consulting Service and the Like

Unit: Number of Companies

Activities		Number of Companies		
		Very Useful	Useful	Not Useful
Consulting Services on Management				
	By Public Agencies	2	35	35
	By Principal (PROTON)	2	16	15
Other Services by Public Organisations				
	Information Services	4	48	23
	Seminars and Symposiums	6	41	23

Source: Questionnaire Survey, JICA Study Team, July to August, 1994

From the above result, it is considered that information services, and seminars and symposiums are more useful than management consulting services to managers working for automotive parts

and components manufacturers.

5.1.2. Labour Management

The present situation of labour management is evaluated from the viewpoints of employment, leaving, absence, and wage.

Until the end of 1993, the ratio of leaving was so high that 10 to 20% of employees left companies yearly. As an extreme case, 10% of employees left in one month at some automotive parts and components manufacturers, and they had to recruit new employees every three months.

Although the rate of leaving has become lower in July, 1994, the supply and demand relationship in the labour market is still tight because the fundamental conditions have not changed. For that reason, many companies have to employ Bangladeshis up to approximately 10% of total employees. Some companies operate commuter buses as a service to employees living about 50 kilometers away.

Those who have shorter working experiences tend to leave easily, and this, on the other hand, makes it easier to recruit unskilled workers. At the same time, the high ratio of leaving hampers the accumulation of technology. In addition, the absence ratio is about 10% at some companies. To cope with such high absenteeism, they have to employ approximately 10% more employees than actually necessary.

One of the surveyed companies had such difficulty in finding younger employees that they raised the age limitation of applicants to 30. According to the questionnaire survey, 66 companies, or 63% of the total, 104 companies, pointed out the difficulty in hiring new employees.

Wage reages are generally adopted in order to deal with this situation. Automotive parts and components manufacturers raised wages by approximately 12% on average at the time of the tight labour situation at the end of 1993. Some companies pointed out that small-scale increases in allowances were not effective at all. According to the survey, the average monthly payment for

a general worker falls between RM$350 to 450.

The results of the questionnaire survey have confirmed the above as follows:

Table 2-5-2 Evaluation of Workers' Wage Level

Evaluation	Number of Companies
No Problem	39
A Little High	29
Too Rapid Increase	31
Total	99

Source: Questionnaire Survey, JICA Study Team, July to August, 1994

In addition to wage raises, employee welfare activities are also carried out. For example, some companies hold company picnics to which all the employees are invited, and some set up libraries and gymnasiums, which also are useful in the education and training of employees.

On the other hand, efforts to introduces laboursaving production methods only are not active except for one company. This is a task to be tackled in the future.

On the other hand, some of the surveyed companies pointed out that the number of engineers and core managers is not sufficient although they are quite capable. The result of the questionnaire survey concerning their managers is as follows:

Table 2-5-3 Evaluation of Managers

Problem	Number of Companies
No Problem	64
Lack of Skill	19
Not Enough Number	15
Lack of Skill & Not Enough Number	4
Total	102

Source: Questionnaire Survey, JICA Study Team, July to August, 1994

5.1.3. Human Resource Development

The result of the questionnaire survey on how management sees its employees is shown below.

Table 2-5-4 Evaluation on Workers' Technical Level

Level of Skill	Number of Companies
Low	30
Medium	67
High	4
Total	101

Source: Questionnaire Survey, JICA Study Team, July to August, 1994

As shown above, 30% of the surveyed companies regarded the technical level of their employees as being low.

The training of employees was also evaluated through the questionnaire survey as summarised below.

Table 2-5-5 Evaluation of Outside Training Facilities

Unit: Number of Companies

	Public Training Facility	Principal (PROTON)	
		Workers' Training	Managers'Training
Very Effective	4	7	4
Effective	42	23	16
Not So Effective	29	7	14
Total	75	37	34

Source: Questionnaire Survey, JICA Study Team, July to August, 1994

As shown above, 23 companies or 62% of the surveyed companies recognised that the training by customer companies is effective. It is noteworthy that 29 companies or 39% of the surveyed companies said that the training by public institutes was not so effective while 42 companies or 56% of them said it was effective.

The fact that a company stressed the importance of establishing an in-house training system in the survey reflects the situation mentioned above.

The most popular training measure adopted by the interviewed companies is to dispatch employees to Japanese companies with which they have set up a joint venture or receive technical assistance. Dispatch of trainees is generally made every year, and the number of employees sent is 2 to 6. The duration of dispatch is between 1 month and 3 months. The AOTS scheme is often utilised for the dispatch of trainees. At some companies, approximately 30% of all employees have received overseas training, and they take important positions at each company.

