# Chapter 2

# Production Linkages and Industrial Upgrading: Case Study of Indonesia's Automotive Industry

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March 2010

**This chapter should be cited as**
Aswicahyono, H. and P. Kartika (2010), 'Production Linkages and Industrial Upgrading: Case Study of Indonesia's Automotive Industry', in Intarakumnerd, P. (ed.), *Fostering Production and Science and Technology Linkages to Stimulates Innovation in ASEAN*. ERIA Research Project Report 2009-7-4, Jakarta: ERIA. pp.57-86.

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# Production Linkages and Industrial Upgrading: Case Study of Indonesia's Automotive Industry

*Haryo Aswicahyono and Pratiwi Kartika*

**Abstract**

This study is on the subject of global production network and its impact on domestic industrial upgrading through technology spillover, using a case study of Indonesia's automotive industry. For this purpose, this study uses secondary data and conducts interviews of two business associations, seven autoparts makers, and one car manufacturer. The result indicates the importance of Japanese investors in the development of Indonesia's automotive industry and in the technological learning of Indonesian engineers. This implies a need for the Indonesian economy to remain open to foreign investors with the intention of continuing their contribution to the development of local industry and improvement of local capabilities. The MNCs' (Multinational companies) authority to allocate their activities across countries should also be a motivational factor for Indonesia to provide established industrial areas and international-quality service links in order to attract MNCs to locate their high value-added activities in Indonesia.

## 1. INTRODUCTION

The relationship between business network and industrial upgrading has been studied by many authors. Dunning (1993) shows evidence of the technology spillover brought by foreign direct investment. More specifically, Ernst (2004) argues that linkages through engagement in a global production network (GPN) stimulate innovation in companies engaged in that network. A survey of 150 manufacturing companies conducted in 2009 by Narjoko (2009) also finds that firms which have international linkages through foreign ownership have been more successful in industrial upgrading than domestic-owned firms. Extending these studies, this research tries to find evidence of that relationship in the Indonesian automotive industry. The research contributes to the general literature of this subject through insights from

interviews of ten prominent institutions in the industry.

While Irawati (2008) focuses her study on knowledge transfer as a result of Indonesia's automotive cluster by using Toyota and Honda as case studies, this research examines supporting data on the involvement of Indonesia in the global automotive production network (GAPN), on the impact of that involvement to the occurrence of technology spillover, and on innovations carried out by Indonesian establishments. In addition, secondary data are also briefly analyzed to gain knowledge of the current situation and prospect of Indonesia's automotive industry.

This study finds that while Indonesia's automotive industry is involved in the global automotive production network, its involvement is in the lowest position in the value chain ladder, which is manufacturing/assembling. This is seen in the case of the foreign-brand non-sedan 4x2 cars,[1] which account for around 70 percent of the country's car sales. On average, these cars have 70 percent local content. However, in general, the main business activity of Indonesian companies is merely in assembling CKD (Completely Knocked Down)[2] and local parts.

The global linkage of the country's industry leads to knowledge transfer and innovation. The common knowledge transfer is in the form of training local engineers on how to run machines. However, there seems to be very limited transfer, if at all, in terms of the main technology and design of the automotive production system. Similar to innovation in other developing economies, innovation in Indonesia is mostly conducted in the production process for the purpose of cost efficiency. There seems to be minimal innovation on products.

This study also indicates a positive outlook for Indonesia's automotive industry

[1] Non Sedan 4x2 includes MPV (Multi Purpose Vehicle is a multi-passenger vehicle based on a car platform with maximized interior space, it is usually used by families and range in size from compact cars to almost van-like dimensions), City Car and SUV 4x2.

[2] CKD part is a fully disassembled item (such as an automobile, bicycle, or a piece of furniture) that is required to be assembled by the end user or the reseller. Goods are shipped in CKD form to reduce freight charged on the basis of the space occupied by (volume of) the item.

both for domestic and export markets. The motor vehicle's domestic sales and autoparts export have been growing fast after the recovery from the 1998 Asian financial crisis. Brief data analysis also suggests a more competitive Indonesian autoparts industry in the world for the last nine years or so. This competitiveness is supported by a policy environment that has removed trade and industry barriers.

The rest of the paper is organized as follows. Section 2 describes the theoretical framework of the study. It uses the value chain concept which refers to the value created by each activity in the global production and marketing network and the types of innovation possibly generated by engaging in the global network. Section 3 is the core of the paper which discusses Indonesia's automotive industry in terms of its market, competitiveness, business activities, level of innovation, and knowledge transfer. The effect of past and current government policies on the performance of the industry is also briefly discussed here. Finally, Section 4 draws out some policy implications based on the findings of the study.

## 2. THEORETICAL FRAMEWORK

### 2.1. Value chain

Although the value chain concept was developed back in the 1980s, it is still an important concept in industrial economics and in the business studies literature. Porter initiated the concept of value chain which is similar to the concept of production network in the economic development literature. Value chains can cover enterprises of a local, regional and also global economy. The structure and dynamism of the market value chain are essential factors because they can influence innovation possibilities of enterprises. Generally, low income or price elastic markets tend to stimulate innovation on processes while high income markets tend to stimulate product and functional innovation (UNIDO, 2004).

In terms of the value chain process in the innovation system, Figure 1 illustrates the type of value chain functions -- primary and secondary chain functions -- which drive innovation (UNESCAP, 2008). The primary value chain refers to the primary activities in the company while the secondary value function refers to activities that do not create the value directly but support primary value functions. Market, government, industry, university and society are the elements of this chain and their interaction activities are mostly about money, human resources, information and technology, among others. The actors' interaction meanwhile will constitute some sort of network. The network can be open or closed networks as well as local or global, and can be formed between users and producers (UNESCAP, 2008). The multinational companies are frequently piloting the network in the globalized economy. They distribute their production and research and development (R&D) units to the prospective locations and coordinate the global value chain process in order to achieve their business purposes.

