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# THE PATTERNS OF SUBCONTRACTING ARRANGEMENTS IN THE MALAYSIAN AUTOMOBILE INDUSTRY\*

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## ABSTRACT

*This paper presents empirical insights into the patterns of subcontracting arrangements and management in the Malaysian automobile industry. Despite a small sample size, the empirical results contribute some knowledge to the subcontracting-related patterns. This study found that two out of four proposals were consistent with the Japanese, but the results still show some distinctive patterns. Although outsourcing is a common practice among the three auto makers under investigation, its patterns are different from the Japanese average: the level of outsourcing was much higher for the production of commercial vehicles than passenger cars; and for functional parts than the general parts. Moreover, multi-sourcing instead of single sourcing as in the Japanese for most auto parts was adopted by the national auto makers. It is also agreeable that a mixed combination of market, hierarchy, and social capital factors were hand-in-hand responsible for managing and binding the auto maker-supplier relationship, but the absence of a full-fledged hierarchical configuration and distinct job specialisation has contributed to a less efficient management system in the subcontracting which would hinder the ability of the national auto makers to compete in the global market. Further research should give attention to global sourcing, subcontracting in services, and subcontracting in non-national auto makers.*

## I. INTRODUCTION

The automobile industry as one of the identified projects under the heavy industrial policy was given major thrust by the Malaysian government to upgrade local capabilities in manufacturing auto parts and components, particularly through small and medium enterprises (UNIDO 1991). As an effort to upgrade local capability in auto parts making, the Government has encouraged auto makers to develop their subcontracting arrangements locally. In this connection, the first Vendor Development Programme

through the Proton Component Scheme was introduced by the Government in 1988. A similar programme was also adopted by the second national company, i.e. Perusahaan Otomobil Kedua Sdn. Bhd. (PERODUA) in the 1990s. The objective of this Programme is to prepare the local small and medium enterprises to be suppliers of intermediate and capital goods and supporting services to auto makers and assemblers (Ungku Ahmad and Abdul Majid 1998).

Despite a growing number of the literature on the Malaysian automobile industry, studies

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on the subcontracting arrangements across the national auto makers are non-existent.<sup>1</sup> For examples, a study by Anazawa (1997) is confined to technology transfer in the first national car project, PROTON. Abbott (2003) examines the automobile industry in Thailand, Indonesia and Malaysia with a focus on auto production and the auto parts industry. Abdulsomad (2003) compares the Thai with the Malaysian auto parts industry, but his special attention is on technological capabilities of suppliers. A study by Simpson et al. (1997) is even narrower because they focus only on the JIT system in the Proton factory. Recognizing the deficiency of the past studies, this paper aims to expound on subcontracting arrangements and management in the Malaysian automobile industry. Specifically, this paper presents empirical insights into the patterns of outsourcing, subcontracting configuration, job specialisation and subcontracting management in the three national auto makers.

## II. LITERATURE REVIEW

The automobile industry as observed by Corswant and Fredriksson (2002) has moved towards more global operations and experienced an increasing commitment to outsourcing activities. Global auto makers have, over the last five years, increasingly passed their responsibilities of research, design, development, testing, validation and integration to their suppliers (Singh et al. 2004). Asanuma (1992) believes that auto maker-supplier networks have developed over time and now become one of the major factors underlying the competitiveness of the Japanese automobile industry. Sheard (1983) argues that the rapid growth

(several folds) in the Japanese automobile industry during the post-1945 period has substantially been attributed to a massive innovation at the level of individual firms and their production systems, among others, through the rationalisation of subcontracting arrangements. This part provides more room for discussion on the Japanese subcontracting arrangement model due to its outstanding performance and popularity.

### Subcontracting Arrangements

Watanabe (1971) defines subcontracting as an arrangement between a parent firm, enterprise, or company and independent firm(s) or sub-contractor(s) in which the parent firm requests the independent firm(s) to undertake the whole or part of an order it has received instead of undertaking the task by itself, while taking full responsibility for the work against the original customers.