It is obvious that the close contact with overseas partner companies is effective as an employee training measure. One good example of this kind of contact is to receive an expert from overseas partner companies. However, some companies pointed out that it was difficult for overseas companies to acquire proper work permits when they send experts to partner companies in Malaysia.

Some companies devise effective measures for training. One press parts manufacturer displays their products coloured in red with a car to show where they were used. Another parts manufacturer uses plenty of photos and drawings for in-house training. They use this method to make their training concrete and certain because they have learned from their experience that teaching in an abstract way is not effective. These kinds of devices can be seen only at a few companies. However, these kinds of efforts should be encouraged to realise effective in-house training.

5.2. PRODUCTION PROCESS

There are no serious problems for the production processes of automotive parts and components for the OEM market which are produced under the technical assistance from overseas companies because manufacturers have installed modern facilities and their production processes are well managed. That is because overseas companies generally bring in their original production processes and facilities which are well established in their home countries. One of the reasons they usually bring in their own production processes untouched is they are concerned about the level of industrial technologies in Malaysia.

Automotive parts and components manufacturers in Malaysia are behind in establishing an organisation for the maintenance and improvement of production processes. This is partly because there are few mechanical problems in their production facilities due to the fact that the history of factory operation of Malaysian automotive parts and components manufacturers is generally short and their facilities are relatively new. Also, their cost-consciousness is low due to the limited competition in the market. It is necessary for Malaysian automotive parts and components manufacturers to raise the level of their own technologies through the improvement of function to maintain and improve their production processes.

5.3. TECHNOLOGY LEVEL

5.3.1. Production Facilities and Machinery

Production facilities and machinery being used by Malaysian automotive parts and components manufacturers are basically similar to those used by overseas manufacturers. This is because automobiles produced in Malaysia are the models manufactured by overseas manufacturers, especially in Japan, and many parts and components suppliers in Malaysia have technological collaboration with foreign partners which are suppliers to those overseas automobile manufacturers. The following factors, however, make facilities and machinery in Malaysia different from those used by overseas suppliers, and generate several issues.

Factors

Compared with Japan:

1) Low production volume
2) Low labour cost
3) Low technology level (including facility related industry)
4) Difficulty in financing by suppliers

Phenomena

1) Use of old machines
2) Use of machines for low-volume production
3) Use of general-purpose machines
4) Sharing of machines among suppliers
5) Use of outsourcing parts
6) Unstable quality

(1) Low Production Volume

Annual production volume of approximately 180 thousand units of motor vehicles in Malaysia is less than that of a typical large-scale production model in Japan. This has various impacts on facilities as follows.

- Most stamping machines used by the companies interviewed are tandem-type. In most cases, they operate with old C-shaped frame machines. In an extreme case, 800 ton hydraulic press machines, which are used for trial production in Japan, are still in operation for the production of shells of fuel tanks. Their productivity level is less than 30% compared with that of Japan. Malaysian suppliers can not introduce more sophisticated machines such as transfer machines and progressive machines because of low production volume. This is a bottleneck in upgrading their technology level.

- A manufacturer of steering wheels has to import core steel parts from Thai suppliers. This is because it is not economical for them to introduce exclusive-use machines which are necessary to secure the accuracy required for the processing of core steel. If they introduced this machine, the operating ratio would be less than 20% due to the low production volume.

- Although several machining parts suppliers have heat treatment facilities, they are usually for their own use. Therefore, even suppliers with low operating ratios have to install their own facilities.

(2) Low Labour Cost

A limited number of automotive parts and components manufacturers, among the interviewed companies, have modified their production line responding to the low labour cost ratio in the total production cost. At most companies, the introduction of laborsaving machinery is not carried out due to the small production volume, and a production line is labour intensive. In addition, some companies depend too much on labour intensive visual checks and repair work at the end of lines. This is because measures to assure the quality of products at each work step in the production line are not sufficient. Especially, REM suppliers tend to have this problem compared with OEM suppliers which receive the inspection of production process by their customers, e.g., automotive manufacturers or assemblers.

(3) Low Technology Level

The low technology level of preventive maintenance and trouble-shooting of production facilities

and machinery prevents suppliers from raising productivity. It is also difficult for most of them to introduce up-to-date facilities because there are too few engineers. Taking APM Plastics, a supplier with a high technology base, for instance, they can repair mechanical systems by themselves, but they have to depend on Japanese counterparts and outside repair shops to handle 75% and 15%, respectively, of troubles related to the computerised control system. The remainder they can take care of by themselves.