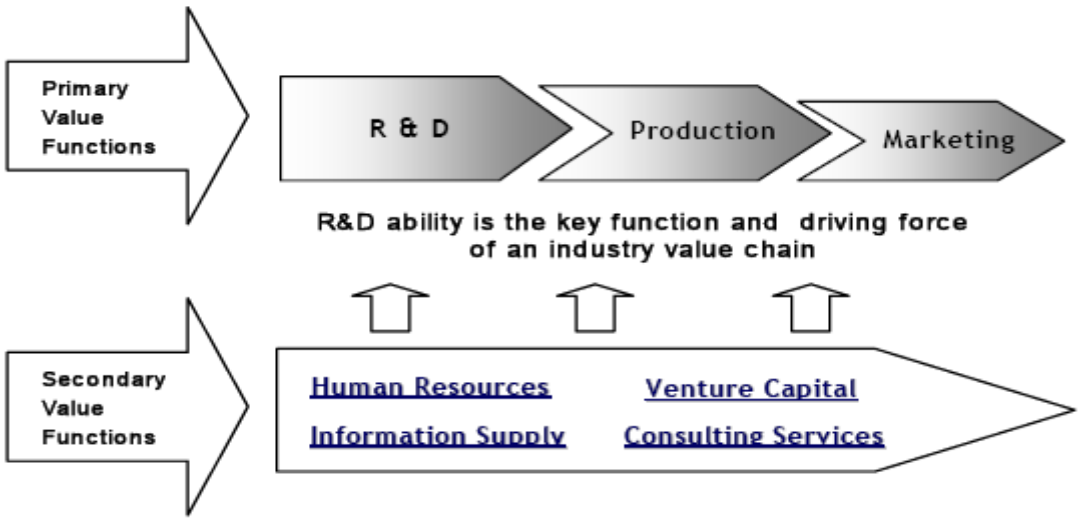


**Figure 1 Value chain process in the innovation system**

Source: UNESCAP, 2008.

The Happy Face graph below describes the value created by each stage in a firm's activities. The graph shows that manufacture and assembly create the lowest added value compared to other activities in the value-added process. Therefore, to generate higher value-added, firms could shift to the left, namely, standardization, innovation, R&D and design or shift to the right, namely, logistics, marketing and brand. Another alternative to generate higher added value is to move up, that is, to advance the firm's manufacturing technology. Thus, an economy could position itself to be an R&D/innovation centre or high value-added product and service centre or global logistics centre.

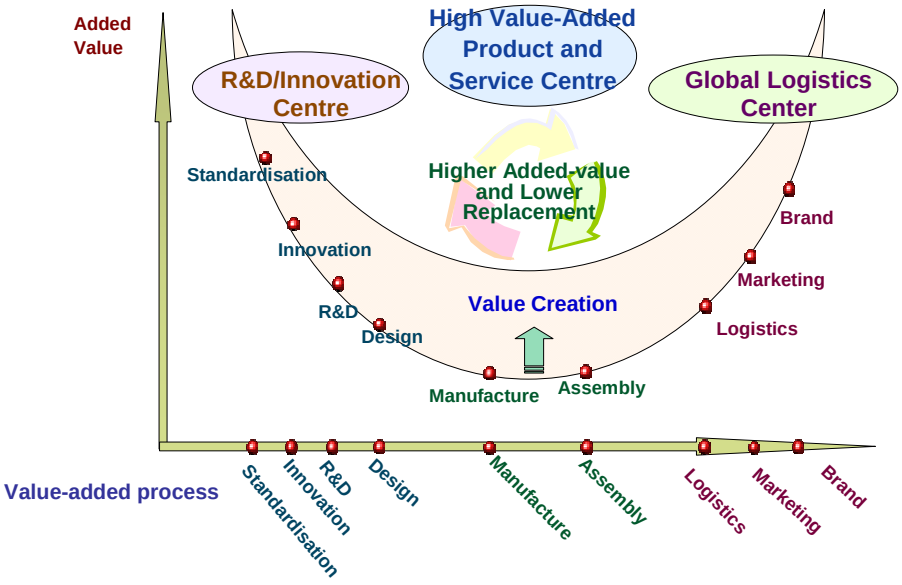


**Figure 2 "Happy Face": conceptual model of the shift to a high value added and globally integrated economy**

Source: Drake-Brockman, 2010.

## 2.2. Industrial upgrading and innovation

To create higher added value, firms should make efforts to attain industrial

upgrading and/or innovation at any level. Many studies have expounded on industrial upgrading and innovation. The coverage of upgrading may include introduction of new products, higher capabilities in design and development, and improved and more integrated business process system (Aswicahyono et al., 2009). The concept of upgrading by Porter (1990) and Kaplinsky (2000) as cited in Giulani et al. (2003) and frequently used for examining competitiveness involves making better products, making them more efficiently or moving into more skilled activities. Gereffi (2005) specifically defines industrial upgrading as the process by which economic actors (nations, firms, and workers) move from low value to relatively high value activities in the GPN (Sturgeon and Gereffi, 2009).

Upgrading is firmly related to innovation. Upgrading which involves process, product and organizational innovation is a necessary condition to maintain or improve competitiveness. Thus, upgrading can also be defined as innovating activity to increase value added. Enterprises may achieve this condition in various ways; for example, by entering higher unit value market niches, by entering new sectors or by undertaking new productive (or service) functions (Giulani et al., 2003).

There are four types of upgrading which effectively describe the enterprises' works within the value chain, namely: process upgrading, product upgrading, functional upgrading and intersectoral upgrading (Humphrey and Schmitz 2000 cited in Giulani et al., 2003). Process upgrading is a type of upgrading which transforms inputs into outputs more efficiently by reorganizing the production system or introducing superior technology. Product upgrading is moving into more sophisticated product lines in terms of increased unit values. Functional upgrading is acquiring new and superior functions in the chain such as design or marketing or abandoning existing low-value added functions to focus on higher value=added activities. Meanwhile, intersectoral upgrading is applying the competence acquired in a particular function to move into a new sector

(Giulani et al., 2003).

In terms of innovation, Huiping et al. (2008) state four characteristics of technological innovation. One, technological innovation stimulates market innovation to conduct and change the structure of supply and demand. Technological innovation creates new demand to upgrade the industrial structure. It may also lead to economic growth, industrial development and improvement of people's living standards. Two, technological innovation requires institutional innovation to achieve policy adjustment. The benefits of technological innovation are obtained through the application and spread of technology and technology operation efficiency which determines the effectiveness of incentive mechanism (Huiping et al., 2008).

Three, an overflow and spread of innovative technology induces the transfer of comparative interests. When an innovative technology is being broadly commercialized, it will inevitably be accompanied by a spillover of innovation and the transfer of comparative interests. And four, technological innovation improves the core competitiveness of enterprises within industry. Technological innovation highly relies on the qualities and conditions of enterprises and takes effects ultimately through the improvement of core competitiveness of enterprises within industry. Hence, product innovation can develop new products, improve existing products, and optimize the variety of product structure. Meanwhile, process innovation can improve quality, increase the technical content and added value as well as optimize the product structure (Huiping et al., 2008).