A subcontracting arrangement between auto makers and suppliers is a prerequisite for survival and success in an open market. As a complex and sophisticated industry, an auto maker would not be able to work alone but have to collaborate more intimately with its parts suppliers. In this context, Rawlinson (1991) reveals that the automobile manufacturing industry involves a complex set of parts making, system-component assembly and the annexation of different bundles of technology. In fact, an automobile comprises 1500 basic parts (Sheard 1983) or 10,000 to 20,000 individual parts (Smitka 1991); but it goes to over 20,000 (Wada 1994) and 20,000-30,000 (Yoshimatsu 1999) parts, contingent upon the complexity and sophistication of the vehicle and the method of counting, each of which has to

meet a standard precision and quality set for market demand, weather and durability (Ueno and Muto 1980).

Auto makers also need to resort to subcontracting because by this move they could focus on their core competency (Venkatesan 1992), improve return on a smaller amount of capital investment (Quinn and Hilmer 1994), export some of their business risk and product development costs to smaller firms (Jarillo 1988, Nassimbeni 1998), and gain economies of scale and economies of scope (Nassimbeni 1998). In other words, by outsourcing certain parts from suppliers, auto makers could focus on certain activities in which they are competent with (Venkatesan 1992); and hence gain various competitive advantages in the market. Yokokura (1988) argues that by outsourcing, parent firms would avoid from too much resource concentration in their own plants for in-house manufacturing. Using specialised technology, know-how and production facilities of suppliers would enable the auto makers to obtain a stable supply of purchased parts at necessary quality, timing and quantity. The suppliers, in turn, get a stable market demand and, to some extent, obtain technical and managerial support from auto makers; hence they are ready to respond promptly to expected quality and precision, timeliness and price. Nonetheless, instead of adopting an in-house production approach for standardised products as normally found in the West, the Japanese automobile firms tend to buy, rather than to make auto parts and components in-house, particularly prior to the economic downturn in the early 1980s (Asanuma 1992). Under a long-term contracting agreement, a particular Japanese auto maker inclines to outsource parts from external

suppliers (Tabeta 1995, Tabeta and Shahidur 1996). Following Best (1990), Japanese auto makers, as an average, manufacture 30 per cent parts in-house compared with about 50 per cent by the average U.S auto makers. Smitka (1991) found that the value of outsourcing in the Japanese automobile industry accounted for 70 per cent of the total manufacturing costs.

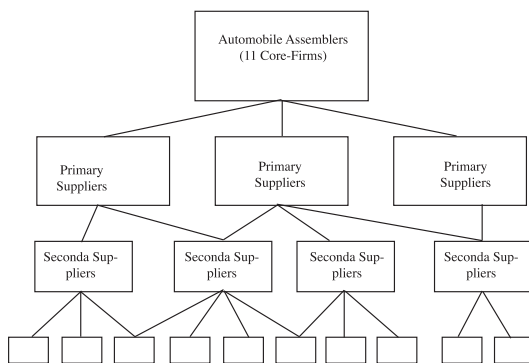
Large Japanese auto makers turn to suppliers for design and component making; and they rely on single sourcing for each auto component (Richardson 1993). Single sourcing in the Japanese subcontracting has enabled the auto makers to use a small number of first-tier suppliers to manage the less critical parts production by second-tier suppliers (Simpson et al. 1997). The increasing trend in outsourcing and the inter-dependency of the large auto makers are probably best described by a manager (administration staff) of the Purchasing Administration Department in Toyota Motor Corporation Headquarters as follows:

“When we started making motor vehicles ..... had to make many components in-house. But ..... after the 1960s, we began to rely on our suppliers’ ability to design and produce automotive components for us ..... We make only engines, transmissions and some other important components.” (Nishiguchi 1994: 118).

Japanese auto makers organise their network with suppliers into a hierarchical configuration (Tabeta 1995), or a pyramidal structure (Yokokura 1988, Asanuma 1992). As shown in Figure 1, suppliers are normally organised into three tiers (layers), i.e. the first-, the second- and the third-tier

suppliers, based on their functions and the type of products produced (Smitka 1991, Tabeta and Shahidur 1996). The total number of suppliers for each tier of the 11 auto makers in Japan differs from one to another; it ranges from 2 to 300 suppliers per core auto maker for the first-tier, 50-200 suppliers for the second-tier and 0-10 suppliers for the third- and lower-tier. The total number of suppliers for the respective tier of the whole automobile industry is 1,200, 8,000 and 40,000 firms respectively (see Figure 1).