There are two reasons for the low technology level. One is a human resource problem. Not only are there too few engineers and they change their jobs frequently, but also there is a general tendency for graduate-level engineers to be reluctant to work at *GENBA* (factory site), making it more difficult to raise the technology level. Forty companies pointed out in the questionnaire survey that technical skill development is needed. It can be considered that many of these answers relate to technical training for engineers.

Table 2-5-6 Evaluation of Production Technology

Answer	Number of Companies
No problem	20
Technical skill development is needed.	40
Further technology transfer from overseas is needed.	22
Both technical skill development and technology transfer are needed.	13
Total	95

Source: Questionnaire Survey, JICA Study Team, July to August, 1994

The other reason is that the ancillary industries related to facilities and machinery are not well developed. Spare parts for machines are often not available from domestic suppliers. This is because there are not enough suppliers of heat treatment, hard chromium plating, and other processes, which are necessary for spare parts production, in Malaysia. The lack of supporting industry also resolves itself into the problem of human resources, especially concerning engineers.

(4) Difficulty in Financing

There must be substantial replacement demand for machines because, in the questionnaire survey, more than 20% of companies responded that their facilities are more or less obsolete . Regarding another question, on the other hand, it turned out that one third of companies responding experience a difficulty in financing investments. It is considered that a certain number of companies have difficulty in carrying out fixed investments according to their original plans. The amount of investment required for the introduction of facilities from Japan, including royalties, has been rapidly increasing soaring value of the Japanese Yen. According to a parts manufacturer, the cost of introducing Japanese technology may be three times as much as that from Australia. Another parts manufacturer pointed out an inconsistency of the tax system where import tariff is imposed on R&D facilities and inspection instruments while it is not imposed on production facilities.

Table 2-5-7 Problem Regarding Machinery and Equipment

Answer	Number of Companies
No problem	79
A little too obsolete	22
Too obsolete	0
Total	101

Source: Questionnaire Survey, JICA Study Team, July to August, 1994

Sharing expensive testing facilities and/or machines among parts manufacturers and consigning maintenance work of moulds and dies to other parts manufacturers are examples of counter measures which can be taken to deal with financial difficulty. As for government measures such as providing material inspection and/or R&D services done by SIRIM, parts manufacturers do not appreciate them as much as was expected. One of the reasons is that SIRIM's services are not well known to many parts manufacturers although some services, especially in rubber and plastic fields, are frequently utilised. It is a good idea to take measures to get parts manufacturers to recognise what SIRIM is doing as is planned by the technical committee of the Proton Vendor Association.

Table 2-5-8 Evaluation of Technical Support by Public Agencies

Type of Support	Answer	Number of Companies
Material Testing Facilities	Very Effective	4
	Effective	43
	Not Effective	13
	Total	60
R&D Supporting Facilities	Very Effective	0
	Effective	25
	Not Effective	30
	Total	55

Source: Questionnaire Survey, JICA Study Team, July to August, 1994

5.3.2. Technology Level and Technological Gap

The Study Team evaluated the technology level of automotive parts and components manfuacturers using a factory checklist during the field survey according to the following method.

Number of Evaluated Campanies: 32

Evaluation Points: GOOD=3 points, FAIR=2 points, BAD=1 point

Evaluation Items:

Hardware Technology: technology level(R&D, design, production) and facilities (age, maintenance, operation, layout)

Software Technology: materials (inventory size, yield ratio), production (inventory, production management for a wide variety of products), process control (control method, work force allocation), work environment (5Ss, safety), quality control (quality assurance system, quality maintenance activity, defect control system), logistics (inside factory, outside factory), delivery control (timeliness) and human resource management (turnover, show-up rate, morale)

Table 2-5-9 Evaluation of Technology Level by Type of Ownership

	Hardware Technology	Software Technology
Average of Bumiputera Companies (5 Companies)	2.04	2.01
Average of Other Domestic Companies (10 Companies)	2.36	2.33
Average of Foreign Companies (17 Companies)	2.58	2.55
Maximum-Minimum Score	3.0~1.3	2.88~1.32

Note: Joint venture companies are classified as "foreign" regardless of percentage of equity participation.