# 3. DISCUSSION OF FINDINGS

## 3.1. Key findings from interviews and secondary data

### *3.1.1. On the Indonesian automotive industry: domestic, export, and the impact of government policies*

The prospect for the Indonesian automotive market seems optimistic. Demand for

cars and motorcycles is forecast to remain high in the coming years. This implies a bright outlook for motor vehicle/motorcycle industry and also for the autoparts industry as a supporting industry of the former. The market for both commercial and passenger cars is expected to remain promising in the years ahead following the buoyant forecast of the country's economy and given the poor condition of the country's public transportation. This positive outlook for the industry is based on data of motor vehicle sales which show a strong growth of more than 50 percent for the period 2002-09. This is in contrast with data in Japan where most of Indonesia's investors in the automotive industry come from, which show a reduction of around 20 percent for the same period. This might encourage the Japanese to shift parts of their business to emerging markets such as Indonesia.

The development of the autoparts industry follows the path of the motor vehicles/motorcycles industry. Indonesia's export of autoparts on average grew very well at 22 percent per annum for the period 2002-07 (Table 1). The largest contributor of total autoparts' export value is motor vehicle parts. However, data show that the motor vehicle parts export declined about 13 percent per annum during the period. The product which grew very fast during the period under study is gearboxes. According to Narjoko (2008), export of gearboxes could have been enhanced because the product's share in global export grew far higher than its share in Indonesia's total export for the period 2002-07.

**Table 1 Indonesian Main Auto-parts Exports Performance, Average of the Period 2002-07**

| HS Code | Commodity | Value (Million USD) | | Annual growth (%) | Export share of the main to overall products (average 2002-07) |
|---|---|---|---|---|---|
| | | 2002 | 2007 | | |
| | **All auto-parts** | **352.7** | **1160.5** | **22.1** | **100.0** |
| | **Main auto-parts:** | **261.9** | **724.0** | **20.2** | **72.9** |
| 870899 | Motor Vehicle Parts | 141.7 | 213.0 | -12.8 | 31.1 |
| 870870 | Wheels, Parts and Accessories for Motor Vehicles | 55.7 | 213.0 | 2.5 | 17.0 |
| 871419 | Motorcycle Parts | 45.7 | 73.4 | -6.2 | 11.8 |
| 870840 | Gearboxes for Motor Vehicles, including Parts of Gearboxes | 0.6 | 210.0 | 73.9 | 11.5 |
| 851190 | Parts of Electrical Ignition or Starting Equipment | 18.2 | 14.6 | -22.7 | 2.9 |

Notes: 1. All auto-parts are defined as a group of 36 auto-parts products, defined at six-digit HS Code level. The list and description of these products are presented in Appendix 1a.

2. Main auto-parts are defined as a group of the Top-5 Indonesian auto-parts products by their share of exports the total Indonesian auto-parts export. The all Top-5 exports account for about 70% of the total Indonesian auto-parts exports. The Top-5 products are identified in Appendix 1a.

Source: Narjoko, 2008.

Figure 3 illustrates the rapid increase of Indonesia's autoparts export starting from 2003; then the export began to stagnate and slightly turned down in 2005. The figure is consistent with the data on the number of autoparts manufacturing plants which doubled from 1995 to 2007 (Table 2). The Indonesian autoparts industry seems to be relatively competitive in the Southeast Asia region. Table 3 shows that the Revealed Comparative Advantage of the country's products increased from 2000 to 2007 and was relatively higher than that of Malaysia, the Philippines and Thailand in 2007. This is consistent with data on the relative export share of 2007 to 2000 which shows a slightly more than two-fold increase of Indonesia's export share of said products in the world. All these reinforce the idea of Indonesia's involvement in the GAPN.

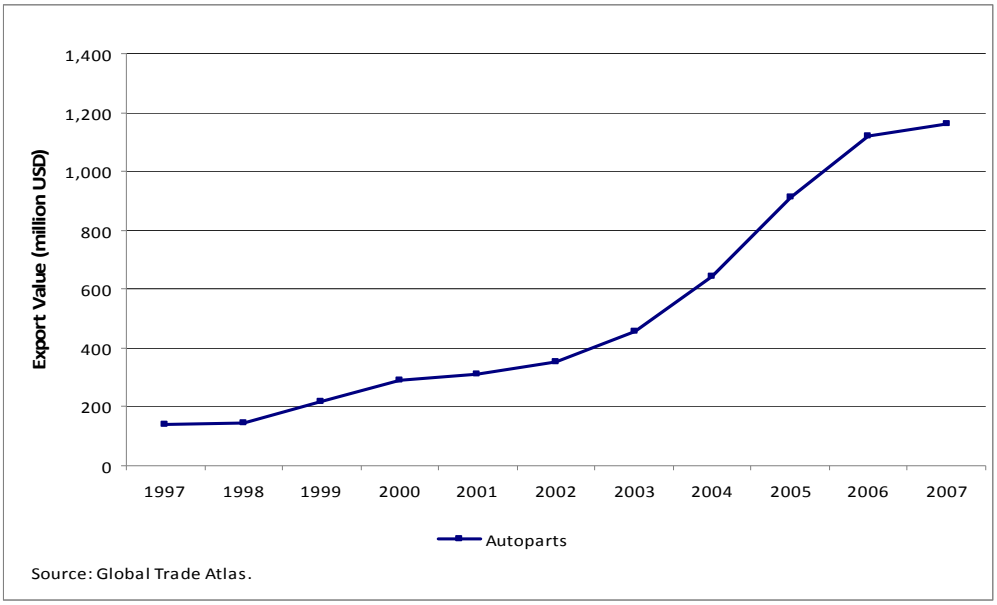


**Figure 3 The trend of the Indonesian auto-parts exports, 1997-2007**

Source: Narjoko, 2008.

**Table 2 Number of manufacturing plants in Indonesia, 1995 and 2007**

| | Motor vehicle bodies | Motor vehicle component and apparatus | Motor vehicles | Motorcycle component and apparatus | Motorcycles | Total automotive |
|---|---|---|---|---|---|---|
| 1995 | 124 | 121 | 14 | 47 | 4 | 310 |
| 2007 | 84 | 200 | 18 | 162 | 24 | 488 |

Source: Central Bureau of Statistics.

**Table 3 Competitiveness of the Indonesian Main Auto-parts Exports, Average of the Period 2002-07.**

| Reporting Country | RCA | | World export share (%) | | Relative export share (2007 to 2000) |
|---|---|---|---|---|---|
| | 2000 | 2007 | (1) | (2) | - Ratio of (2) to (1) - |
| | | | 2000 | 2007 | |
| Indonesia | 1.21 | 1.39 | 0.2 | 0.5 | **2.18** |
| Malaysia | 0.97 | 0.86 | 0.1 | 0.2 | **1.76** |
| Philippines | 1.23 | 1.34 | 0.5 | 0.7 | **1.57** |
| Thailand | 1.40 | 1.33 | 0.6 | 1.8 | **3.02** |

Source: Narjoko, 2008.