**Figure 1: The Structure of Japanese Auto Subcontracting Arrangements**



- Note:
- Primary Suppliers: Direct Suppliers, 2-300 per core-firm, or 1200 in the industry
  - Secondary Suppliers: 50-200 per primary supplier, or 8,000 in the industry
  - Tertiary & Lower-Level Suppliers: 0- 10 per second-tier supplier, or 40,000 in the industry

Source: Smitka 1991, Figure 1.1, p. 15 (adapted).

There are two types of suppliers in a particular auto maker group, i.e. the affiliated

and independent suppliers. In many cases, a particular auto maker is the primary shareholders of its affiliated suppliers which produce critical or functional parts, such as engine, transmissions, steering and clutch components (Tabeta 1995). Due to historical and institutional factors, only a few numbers of firms do not belong to any automobile group (Sheard 1983); about 25 per cent of the 1,200 primary suppliers of 11 auto makers combined are independent suppliers (Smitka 1991). Independent suppliers come in when the industrial activities are less attracted for an auto maker to keep the supplier firms in a group. These activities include the supply of raw materials and the mass production of standard or general parts. However, for established independent firms, such as Nippon Denso and Mitsubishi Electric, there is little assistance that can be furnished by the auto makers since they can take care of themselves (Asanuma 1992).

Job specialisation within the subcontracting arrangement of any one Japanese auto maker also has a special pattern. Each party manufactures a narrow range of products, or undertakes a limited number of production processes. Auto makers tend to focus on the final assembly of automobiles, whilst the suppliers specialise in the manufacturing of parts, or in the assembly of sub-components which is later assembled into the final assembly of automobiles at the auto maker's plants.

Typically the first-tier suppliers do a more specialised job (for instance the sub-assembly of parts produced in-house or by lower-tier suppliers) or produce functional parts (e.g. engine and transmissions, electrical components and steering sub-assemblies). Meanwhile, the lower-tier suppliers perform

a more standardised job or produce general parts (such as tyres, bearing, or electrical wiring) just to support their upper-tier counterparts (Inaba and Tabeta 1995, Tabeta and Shahidur 1996).

## Subcontracting Management

Smitka (1991) asserts that the Japanese subcontracting is not coordinated or managed by market or hierarchy because it depends not only on contracts or prices as in the markets and hierarchical fiat (rules or legitimate authority) as in the hierarchies (Bradach and Eccles 1989), but also on social capital, such as goodwill and benevolence (Nishiguchi 1994) and trust (Smitka 1991, Asanuma 1992). As some legal aspects of contracts are difficult to enforce, trustworthiness becomes an important media to manage interdependency between auto makers and suppliers. Due to high sophistication of the automobile products and its technology secrets, auto makers are ready to deal with could-be-trusted suppliers only. Mutual trust also would provide a solid bridge between customers (auto makers) and suppliers (Seetharaman et al. 2004) and encourage suppliers to continuously improve their manufacturing processes and product design (Asanuma 1992).

Contract is one of the features of a market mechanism adopted by the Japanese, but with less formal than the market itself. A particular contract provides some flexibility to the suppliers by giving different time frames for different items: i.e. the position and obligation of each party in the relation; the standard duration of contracted auto parts; and the allowable interval for price adjustments. A basic contract stating the general obligation of each side of contracting

parties takes force for one year only. Nonetheless, the contract is automatically renewed, unless there is any objection from either side (Asanuma 1992).

Other managerial instruments binding network relations between auto makers and suppliers are their mutual commitment to price, quality and delivery of auto parts. Price bidding mechanism in Japan is rather different from that of the United States. Instead of comparing the final unit price as in the latter, the focus of comparison of the Japanese auto makers is based on detailed cost decomposition of certain auto parts among suppliers (Smitka 1991). Given some adjustments for parts improvement via manufacturing efficiency, the suppliers are expected to bid lower price than the previous one (Asanuma 1992). A price adjustment is allowable only for certain specialised auto parts which may change regularly as a result of technological changes in design, quality and specification. Material costs, purchases of parts and process from secondary suppliers, direct manufacturing costs, tooling costs and gross margin (overhead plus a profit margin) are among cost components allowable for adjustment during the subsequent bids (Smitka 1991). Nonetheless, increases in labour and energy costs are not permitted to be passed on the auto makers by means of higher contract prices (Inaba and Tabeta 1995).