Source: Questionnaire Survey, JICA Study Team, July to August, 1994

There is a significant technological gap between foreign companies and Malaysian companies, especially Bumiputera companies, in terms of both hardware and software technology. In hardware technology, the areas where there is a big gap are technologies related to product development such as prototype production and tool and die making, and maintenance level and newness of facilities. Among the companies interviewed. there is no company which is able to design a production processes and to design and make dies. As for stamping dies, some parts manufacturers make in-house small sized dies for such process as forming, bending, and piercing, drawing dies with simple shapes like circular cylinders, and drawing dies for parts which do not require extreme accuracy such as sheet cushions. Even in these cases, they usually consign machining for profiling to outside die suppliers.

In the field of software technology, some companies lack basic knowledge to manage their factory. As for safety management, one example is that operators of press machines push the start button with one hand, not with both hands, and the other example is that paint thinner fumes in the painting process are not ventilated well enough. There is a company where goods in process are packed in used cement bags and placed on the floor. Technical collaboration with overseas companies, in general, focusses on specific product and production technology, i.e., hardware technology. Among companies which have technical collaboration, some companies do not carry out sufficient factory management, which requires continuous and company-wide improvement

activities.

Another example of technological gaps is the gap between OEM suppliers and REM suppliers. This gap is outstanding compared with the gap by ownership (nationality) segmentation.

Table 2-5-10 Evaluation of Technology Level of OEM/REM Suppliers

	Hardware Technology	Software Technology
OEM suppliers (29 companies)	2.51	2.42
REM suppliers (3 companies)	1.62	1.58

Note: An REM supplier is defined here as a company whose REM sales exceed 50% of its total sales.
Source: Questionnaire Survey, JICA Study Team, July to August, 1994

5.3.3. Technological Evaluation by Production Process

Based on the field survey, technology by type of production process was evaluated and the results are as follows.

Score A: Excellent B: Normal C: Inferior

- Casting: C

Although HICOM Engineering, having started operations in 1991, is a leading company in this field, their quality level is still unstable considering such data as the in-house defect rate of 2%, reject rate by customers of 8%, and market claim ratio of 2 - 3%. Especially they are poor in pattern maintenance technology.

- Forging: C

BERTOOL, a subsidiary of HICOM, and Sapura Automotive are the sole manufacturers of hot forging products. According to a customer, BERTOOL is still not able to supply acceptable quality products. There is no specialised cold forging manufacturer in Malaysia. Although TRW Steering & Suspension in Penang which produces tie rods has in-house cold forging facilities, its

product line is limited to small parts.

- Sintering: A

Sintering parts such as timing belt pulleys and oil pump gears are mainly used for engine, transmission, and suspension units. Main suppliers are Sumitomo Electric Sintering Components (SESC), 100% owned by Sumitomo Electronics, and Dia Klang, 100% owned by Mitsubishi Material. These foreign companies produce high quality products with the latest production facilities.

- Machining: B

PBR Automotive (brake and clutch parts), Sapura Machining (water pump pulleys), Asian Driveshaft (driveshafts), Armstrong Autoparts (shock absorbers) were interviewed. Foreign companies and/or companies with technological collaboration with foreign companies have no operational problems. Their production technology level is high with assistance from their parent companies. As for domestic suppliers, in most cases, they engage in general machining processes such as drilling and polishing where high precision is not needed.

- Stamping: B

Metal Formers (small parts), Brimal Stampress (small parts), Oriental Summit (middle sized parts), Tracoma (functional parts), APM Stamping (large parts) were interviewed. At some companies where maintenance of dies and machines is insufficient, line troubles such as miss-feeding sheet metal and work-setting and rejecting problems frequently occur. There is no company that can produce fine blanking products.

- Welding: B

The above mentioned stamping manufacturers also work on arc welding, spot welding, and seam welding. The next technological task in this field is the acquisition of welding technology for plating metal and high tension metal where setting of welding conditions is difficult.

- Plating: No interviews were conducted.

- Heat Treatment: C

Yong Shen Heat Treatment and MR Heat Treatment are major specialised heat treatment processors. There is no local heat treatment processor which can satisfy required quality level, especially hardness. Therefore, taking steel wire for example, SWPA which requires heat treatment is imported from Japan in spite of the fact that the drawing process can be done in Malaysia. Among interviewed companies, only two companies, Sapura Machining and Asian Driveshaft, have in-house heat treatment facilities.

- Painting: A

Metal parts manufacturers producing suspension or wheel components which need high level anti-corrosion have cationic painting and salt-spray test facilities. No critical problems are not seen in the plastic painting field either because the technology has been established for the electronics industry in Malaysia.