Government policy has historically affected the development of the country's automotive industry. Policies in the 1970s forbidding the import of Completely Built Up (CBU) cars and requiring certain local content seem to contribute to the current existence of Indonesia's automotive factories, surely at the cost of protection. The Indonesian automotive industry is claimed to have started in 1974 when the policies were implemented (Irawati 2008). The present policy however supports business competitiveness in the industry. This more or less began in 1999 when the government removed the local content requirements and reduced other trade barriers. In 2006, import duty on autoparts of cars for export market was eliminated permanently and in 2007, import duty on raw materials for autoparts industry was abolished temporarily. In addition, Indonesia's automotive sector seems to have gained from the ASEAN Economic Community (AEC) liberalization scheme because the sector is claimed to have made the most of the AEC scheme among the twelve priority sectors.

The past government policy, together with the change due to 1998 Asian financial crisis, had shaped the performance of automotive business in Indonesia. Regarding ownership and division of responsibilities, it seems that the heavily foreign-owned companies conduct the manufacturing while their domestic partners concentrate on distribution. For instance, Mitsubishi Krama Yudha Motor and Manufacturing (MKM), which is 65 percent owned by Japanese, carries out the manufacturing while Krama Yudha Tiga Berlian, the MKM's domestic partner, focuses its activities on sales and marketing. Likewise, Suzuki Motor Corp., a heavily Japanese-owned firm, does the manufacturing while Indomobil Niaga International, the Suzuki's domestic partner, is responsible for the domestic sales and marketing (Pasha, forthcoming).

### *3.1.2. On the activities, business upgrading and linkages of Indonesian automotive firms*

In general, the main activity of Indonesian automotive companies is assembling,

either intermediate goods, e.g., autoparts, or final goods, i.e., car and motorcycle. The technology is mostly from Japan obtained through companies' sharing ownership with technology-advanced Japanese companies, purchasing of license and machineries from foreign firms, and engaging as suppliers of large and technology-intensive firms. Majority of the inputs of the Indonesian firms are imported CKD parts. Thus, the car/motorcycle firms merely assemble the CKD parts into final goods ready to be marketed to consumers. Likewise, nearly all autoparts makers only assemble the inputs with technology purchased/provided by consumers for the products supplied to those consumers. This kind of activity seems to be the nature of the Indonesian automotive manufacturers.

The role of the local manufacturers is significant in a way that a large proportion of the manufacturers' products is to serve domestic market. The autoparts makers produce parts for cars and motorcycles to be largely sold in Indonesia. Similarly, assemblers of final goods produce cars and motorcycles which have considerable market shares in the country. Non sedan 4x2 is the type of car which has around 70 percent market share of total car sales. The local content of this kind of car is also about 70 percent. This fact may show the existence of a local automotive industry. Furthermore, Daihatsu has just expanded its investment in Indonesia for the country to be its second largest production base after Japan. Given this information and the fact that all of the manufactured cars are under foreign brand, it may be reasonable to argue that Indonesia's automotive industry has participated in the GPN to some extent.

In the GPN, the major activity conducted by the Indonesian automotive firms seems to be in the lowest rung in the value chain ladder, which is, as mentioned earlier, in the manufacturing/assembling industry. Other activities such as R&D, innovation, design, logistics, and global strategic marketing are mostly handled by parent companies which are generally in Japan. The interviews find a company which has started to be involved

in design and engineering but this seems to be more the exception rather than the rule in the prevailing cases of the Indonesian companies. Majority carried out innovation only in car accessories and production process. The innovation in car accessories is usually merely small modification to adjust to the domestic market's requests. The innovation in production process aims to reduce production and logistic costs. For instance, in the shortcutting production stages, utilization of scraps of inputs thereby reducing waste, and decrease in the volume-to-weight ratio of containers. This kind of innovation highlights the importance of service links such as delivery service and hard infrastructure in supporting business engagements in the production network.

This result strengthens the argument raised by UNIDO (2004) that low-income countries tend to innovate in production process, not in the product and function. The reason is perhaps that firms in emerging countries such as Indonesia aim to increase quantity of production to serve the growing market. Meanwhile, firms in high-income countries aim to produce higher value-added products by developing new products.

Technology transfers through global-local linkage do happen although the technology transferred is not the main production know-how such as the design and machineries for the creation of a car's system. The spillover seems to be taking a form of knowledge transfer to Indonesian engineers on how to operate and do maintenance of machines in the factories. Knowledge transfer is also via the application of Japanese work ethics to its Indonesia-located companies. Although this knowledge spillover cannot be considered negligible, it is also interesting to note that employees in the Japanese-owned firms seldom move to other firms, e.g., the pure domestic-owned firms or starting his/her own business using skills acquired from the Japanese employers.

Majority of the autoparts companies serving Japanese car producers as first-tier suppliers have capital tie-ups with Japanese companies. There is a slight suspicion among the interviewees that there are some unknown barriers in the Japanese-principal

production network that exclude the requirements on quality, cost, and delivery. Because of this, some autoparts makers shift their strategy to after-market activities, i.e., producing products for general markets. Furthermore, after-market became a lucrative market after the 1998 Asian financial crisis when people began to shift their autoparts purchase from authorized dealers to general retailers.

### *3.1.3. Excerpts from interviews*

The interviews were conducted from January-February 2010 among 10 institutions. Two of these institutions are the business association of autoparts & components producers and the business association of motor vehicle producers; six are car parts and components producers; one is a motorcycle parts producer; and another is a car producer. Among the seven autoparts makers, six are Original Equipment Manufacturers (OEM) which act as first-tier suppliers to final goods establishments and the other does transactions in the after-market.

Among the chief functions of business associations are collecting data from their members and advocating policies to the government, particularly the Ministry of Trade and the Ministry of Industry. The motor vehicle association has a larger participation of foreign investors in the domestic firms resulting from the acquisition of domestic shares in the aftermath of the 1998 Asian financial crisis. The autoparts & components association, meanwhile, noted that there seems to be some secrecy among the Japanese investors in terms of their main production technology. However in general, both associations scrutinize government policies which are perceived to be non-supportive of their members such as in the imposition of luxury tax on premium cars.

**(i) Firm 1**

**Products: Passenger Car**

**Main Characteristics: Large and Joint Venture**

Firm 1 was established in 2001. Before 2001, Nissan products had been widely distributed in Indonesia through a local automotive business group. Gradually, Firm 1 began to operate in Indonesia independently of the local business group in manufacturing and distributing vehicles with a joint venture capital consisting of 80 percent foreign and 20 percent domestic capital. The 20 percent domestic capital is owned by the local business group which previously functioned as Nissan's distributor. Firm 1 employed around 100 permanent workers and about 300 temporary workers in 2001. The increase in Firm 1 sales led to an increase in the number of employees to about 300 permanent workers and 500 temporary workers in 2010.