Grading system makes the Japanese production chain attain its full potential. Grade A, B, C, D and E conferred by auto makers which are evaluated based on product quality, price, delivery, engineering and other indicators (Nishiguchi 1994) compel the suppliers to work hard to improve

their manufacturing process and quality management. Those who are conferred with higher grades would be promising in the coming selection process of suppliers. Those who achieve poor grades have to work harder; otherwise they would be squeezed out after an allowable rationalised period is given, or they would be pushed down as lower-tier suppliers supplying parts to higher-tier counterparts.

Delivery commitment undertaken under the Just-in-Time (JIT) system is rather strict. It requires suppliers to frequently deliver contracted parts in small batches to their core auto makers. Therefore, it becomes common for suppliers who channel a large portion of their output and supply bulky components (such as doors, seats and dashboards) to locate within a two-mile radius of their affiliated auto maker’s assembly plants (Young 1992). This cluster has tremendously reduced the costs of keeping inventories among auto makers since the delivery of certain parts could even be made hourly (Sheard 1983).

**III. RESEARCH METHODOLOGY**

The Japanese model of subcontracting was used as the basis for comparison with the Malaysian auto makers under investigation due to the fact that Japanese multinational corporations have played a dominant role in the Malaysian automobile projects since 1983. In line with the literature, four proposals are outlined in Table 1 in which this study would then try to falsify with the empirical results (as adopted by Correa and Miranda 1998).

**Table 1: Proposals pertinent to the patterns of auto subcontracting arrangements**

<i>P1</i>	Outsourcing is a common practice among auto makers
<i>P2</i>	Auto makers organise their suppliers into a hierarchical configuration
<i>P3</i>	There is a job specialisation between auto makers and suppliers
<i>P4</i>	Subcontracting is managed by a combination element of market, hierarchy and social capital

Note: These proposals are made following Corswant and Fredriksson (2002).

The empirical investigation of this paper is based upon a self-report method which involved three phases of data collection. First, audio-taped interviews with the middle managers of the three auto makers were conducted to have a better understanding of the Malaysian automobile industry and their subcontracting arrangements. These interviews were held only after an appointment with each auto maker was made a few weeks earlier.<sup>2</sup>

Second, after getting another permission from the auto makers, a set of close and open-ended questionnaire was passed on to respective departments (such as purchasing, supplier sourcing and technology departments) of each individual auto maker. This questionnaire was divided into four sections. Section A examined the company profile, including plant location, number of years in operation, legal status of the company, and equity structure of the company. Section B, Section C and Section D investigated issues pertinent to the company’s activities, auto parts production and sourcing, and subcontracting

management respectively. Given the diverse nature of the questions which could be answered only by different departments, a series of follow-up was made and it took nearly two months before the completed questionnaires were ready for collection.

Lastly, another series of follow-up through phone calls was made when some written responses in the questionnaires need further clarification. Due to the request for confidentiality, the company names of the three auto makers are not revealed throughout this paper. For analytical purposes, these firms are consistently referred to Automaker A, Automaker B and Automaker C in accordance with their relative contributions to the Malaysian automobile production and market share. This method of company reference was also employed by Correa and Miranda (1998) as well as Schmitz and Platts (2003).

In order to make comparisons with the Japanese model, the three auto makers were given the same questionnaire with a set of questions or variables pertinent to the subcontracting derived from the Japanese subcontracting literature. Important themes mentioned in the literature related to the four proposals (as in Table 1) were developed into questions. First step of the analysis was to explore the patterns of subcontracting of each auto maker; and the next step was to make overall comparisons with the Japanese model.

These three auto makers would be able to represent the patterns of subcontracting arrangements of the national automobile project of Malaysia because of several reasons. First, the government's (the prime mover) attention on these three auto makers was relatively high. Second, the majority shares of all the three auto makers

were owned by Malaysian investors. Third, Bumiputera<sup>3</sup> shares (individual and institutional, particularly government-sponsored institutions, such as HICOM, Khazanah Holdings and Permodalan Nasional Berhad) were also significant in all the auto makers. Fourth, their management was controlled by Malaysians. Lastly, these three auto makers accounted for 76.7 per cent of the total auto production in Malaysia (Rosli 2006).

#### **IV. RESULTS AND DISCUSSION**

Two auto makers have been incorporated and involved in the automobile industry for more than ten years. The other one has been incorporated for more than ten years, but in operation for less than ten years. Two auto makers produce either passenger cars or commercial vehicles, whilst the other one produces both passenger and commercial vehicles. Irrespective of the auto maker companies, their production is mostly catered for the local market.