- Plastic Injection Moulding: B

HICOM Teck See (large plastic parts), Teck See Plastic (small and medium size parts), and P.U. Tech Industry (urethane moulding) were interviewed. HICOM Teck See was established solely for the purpose of automotive parts and is currently producing large components such as bumpers and instrument panels. They still need to improve because their defect rate is high. They consign product tests to SIRIM. Teck See Plastic, on the other hand, is able to manufacture two-colored injection moulding parts which require a high technology level because they have accumulated technology in the process of doing business with the electronics industry. They have started to manufacture moulds with two sets of machining centres.

- Rubber Moulding: A

Pong Codan Rubber, a joint venture between Thai and Danish companies, produces such extrusion

rubber products as weather strips and fuel hoses. Fuel hoses, consisting of double-layer rubber and reinforced textile are produced by the company without any difficulty even though this product is difficult to produce. Defect rate is as low as 0.03 percent.

The manufacture of insulating rubber for engine and transmission mounting has not been localised, and is the next target of localisation.

- Assembly: A

Component assemblers for radios, stereo sets, relays, and air conditioners generally are large-scale foreign-related companies and their technology level is high. Their major production facilities were imported. They prepare in-house checking jigs for electric conductivity and software for inspection. To develop simple material handling and assembling robots may be the next task to upgrade the technology level.

5.4. MATERIAL AND PARTS PROCUREMENT

5.4.1. Material Procurement

Some non-metal materials (glass, PP resin and natural rubber, etc.) for automotive parts are procured within Malaysia, while all the metal materials must be imported from overseas. Formerly, automotive parts manufacturers purchased materials only based on the specifications. However, as it has been becoming easier to procure materials globally, the flexibility of procurement has been widening, and more importance is being placed on prices.

Material manufacturers in Malaysia play a role as warehouses for automotive parts manufacturers, which alleviates the inventory burden for those parts manufacturers.

At present, no big problems regarding material procurement can be found in the Malaysian automotive parts industry. However, Malaysian automotive parts manufacturers should widen local procurement, from resin and rubber materials, to more functional and highly value-added

materials to enjoy the advantage of local procurement of materials for automotive parts and components.

5.4.2. Parts Procurement

There are two styles of parts procurement: one is where car sales companies/assemblers import parts on a CKD parts basis and the other is where parts manufacturers import parts they cannot make. Lower customs tariffs are applied to parts imported by parts manufacturers than on CKD parts. This promotes localisation of parts procurement by car companies, but at the same time, defers the localisation of parts production by parts manufacturers.

5.5. FACTORY MANAGEMENT AND QUALITY CONTROL

5.5.1. Factory Management

(1) Factory Management Activity

Factory management carried out by most automotive parts manfuactuers is guided by PROTON, NPC, and SIRIM with the purpose of improving the quality level. This is a company-wide activity starting from the achievement of the 5Ss (*Seiri, Seiton, Seiso, Seiketsu, and Shitsuke*) and finally achieving the company's targets of QCD (Quality, Cost, and Delivery) in line with the management goals. Posters on 5S for promotional purposes prepared by NPC are effectively used for the understanding of that activity among workers. Five Ss has been translated into Malay and is widely used.

Case 1:

One of the press parts manufacturers carries out a 5S action plan which was started on 1, July, 1994, and has strengthened its factory management through this activity. This company places big white boards at several places in the factory, and posts the results of daily activity, e.g., the production plan and its achievement, record of defect ratio and control limit line, content of

defects and necessary countermeasures, and so on. Thus, production results are updated every day so that the latest information can be fed back to production. As a result, in this factory, work-in-process parts are well organised except for some, quality has been improved, and punctual delivery has been achieved.

Case 2:

At one of the surveyed companies, management activity was stagnant, as judged from a factory visit, although it had received support from an outside organisation. Several defective parts were observed in the production process in this factory. There was excessive inventory.

Case 3:

Another example is a company which does not supply PROTON with its parts. Because it was not a PROTON vendor, it had not received any support for factory management. The situation of factory management of the company was very similar to that of the above Case 2.

These typical cases indicate that factory management can not be improved without knowledge. Still, at the same time, even if they have knowledge, no improvement in factory management can be expected without effective action. Companies may change only when management resolves to carry out factory management activities with leadership and knowledge.