In Indonesia, Firm 1's core operation is the assembly/assembling of cars with multi-sourcing inputs (Figure 4). According to the respondent, this form of operation is due to the tax benefit gained from assembling CKD parts in the country rather than from importing CBU units. The majority of inputs are from Thailand and Japan, and a small amount of inputs (less than 20%) come from local suppliers which are mostly affiliated with Japanese companies such as tire from Dunlop and Bridgestone or the rim of wheels from Enkei.

Innovations created by Nissan Global aim to cut the logistic cost and implement green policy. Therefore, the innovations in Nissan take the form of enhancing efficiency in the delivery of inputs and taking into account the volume-to-weight ratio of containers. These policies are discussed and disseminated every year in Nissan's global meeting, and applied in all Nissan companies globally. Innovation in Nissan's product is also carried out according to requests and demands from the regional market. In Indonesia, as an example, the market demands a vehicle capable of carrying many passengers and being efficient in fuel consumption. This kind of vehicle is designed by Nissan's R&D centre abroad and is then produced in Indonesia. Nissan has four R&D

centers in four large economies, i.e., Japan, China, Europe, and the United States. Innovation at the local level which is conducted by local engineers is merely modification of car accessories. For the production process, the innovation is shortcutting the production process with the purpose of meeting high demand.

Firm 1 also employs local suppliers for supplies used in stamping and seat tailoring as well as for bumpers and rims of wheel. Firm 1 has around 30 suppliers; 40 percent of which are big and joint venture companies. The production operation of these suppliers conforms with Nissan's global standard. Some of them use inputs supplied by Nissan.

Nissan has two approaches in choosing suppliers. One, for several parts and components, the suppliers are assigned by Nissan Motor Ltd. (NML) in Japan. These companies supply the products for NML in Japan and Nissan companies in other regions/countries. The suppliers' branches will supply to Nissan located in the corresponding country. For example, the tire in Nissan's vehicle is supplied by Bridgestone for Nissan X-Trail and Dunlop for Nissan Grand Livina. And two, Nissan will conduct an open bidding for the supplier. The steps in the bidding are as follows:

1. Nissan announces the specification and drawing details of the product supplied.
2. Potential suppliers will then submit the sample of their product together with the quotation.
3. Nissan will test the quality and cost of the product supplied (if it conforms with the minimum standard of Nissan called Nissan Design Standard (NDS)).
4. If the product does not meet the standard, potential suppliers will be asked to make appropriate improvements. Potential suppliers which meet the standard will be given opportunities to revise their quotation in accordance with the cost required.
5. Nissan will choose the supplier.

Firm 1 does not provide training or capacity building for the suppliers because they

are chosen based on their capability (that meet Nissan's standard). In this case, Firm 1 only provides tools. Occasionally, there are a few Nissan engineers who visit the local supplier companies, and vice versa. Meetings to discuss Nissan's goals are held annually to maintain the business relationship.

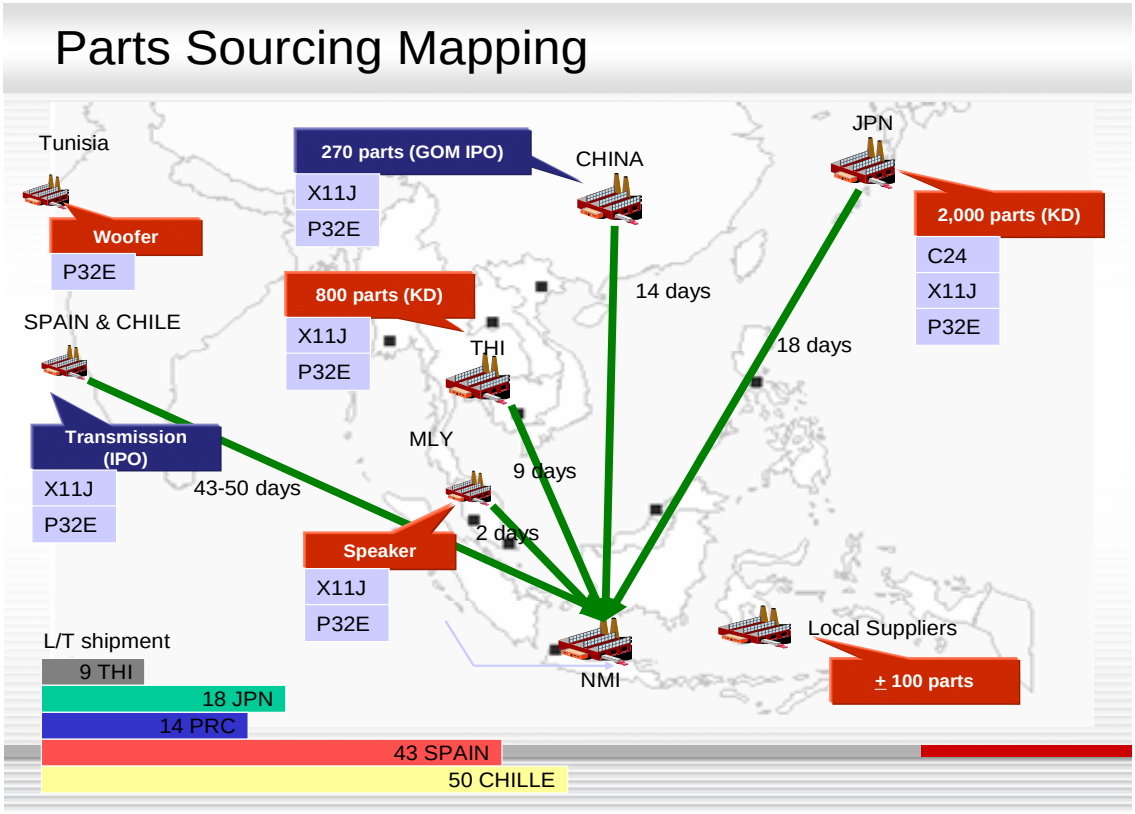


**Figure 4 Firm 1 Parts Sourcing Mapping**

Source: Firm 1, 2010.

### (ii) Firm 2

**Products: Engine for commercial trucks; Body parts**

**Main Characteristics: Large and Joint Venture**

The company was established in 1973. At that time, the company produced both passenger cars and commercial cars. However, production of passenger cars was stopped due to severe competition. After several mergers and acquisitions resulting from

internal changes in the firm and developments in the world market, the company is now currently owned by four shareholders. Two of them are domestic investors while the other two -- the major shareholders -- are Japanese and German. The German's share is through its ownership of a Japanese-based company.

The firm's activity is engine assembling and truck body stamping. Its production is based on order from its affiliated company (KTB) which is the domestic minor shareholder of the Firm 2. The affiliated company handles the sales and marketing of the final products. It also imports parts and components from Japan to be supplied to Firm 2 as inputs (Figure 5 and Figure 6).