As expected, the empirical results are consistent with Proposal P1 that outsourcing is a common practice among the three auto makers. The level of outsourcing is, however, different from one auto maker to another. Automaker B was must less dependent on outsourcing for producing passenger cars; but much more for producing commercial vehicles; whereas Automaker C was almost completely contingent upon outsourcing to produce its commercial vehicles (Table 2).

Compared to the Japanese, three different patterns could be observed from the empirical results. First, the dependency of the national auto makers on outsourcing is very obvious in the production of commercial vehicles and



Table 2: Total costs of auto parts by sources and companies (per cent)

Variants	Automaker A	Automaker B		Automaker C
		Passenger	Commercial	Commercial
In-house making	n.d	75	20	1
Outsourcing	n.d	25	80	99
		(5 L, 20 M)	(5 L, 75 M)	(25 L, 74 M)
Total costs	n.d	100.0	100.0	100.0

Note: n.d – no data are provided; L - local sourcing; M - import. Source: Based on the survey data.

much less in passenger cars (as in Table 2). This pattern is not surprising since the focus of the national automobile industry has been more on the production of passenger cars to meeting the increasing demand of local consumers. In 2003, passenger cars accounted for 76.6 per cent of 424,107 units of auto production (Rosli, 2006). Therefore supported by the favourable amount of

automobile industry. Lastly, instead of resorting to single sourcing as the Japanese, the auto makers undertook multiple sourcing for the same category of parts from a number of suppliers. This finding is consistent with Simpson et al. (1997) that the national auto maker (Proton) had to do dual sourcing for most parts and components as a result of the lack of reliability on local suppliers.

Table 3: Auto parts outsourcing for the three auto makers (per cent)

Variants	Companies							
	Automaker A		Automaker B		Automaker C			
	Passenger		Passenger		Commercial		Commercial	
	L	M	L	M	L	M	L	M
Body	> 90	< 10	80	20	0	100	0	100
Engine & Emission	< 30	> 70	10	90	0	100	0	100
Chassis & Brake	> 70	< 30	10	90	0	100	20	80
Transmission, Steering & Clutch	< 30	> 70	10	90	0	100	10	90
Electrical & Electronics	> 95	< 5	100	0	100	0	90	10
General Parts	50	50	80	20	80	20	50	50

Note: - L - local outsourcing; M - import.  
 - The figures indicate the percentage value of outsourcing to total purchases of auto parts.  
 - Total figures per auto parts per vehicle utility of each auto maker are 100 per cent.

Source: Based on the survey data.

demand, efforts were made by Automaker B to produce more parts in-house.

Second, the dependency of Automaker A and Automaker B on outsourcing from import sources was substantial which is not found in the literature on the Japanese domestic

Further investigation into auto parts outsourcing alone reveals another interesting pattern which is also not found in the Japanese literature. As displayed in Table 3, the patterns of auto parts outsourcing for electrical and electronics parts are similar for the three auto makers in which

they outsourced this functional parts from local suppliers. This pattern is unsurprising since there are many large, established multinational corporations operating and producing this type of parts in Malaysia, particularly in Penang, Kuala Lumpur and Selangor. Local outsourcing for general parts for all the auto makers and body parts (except for producing commercial vehicles) is also substantial because this type of parts is less capital intensive and able to be produced by local suppliers.

In contrast, all the auto makers outsourced a remarkable amount of functional parts, namely engine and emission, transmission, steering and clutch, as well as chassis and brake (except for Automaker A) from import sources, primarily from Japan. According to MITI (1999), the tendency to import higher value-added (surely higher prices) functional parts has pushed down the average net local content of auto production from as low as 11.1 per cent for commercial vehicles and as high as 47.5 per cent for passenger vehicles. MITI (1997) reported that the import value of completely-knocked-down (CKD) kits (mostly imported from principal auto makers in the home countries) in 1996 was 13.1 per cent of the overall import value of automobile products (excluding motorcycles). Among other imported individual auto parts in engine were rocker arm, cylinder head, delivery pipe, connecting rod, thermostat, insulator, valve, piston ring and o-ring, exhaust manifold cover, connecting bearing, injector and drain bolt (MITI 1997). This pattern of outsourcing occurs as a result of the lack of technology and expertise among the domestic suppliers to produce functional parts locally, while the foreign companies are reluctant to transfer technology to their local counterparts (Rosli 2004).