(2) Delivery Management

The delivery schedule set by PROTON is summarised as follows:

- Final production schedule of the next month is shown at the middle of the month.
- At the same time, the succeeding 3 months' production schedule is given.
- Actual delivery quantity is presented two days before.
- Actual delivery quantity may fluctuate day by day.
- Automotive parts manufacturers usually deliver parts twice a day.
- Large parts may be delivered every hour (for a manufacturer located near PROTON) in some cases.

On the other hand, automotive parts manufacturers are not necessarily located close to automobile

manufacturers and assemblers. The following Table 2-5-11 shows the distance between Cycle & Carriage Bintang (CCB), an automobile assembler located in Petaling Jaya, Selangor, and its vendors. This kind of situation is common to all the automobile manfuacturers and assemblers.

Table 2-5-11 Distance between CCB and Vendors

Distance	Number of Vendors
1 to 50 Km	33
51 to 100 Km	18
101 to 200 Km	3
201 to 300 Km	2
301 to 400 Km	7
401 to 500 Km	2
Total	64

Source: List of Local Content Suppliers, Cycle & Carriage Bintang, July, 1994

Delivery control by automobile assemblers is strict so that assembly may proceed smoothly. This was endorsed by the questionnaire survey in which 77% of the surveyed companies pointed out strict delivery control by automobile manufacturers/assemblers.

Table 2-5-12 Evaluation of PROTON's Delivery Control

Evaluation	Number of Companies
Very Strict	43
Moderate	13
Not Strict	0
Total	56

Source: Questionnaire Survey, JICA Study Team, July to August, 1994

Automotive parts manufacturers located near automobile manufacturers/assemblers should have tighter delivery policies to reduce the level of inventory. On the other hand, parts manufacturers

located far from automobile manufacturers/assemblers should consider relocation of their factories because of limitations in the delivery control system.

5.5.2. Quality Control

Quality control improvement activities are led by the NPC-PROTON joint programme and SIRIM's activity, which aims at the acquisition of ISO-9002.

The NPC-PROTON joint programme is often called a "Japanese style quality control programme" which consists of the following:

- 5Ss (*Seiri, Seiton, Seiso, Seiketsu, and Shitsuke*)
- QCC (Quality Control Circle)
- QCD (Quality, Cost, and Delivery)
- Weekly meetings (about quality control)
- Morning briefings (morning meetings at a workshop)
- Factory visits (monthly visit to excellent factories)

PROTON asks its vendors to prepare the following documents in order to secure a specific quality level.

- Follow-Up Sheet (necessary for new product development)
- Process Change Plan & Notification (necessary to change a production process)
- Inspection Agreement (should include the inspection method of procured parts)
- Inspection Sheet of Sampled Parts (monthly)
- Record of Daily Inspection

In addition, quality audits are conducted by NPC-PROTON twice a year, especially for Bumiputera companies. One audit takes two to three hours by three inspectors.

In many factories, basic quality control measures, such as the utilisation of various control graphs, notice of standard operation procedure, attachment of slips to each stock part, separation of

defective parts into red coloured boxes, and record of production and defects, are carried out. The word "SOP" which represents "Standard Operation Procedure" is so prevalent among parts manufacturers that it indicates the deep penetration of quality control activities.

Automated inspection systems as well as in-process inspections by QC-inspectors are also employed. Some companies use magnetic particle testing for the inspection of flaws of steel materials. Some companies have an excellent quality control system in which inspectors of visual inspection change product items to be checked twice a day so that mistakes stemming from experience in inspecting the same parts may not occur. According to the interview survey conducted by the JICA Study Team, many companies, at morning briefings, discuss the previous day's production records and today's production plan, comparing the work and inspection testing records.

Even companies which have already obtained or are preparing for international standards evaluate PROTON's quality standards as very strict. The questionnaire survey by the JICA Study Team also shows the same result as summarised in Table 2-5-13 below.

Table 2-5-13 Evaluation of PROTON's Quality Standard

Evaluation	Number of Companies
Very Strict	34 (69%)
Moderate	15 (31%)
Not Strict	0 (0%)
Total	49 (100%)

Source: Questionnaire Survey, JICA Study Team, July to August, 1994

The acquisition activity of ISO-9002 is carried out through the APK (Amaian Peningkatan Kualiti) system. This system was developed in accordance with the content of ISO requirements. As a result of the activity, the acquisition of ISO-9002 has proceeded significantly as shown below.