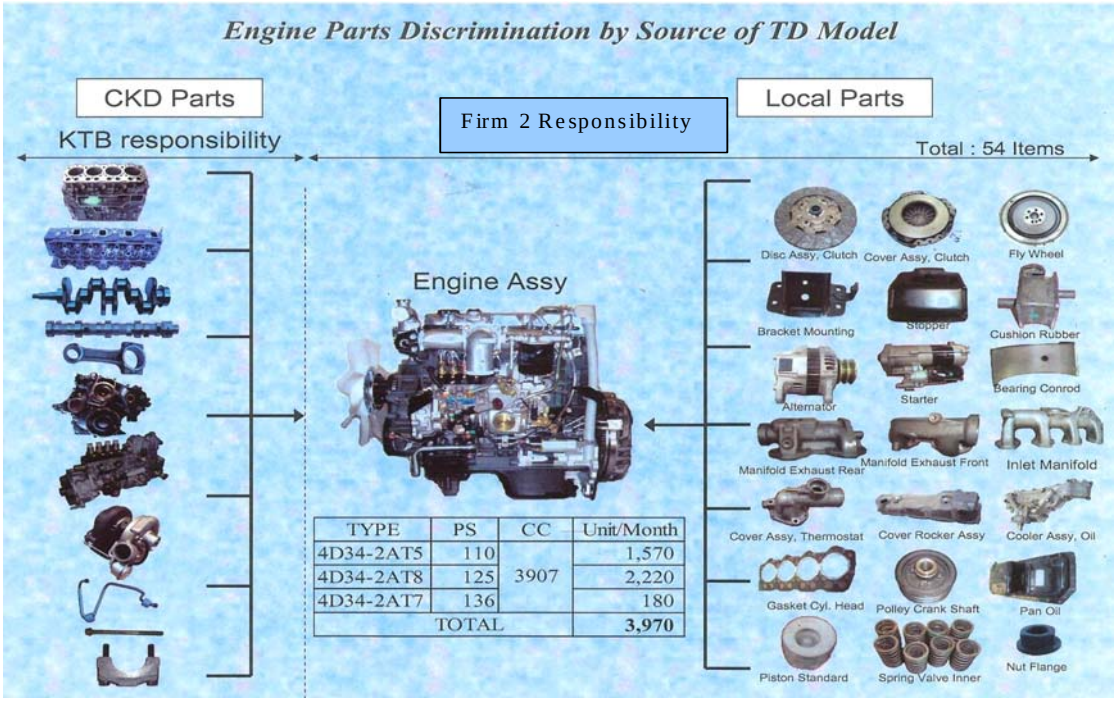


**Figure 5 Engine Parts of Firm 2**

Source: Firm 2, 2010.

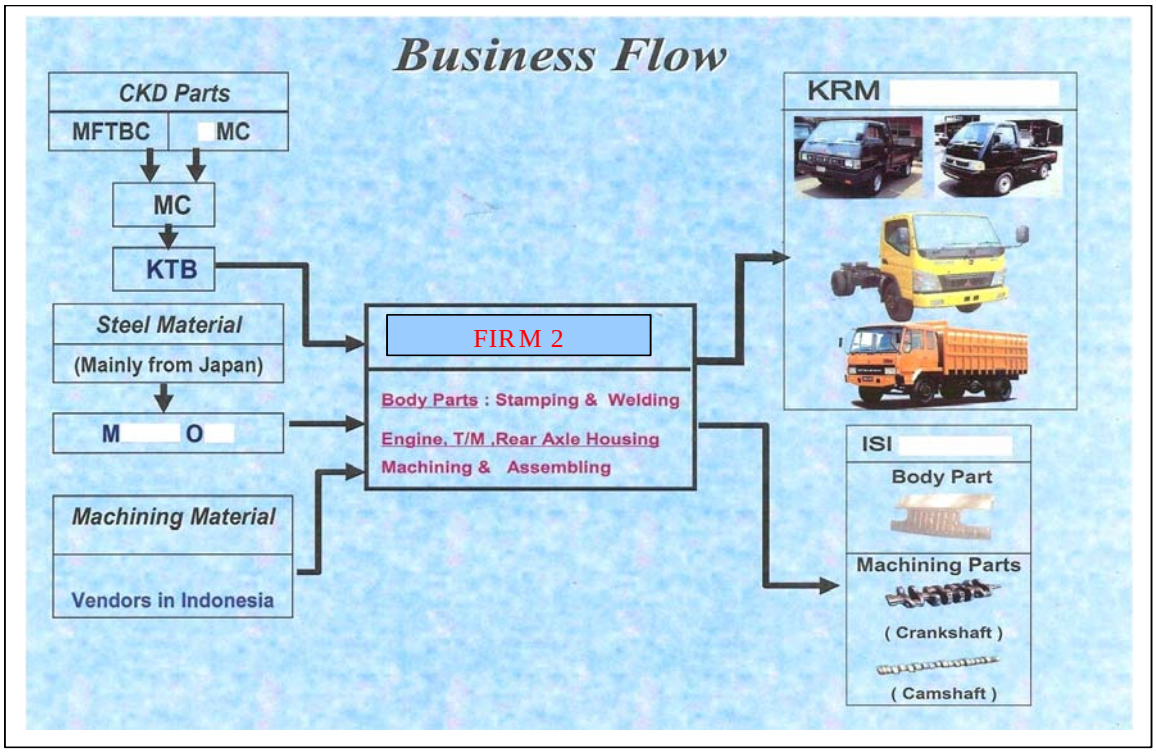


**Figure 6 Business Flow of Firm 2**

Source: Firm 2, 2010.

The rest of Firm 2's inputs are supplied by local vendors. These local vendors have been supplying Firm 2 for decades on average. Some of them are also joint venture and medium or large companies. Therefore, training among these local vendors is not often conducted. It is only done when there is a new adopted technology or special products ordered to the vendors. However, interestingly, retired engineers from Firm 2 are most of the times employed by the domestic vendors. This seems to be the knowledge transfer mechanism in the global-local linkage.

Firm 2's technology is from its parent company in Japan. This technology is transferred to Indonesia's factories through the exchange of engineers. Eight Japanese are stationed in Firm 2 in Indonesia for the positions of director and manager. Furthermore, every year, Indonesian engineers are dispatched to Japan for around two months to learn the production process and the operation of new machines.

In general, Firm 2 does not conduct R&D except for minor modifications. Products are sometimes modified due to specific domestic conditions such as the lack of certain inputs. Modifications are also carried out to improve yield rate (known as 'budomari' in Japan). For example, innovations were made to optimize the use of materials and therefore reduce wasted scraps. It is noteworthy to mention that Firm 2 revitalized some of its machines as a result of the German's acquisition of the Japanese company which previously owned Firm 2.