There is no clear evidence that the three auto makers organised their suppliers into a hierarchical configuration as found in the Japanese. In other words, Proposal 2 cannot be confirmed because a special pattern of relationship between auto makers and their suppliers as in the Japanese subcontracting was not established. It was found that Automaker C which hardly depended on local auto parts had no initiatives to organise its suppliers hierarchically. In contrast, Automaker A had an effort to organise its suppliers into a multi-tier system, but it considerably failed to do so because the number of suppliers in Malaysia is rather small. Compared to the Japanese which has many thousand numbers of suppliers, Malaysia has 350 suppliers only (MIDA 2004).

Therefore the relationship between Automaker A with its suppliers was rather shallow as it merely involved two tiers against at least three tiers in the Japanese sub-contracting. Automaker B also faced similar problems which made it difficult to organise its own suppliers into pyramidal configuration. In fact, most of the same suppliers supplied the same auto parts to several auto makers and assemblers operating in Malaysia (see Proton Vendor's Directory 2005) in order to gain economies of scale. It makes the matter even worse when a large proportion of functional auto parts have to be outsourced from foreign suppliers abroad.

The results also provide no support to Proposal 3 that there is a job specialisation between auto makers and suppliers. The absence of a large number of local suppliers and adequate local technologies did affect the overall performance of the

subcontracting arrangements in Malaysia. Detailing out core manufacturing activities of the three auto makers, it shows that all the auto makers had to perform all the jobs, i.e. they did final assembly of automobiles and sub-assembly of auto parts and components as well as manufactured individual auto parts in-house (based on the survey data).

In respect with individual auto parts, Automaker A made door, hood, fender and front deck; Automaker B manufactured hood, back door, under body, fender, intake manifold, exhaust manifold, camshaft, cylinder block, cylinder head, flywheel and chassis frame; and Automaker C made partitions, reinforcement bars, power steering and cooling tubes (based on the survey data). This shows that Automaker B tended to make auto parts in-house compared with Automakers A and C.

The involvement of the auto makers in all activities should not be a case in a complex industry, such as the automobiles; but it has to be so due to a weak structure of the overall industry. In other words, the auto makers cannot depend substantially on or outsource from a small number of suppliers with little capability to undertake more important jobs in auto making. Another problem with the local suppliers is that they tend to focus on the production of individual auto parts and not on auto components or sub-assembly of auto parts. Worse still, when basic materials, such as plastics, and iron and steel have to be substantially imported from Japan, with growing trade deficits over the years (Tham 1997).

### Patterns of Subcontracting Management

Concomitant with Proposal 4, the auto makers agreed that market, hierarchy, and social capital factors were hand-in-hand

responsible for managing and maintaining their relationship with suppliers. Table 4 displays the details of the managerial mechanism of sub-contracting among the three auto makers. As a complex industry, an intimate relationship between the auto makers and their suppliers is needed and tied-up by various factors; thus as expected almost all the auto makers strongly agreed that factors, such as contracts, price and quality assurance, Just-in-Time (JIT) system, authority, and trust bound them together. This is especially true for the auto makers which have been long in the industry, primarily Automaker A and Automaker B.

Comparing the three auto makers, Automaker B was more particular about dealings with its suppliers when it detailed out its legal contracts to cover all items listed in Table 4 (Item 2). Automaker A specified only certain items, such as price of parts, quantity of parts supplied, quality of parts, delivery of parts and penalty for parts defects in its legal contracts; whilst Automaker C set the items, such as price of parts, quantity of parts supplied, quality of parts, delivery of parts and suppliers' obligation in its legal contracts.