Table 2-5-14 Acquisition of ISO-9002 by Parts Manufacturers

Condition	Number of Companies
Acquired	23 (26%)
Preparing	46 (52%)
Not plan to do	19 (22%)
Total	88 (100%)

Note: The above includes non-PROTON vendors.
Source: Questionnaire Survey, JICA Study Team, July to August, 1994

On the other hand, approximately 30% of the surveyed companies consider the quality improvement activity undertaken by the Government to be improved as shown in Table 2-4-15.

Table 2-5-15 Evaluation of National Quality Control Activities

Evaluation	Number of Companies
Very Effective	4 (5%)
Effective	49 (67%)
Not Effective	20 (27%)
Total	73 (100%)

Source: Questionnaire Survey, JICA Study Team, July to August, 1994

The reasons for the negative evaluation of the Governmental quality control activities are not clear. The problems of the Governmental quality improvement activities should be made clear and resolved. In addition, it is also important for parts manufacturers to have an idea such as "Quality is first."

5.6. PRODUCT DEVELOPMENT AND DESIGN

Generally, automotive parts and components manufacturers in Malaysia do not have their own brand products and they are positioned as subcontracting factories of automotive sales companies or

automotive assembly companies. They manufacture automotive parts according to the product specifications provided from their consignors using production technologies provided from those consignors. At this stage, what is necessary is production technology to produce precisely according to the specifications, and management control to deliver cheap and high-quality products on time.

At present, almost all parts manufacturers depend on technical support from their consignors or their related companies for product development. Generally, they do not have capabilities to develop products with their own unique technology.

Accordingly, it is effective for Malaysian parts manufacturers to place priority on the upgrading of production know-how rather than product development capability. In addition, they should upgrade production technologies and human resources so that they can develop machinery, equipment, tools and jigs, and new production methos by themselves. One of the approaches to develop R&D capability is to pursue the upgrading of production technology in terms of quality and quantity, and to be involved in product development and design through product modifications from the aspect of production technology.

5.7. MANUFACTURING COSTS

The Malaysian automotive industry is lagging in the areas of casting, forging, machining, heat treatment and pressing, which require large investments for facilities and integrated technology. At present, the main production style in this industry is to import auto parts and assemble them, although machining, to some extent, is carried out locally.

Lower customs tariff is imposed on automotive parts and components imported by parts manufacturers than on CKD parts imported by automotive manufacturers. However, in the case of non-CKD parts, the percentage of material procurement costs in overall manufacturing costs is about 60 - 80%, which is the average of 20 parts assemblers according to the Questionnaire Survey, conducted by the JICA Study Team. The percentage of labour costs ranges from 2~20% with an average of approximately 10%, and subcontracting costs vary between 0~25% with an average of approximately 4%. It is characteristic that Malaysian parts manufacturers mainly do

low value-added processing by themselves with imported materials and component parts, and do not so often utilise subcontractors.

5.8. MARKETING

5.8.1. Characteristics

There are two major characteristics in marketing by automotive parts and components manufacturers, considered from the aspect of the relationships with their customers, the automobile manufacturers/assemblers.

i. Automobile manufacturers/assemblers are eager to find new suppliers and develop them, but an approach from parts and components manfuacturers are not actively approaching automobile manufacturers/assemblers to start new business.

   Business between automobile manufacturers/assemblers and parts and components manufacturers generally starts at the initiative of the automobile manufacuters/assemblers.

   Automobile manfuacturers/assemblers in Malaysia, especially PROTON, actively looking for potential vendors and provide them with various kinds of assistance after the start of business.

   This tendency is reflected in the flow of PROTON's activities for finding new suppliers as follows:

   Step 1: To select potential vendors for specific parts and components.
   Step 2: To evaluate the technical levels of potential vendors from the viewpoint of the 4Ms (Man, Machine, Method and Material).
   Step 3: To conduct a feasibility study. If necessary, to assist in the introduction of technical collaboration partners.
   Step 4: To monitor such factors as cycle time, facilities and equipment if the vendor newly constructs or renovates its factory.
   Step 5: The vendor starts production and starts to deliver to PROTON.

ii. There is a large difference in marketing between PROTON vendors and non-PROTON vendors.

a. Difference in efforts to increase sales

Manufacturers mainly supplying to PROTON

Their major concern is how to increase sales volume and items to PROTON steadily, and for this, they put emphasis on how to improve their technical level, product quality, cost and delivery to meet the requirements of PROTON.