**(iii) Firm 3**

**Products: Frame chassis and press parts**

**Main Characteristics: Large and domestic firm**

Firm 3 was established in 1980, owned by two local business groups. The company produces two autoparts, namely, frame chassis and press parts. The company supplies its products to Mitsubishi (46%), Toyota (17%), Nissan (5%), Hino (3%) and others (29%). Included in "others" is Firm 4. The products are supplied mostly for the domestic vehicle production and only a small amount from total production is directly exported overseas.

Currently, Firm 3 is in the process of capturing a new customer, i.e., Volvo India. For this customer, Firm 3 has to compete in an open bidding with China and Thailand. The information about this potential customer is obtained from Nissan as one of the firm's customers since part of Nissan's ownership has been acquired by Volvo.

Firm 3 produces several types of products because each customer requires a different standard. Particularly for the export requirement to Volvo India, the company plans to invest in new machineries to produce the product being demanded. However, apart from this, there has been no significant innovation in the company since its establishment. According to the respondents, the reason is that the technology currently

used in the company is capable enough to produce the product.

The company's value added is 35 percent, which is relatively large compared to the value added generated by other companies under the same business group. Another 65 percent constitute raw materials as input of the product. This input is mostly imported from Japan, Thailand and China. Therefore, the company's finance depends largely on exchange rate. However, the company explained that it has no problem in getting the imported input so far, either from the regulation side or from the supply of the raw material.

**(iv) Firm 4**

**Products: Front and Rear Axle; and Propeller Shaft**

**Main Characteristics: Large and domestic firm**

Firm 4 was established in 1982, and is owned by three local business groups. Each of the two business groups has 40 percent share of the company. One of these two is also the owner of Firm 3. The other owner business group has 10 percent share of the company. The company produces products with 18 percent value added. Firm 4 imports 30 percent of its input while the rest of the input comes from local companies. Included as suppliers are Firms 5 and 6.

Firm 4 produces two autoparts, i.e., Front and Rear Axle, and Propeller Shaft. The propeller shaft has 67 percent local content. Its products are supplied to Daihatsu (53%), Toyota (35%), and others (12%). The customers provide Firm 4 with technical assistance. The customers' affiliated companies, namely, Toyota Motor Corp., JTEKT, and Akashi–Kikai sell royalties to Firm 4.

The innovation for design of products started in 2005, which was a big improvement for the company. The company made the design of a propeller shaft for one of Daihatsu's car, Gran Max. The innovation led to a major development for the

company as the car is highly demanded by the local market. Usually, designs for Firm 4 products are given by customers, and Firm 4 only manufactures according to the given designs. The innovation in the product design comes from Astra's vision as the parent company of Firm 4. The design of the propeller shaft for Daihatsu took 1.5 years. In the process, one of Firm 4's staff was sent to the United Kingdom (UK) to study autoparts and the testing of the product.

*Common Features of Firms 3 and 4*

Firms 3 and 4 are under a business group. Their products do not have competitors in Indonesia. The owner asked for protection of their products in the 1980s. The protection was abandoned after the 1998 Asian financial crisis but up until now, there has not been a new player in this market because the investment in this industry is high. In general, the main business activity of Firms 3 and 4 is merely the assembly/assembling of CKD and local parts with existing design and technology. The business processes of the firms are depicted in Figure 7.

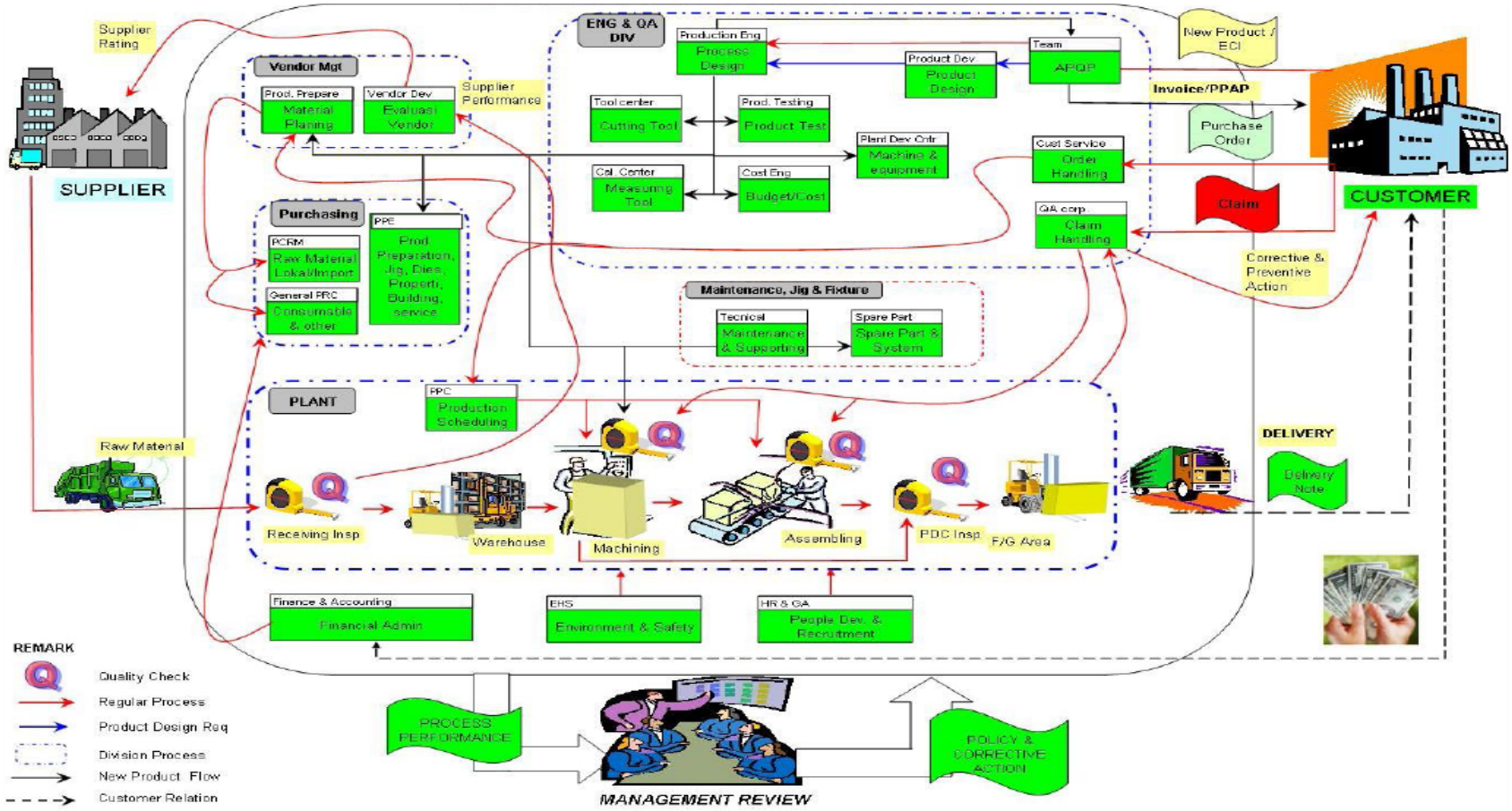


**Figure 7 Business Process of Firm 3 and 4**

Source: firm 3 and 4, 2010.