As displayed in Table 4, Automaker B and C allowed their suppliers to adjust prices of functional and general parts in the future bidding due to unavoidable factors. Automaker B allowed its suppliers to adjust several price or cost items, such as material and tooling costs as well as direct manufacturing costs (e.g. energy and labour costs); and Automaker C allowed adjustments for material and tooling costs and the costs for buying products from other suppliers. Furthermore, all the auto makers provided room for their suppliers to rectify any default in parts supply (quality,

**Table 4: Managerial features of the subcontracting for the three auto makers**

No.	Variants	Companies		
		Automaker A	Automaker B	Automaker C
1.	Levels of strength of the following factors in managing and binding the subcontracting			
	Contracts (legal)	Very strong	Strong	Strong
	Price & Quality Assurance	Strong	Strong	Very strong
	Just-in-Time	Strong	Strong	Very weak
	Rules and regulation (authority)	Strong	Strong	Strong
	Trust (based on suppliers's track records)	Weak	Strong	Strong
2.	Specified items in legal contracts			
	Price of parts	Yes	Yes	Yes
	Quantity parts supplied	Yes	Yes	Yes
	Quality of parts	Yes	Yes	Yes
	Delivery of parts	Yes	Yes	Yes
	Bonus for on-time delivery of parts	No	Yes	No
	Penalty for late delivery of parts	No	Yes	No
	Penalty for parts defects	Yes	Yes	No
	Supplier's obligation with auto makers	No	Yes	Yes
3.	Allowing for price adjustments in the future bidding due to unavoidable factors			
	Functional auto parts	n.d	Yes	Yes
	General auto parts	n.d	Yes	Yes
4.	Types of price/cost items allowed for adjustments			
	Materials	n.d	Yes	Yes
	Tooling costs	n.d	Yes	Yes
	Gross margin (overhead + a profit margin)	n.d	No	No
	Direct manufacturing costs (e.g. energy, labour)	n.d	Yes	No
	Costs of purchased auto parts from other suppliers	n.d	No	Yes
5.	Grading system to grade suppliers in			
	Price of parts	No	Yes	No
	Quality of parts	Yes	Yes	Yes
	Engineering/system	Yes	Yes	No
	Precision (accurate specification)	No	Yes	No
	Delivery time	Yes	Yes	Yes
6.	Delivery frequencies for parts			
	Body	Hourly	Weekly	Weekly
	Engine & emission	Hourly	n.d	Weekly
	Chassis & brake	Daily	Monthly	Weekly
	Transmission, steering & clutch	Daily	Monthly	Weekly
	Electrical & electronics	Daily	Monthly	Weekly
	General parts	Daily	Weekly	Weekly

Note: n.d - no data.

Source: Based on the survey data.

quantity and delivery time); their suppliers were given an adjustment period, sent technical expertise and provided advisory or consultancy services (based on researcher's interviews).

Grading system was also adopted by the three auto makers. Automaker A graded its suppliers based on quality, engineering or system, and delivery time of parts; Automaker B on price, quality, engineering or system, precision (accurate specification), and delivery time of parts; and Automaker C on quality and delivery time of parts (Table 4). This shows that the auto makers are concerned with the quality management undertaken by their suppliers.

A strict JIT system was adopted by Automaker A and Automaker B. As shown in Table 4, Automaker A's delivery frequencies for body and engine and emission parts were hourly; but daily for chassis and brake, transmission, steering and clutch, electrical and electronics and general parts. For Automaker B, its delivery frequencies for body and general parts were weekly, and for chassis and brake, transmission, steering and clutch, and electrical and electronics parts were monthly. Although Automaker C did not employ a JIT system, all of auto parts deliveries were made every weekly.

Auto parts deliveries for Automaker A were more frequent than Automaker B and Automaker C. This pattern may be attributable to the higher consumer demand for its output and smaller amount of inventories it kept than Automaker B and Automaker C. Nevertheless, Simpson *et al.* (1997) argues that the full implementation of JIT system is quite impossible to materialise in the Malaysian automobile industry due to inconsistent quality and late delivery of auto parts, unpredictable parts supply, frequent machine breakdowns, and less flexible

workforce. Consequently, the national auto makers have no choice but to keep large inventories on their shelves.

## V. CONCLUDING REMARKS

Although it is quite unfair to compare the Malaysian subcontracting (which is just developed for less than two decades) with the Japanese (which has been developed since 1950), this study provides several useful insights into the subcontracting arrangements and management of the national auto makers. First, it was found that outsourcing is a common practice among the three auto makers, but its patterns are different from the Japanese. While it is unseen that outsourcing is distinguished by the types of auto production and auto parts in the Japanese, the level of outsourcing in the Malaysian national automobile industry was much higher for the production of commercial vehicles than passenger cars and for functional parts than the general parts. Moreover, multi-sourcing instead of single sourcing as in the Japanese for most auto parts had to be adopted by the national auto makers due to the lack of reliability on local suppliers.