Manufacturers mainly supplying to non-PROTON assemblers or supplying to both to some extent

They choose one or some of the following directions:

* How to start or expand business with PROTON and for this, how to promote technical collaboration and/or localisation of parts and components.
* How to increase the OEM supply to non-PROTON assemblers.
* How to develop buyers and expand sales for the REM including export, where they can supply essentially with existing technology and facilities.

b. Difference in number of assemblers they supply

As shown in Table 2-5-16, parts manufacturers supplying to PROTON have relatively smaller numbers of customers than those supplying to non-PROTON assemblers, because the latter cannot realise sufficient production volume without supplying to many customers.

Table 2-5-16 Comparison of the Number of Customers between Suppliers to PROTON and non-PROTON Assemblers

Number of Customers	Percentage of Companies Supplying to PROTON	Average Percentage of Companies Supplying to Non-PROTON Assemblers
1.00	17%	3%
2.00	17%	5%
3.00	12%	6%
4.00	24%	17%
5.00 or More	30%	69%
Total	100%	100%

Note: Some suppliers to PROTON are also supplying to non-PROTON assemblers and vice versa.

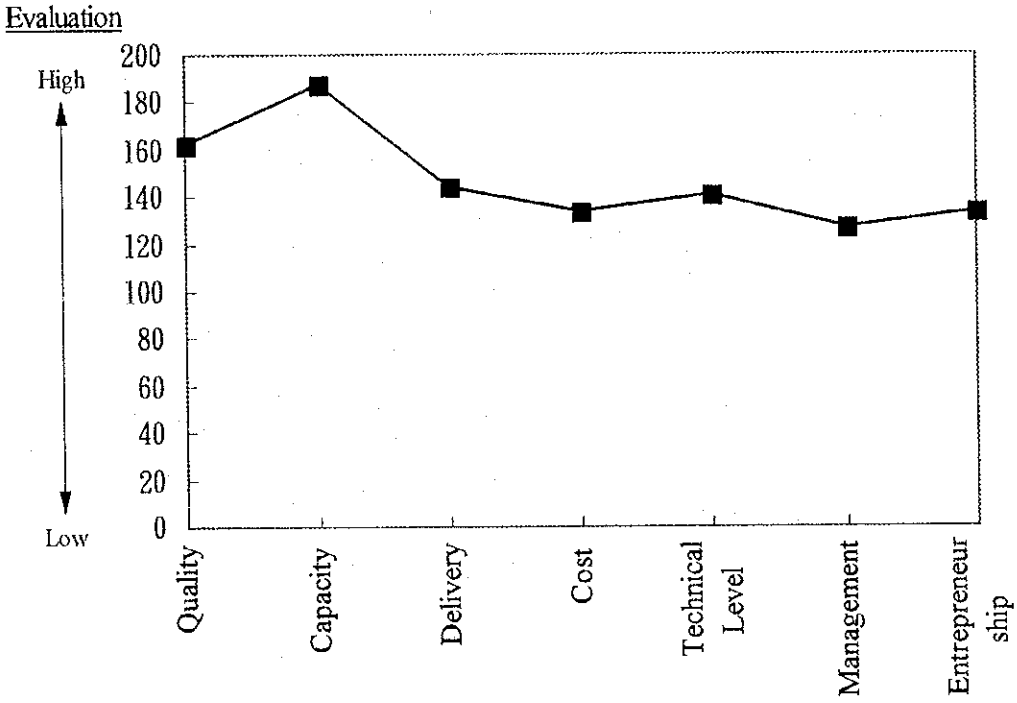
Source: Questionnaire Survey, JICA Study Team, July to August, 1994

5.8.2. Problems to Be Solved

The further expansion of local production and the progress of localisation in real terms of automotive parts and components depends on how automotive parts and components manufacturers try to satisfy the requirements of automobile manfuacturers/assemblers in terms of technical level, quality, cost and delivery.

Fig. 2-5-1 shows the evaluation of parts and components manufacturers by automobile assemblers.

Fig. 2-5-1 Evaluation of Parts and Components Manufacturers by Assemblers



Source: Questionnaire Survey, JICA Study Team, July to August, 1994

Capacity and quality, which are indispensable conditions for the development of the automotive industry, are highly evaluated. However, evaluation is low for such factors as suitable delivery, which is necessary for assemblers to make use of their production lines without delay; price, which is important for the cost competitiveness of final products; technology, indispensable for further localisation; and management and entrepreneurship, which are necessary for improving and controlling the above mentioned factors. It is necessary for automotive parts and components manufacturers to improve these factors.