Second, unlike the Japanese, the three auto makers were unable to organise their suppliers into a full-fledged hierarchical configuration due to a small number of local suppliers and a high dependency on imported auto parts. Third, as a result of the poor structure of the subcontracting arrangements, job specialisation between the three auto makers and their suppliers could not reach its full potential. Instead of having distinctive job specialisation as in the Japanese, the three auto makers had to perform all the jobs, namely the final assembly of automobiles, sub-assembly of auto parts and the manufactures of individual auto parts in-house.

Lastly, it is agreeable that a mixed combination of market, hierarchy, and social capital factors were hand-in-hand responsible for managing and maintaining the relationship between the three auto makers with their suppliers. Therefore, the Japanese managerial characteristics (contracts, price and quality insurance, JIT and authority), were a common practice among the auto makers since the national automobile projects have worked closely with the Japanese to establish and run the companies.

Despite the case, some management implications could be drawn from the findings. The high dependency on outsourcing from import sources and the absence of a full-fledged hierarchical configuration and distinct job specialisation would lead to inefficient management system of the auto makers. The implementation of JIT system, for example, requires a tight synchronisation of and self-control all parts of production lines at the final assembly plants which, in turn, demands an intimate cooperation between auto makers and their suppliers. Unfortunately, the failure to establish a full-fledged hierarchical configuration and distinct job specialisation as a result of the high dependency of the auto makers on suppliers overseas and the absence of adequate numbers of local suppliers is believed to have affected the overall efficiency of the subcontracting management.

Some other problems, such as inconsistent quality and late delivery of auto parts, unpredictable parts supply, frequent machine breakdowns, and less flexible workforce were also found to be obstacles to the full implementation of JIT (Simpson *et al.* 1997). Should, this pattern remains unchanged in the near future, it would be impossible for the national auto makers

to adopt a more advanced management system - a modular consortium system – to compete in the global market. This system is now increasingly adopted by the global auto makers and capable of managing the flow of goods and services from modular (sub-assembly) suppliers to the customer or auto makers (see Jones 1990, Pires 1998). However, before the auto makers could adopt this state-of-the-art system, the local suppliers must be flexible and able to undertake more important production jobs.

Further research should be made to complement this study and enrich the knowledge in the subcontracting-related issues. With the increased costs in local auto parts production, future research should examine whether there would be any changing patterns in the subcontracting arrangements. Some pertinent questions are; would the Government be able to continuously shape the subcontracting patterns as in the recent period?; or would global sourcing be arisen among the national auto makers in the near future?

Subcontracting patterns in services (processes, testing, design, research and development, contract sub-assembly) should also be examined, so that better picture of subcontracting could be perceived from different perspectives. Finally, instead of confining to the national auto makers, future research should extent the study on subcontracting patterns among non-national auto makers (foreign auto makers, particularly the Japanese) to answer the following questions: do they also outsource auto parts?; is there any tendency for them to outsource parts and components from import sources, particularly from their home countries?; and do they have initiatives to structure their suppliers and manage their subcontracting as in Japan?

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#### End Notes

- 1 National auto makers refer to the automobile companies initiated by the Malaysian Government under the Heavy Industrial Policy. Following MIDA (2004), there were four national-status auto makers at present, namely PROTON, PERODUA, INOKOM, and MTB. They are joint-venture projects with foreign multinational companies due to the lack of local expertise and technology, but mostly controlled by the locals (particularly the Government) through a majority shareholding.
- 2 All the four national auto makers were contacted, but one turned down the request for interviews for its own reason.
- 3 The term Bumiputera denotes the ethnic Malays of Muslim religion and indigenous inhabitants of East and West Malaysia.

#### A Short Bio of Dr. Mohd. Rosli

Dr. Mohd. Rosli is Associate Professor at the Economics Department , Faculty of Economics & Administration, University of Malaya, Kuala Lumpur, Malaysia. He has been teaching at the Faculty since 1992 on various courses, including Microeconomics, Advanced Microeconomics, Macroeconomics, Malaysian Economy, and History of Economic Thought at both Undergraduate and Postgraduate Levels. His research of interest is small business economics, development economics and foreign direct investment. His books and articles have been published by various national and international publishers. He is currently working on Global Competitiveness of Malaysia Small and Medium Enterprises.