**(v) Firm 5**

**Products: Differential manufacture**

**Main Characteristics: Medium and Joint Venture**

Firm 5 is characterized as a medium firm since it has 67 full-time employees. The firm was established in 2005. The capital structure of Firm 5 is joint venture where Japan has 74 percent of ownership. Meanwhile, 26 percent is owned by a local firm which is Firm 4. The Japanese shareholder has a capital tie-up with Daihatsu Motor Corp. Japan which is strongly affiliated with Daihatsu Indonesia.

Moreover, Firm 5's value added is 18 percent and about 70 percent of its inputs are imported from Japan. This company is dedicated to supply autoparts to Daihatsu Indonesia. However, in the firm's business cycle, the autoparts that it produces should be supplied to Firm 4 first before sending them to Daihatsu. The reason for this is because Firm 5's products should be merged or equipped with Firm 4's products.

**(vi) Firm 6**

**Products: Transmission manufacture**

**Main Characteristics: Large and joint Venture**

Firm 6 is a joint venture company which is owned by a Japanese firm (51%) and a local business group (49%). The Japanese firm has a strong affiliation (*keiretsu)* with Daihatsu Motor Corp. Japan. Meanwhile, the local business group is the group that also owns Firms 3 and 4. The Japanese ownership is through the acquisition in 2006 after the firm was left by its most important customer, Toyota. At that time, Toyota moved its car's transmission operation to the Philippines.

Similar to Firm 5, all the products of Firm 6 are exclusively supplied to Daihatsu Indonesia after they are sent to Firm 4. Firm 6's value added is worth 15 percent. The local inputs of the products are only 20 percent while the other 80 percent are sourced from imports.

*Common Features of Firms 5 and 6*

Both Firms 5 and 6 confirmed that the major problem of their business is the exchange rate. This is understandable because most of the inputs come from other countries. In the meantime, they engage in cooperation with local suppliers based on the

following requirements: quality, cost, and delivery. The selection of suppliers needs an approval from the respective Japanese shareholders and the whole process of selection takes more or less one year. The technology used by both firms originates from their Japanese shareholder. There are two Japanese who are working in each of the two firms. Furthermore, technology spillover in both firms also takes place through the training of local engineers held in Japan.

*Common Features of Firms 3, 4, 5, and 6*

Firms 3, 4, 5 and 6 are firms under one business group. They are located in one large area and have a total number of 2057 workers. Their production has reached full capacity. In relation to domestic suppliers, they have a division of vendor management which tackles difficulties concerning domestic vendors and the evaluation of their performance (Figure 7). Unlike other manufacturing firms, these companies basically do not have problems with road and transportation because as the most important customer, Daihatsu Indonesia picks up the orders from the companies and the companies' inputs are delivered by their suppliers.

**(vii) Firm 7**

**Main Products: Automotive batteries**

**Characteristics: Large and domestic-owned company**

The firm's initial owner is Indonesian and it started its operation in Indonesia in 1991. In 1997, the firm was merged with another automotive battery company whose 50 percent share is owned by the Japanese. The company is now being managed by the initial owner and has the status of a domestic-owned company.

Its distribution of sales is 20 percent for the domestic market and 80 percent for the export market. The marketing of around 60 percent of its sales is conducted by its affiliated company in Japan. Most of its exported products are therefore shipped to Japan and then redistributed to other countries around the world.

The products are sold in after-market, i.e., automotive batteries for the replacement of used batteries. The firm does not supply car manufacturers such as Japanese branded car manufacturers because of several problems. One, the car producers ask for a relatively low price of batteries compared to the after-market segment. Competition

among battery producers is severe because being a supplier for the car producers could leverage the branding of the batteries. Two, meeting requirements of the car producers takes time and is costly. For example, the batteries need to pass initial testing in Japan for about one year. And three, few car producers tend to choose companies from their business groups to be their suppliers.

Roughly 95 percent of inputs are imported and the other 5 percent are supplied by domestic producers. The firm has a Vendor Development Program which aims to assist its domestic suppliers in terms of quality control. The assistance includes dispatching engineers and giving trainings to the domestic subcontractors. As for the international suppliers, the firm does not have this kind of relationship because the firm imports natural mining resources from other countries.

Production of the firm jumped 2.5 times from 2004 to 2009 owing to China's protection of its timber resources and the firm's brand recognition in the world market. The surge in the world's demand has encouraged the firm to upgrade its production and managerial systems. The upgrading has been in many aspects of the production process such as in the re-arrangement of the factory layout, adoption of international standards, increase in the batteries' life time, improvement of the quality of batteries' calcium plate, and many others.

It is also worthy to note that the company began with 1500 workers but since 1998, the number of workers has gradually declined until it reached 950 in 2010. However, as mentioned above, the production did not decrease but instead increased substantially. This is because the firm renewed its machines and is now planning to change its machines for automated ones which can give another 50 percent increase in the firm's production in 2013.

Having discussed the drivers of the upgrading, it is obvious that the source of new technology and industrial upgrading is the firm itself. The firm reports that recruiting local mid-career engineers contributes considerably to the company's improvement. The incentive for the firm to expand its production capacity is the prospect of a large market.

The Japanese buyer has its representative stationed in the company to control the production quality. However, according to the company's director, this kind of assistance has only served to limit the contribution to the company's advancement of technology.

**(viii) Firm 8**

**Main Products: Motorcycle's parts and components**

**Characteristics: Large and domestic-owned company**

The company's product is sold only to its affiliated company located in the Greater Jakarta area. The company produces motorcycle parts and its customer produces the motorcycles by assembling all the parts and components.

The company's inputs are both imported and purchased from local suppliers. The local suppliers are large and foreign-owned which sell products only to this company. The suppliers are not allowed to sell products to the retail market. The company provides detailed instruction, including the mould, dice, and drawing to the suppliers. The suppliers' performance is also evaluated frequently and transaction can be discontinued if the performance is not satisfying.

The firm does not conduct R&D. The technology is obtained through purchasing license from its parent company in Japan. The firm purchases its machines from its parent company and sends its engineers to Japan to learn the operation of the machines.

## 4. POLICY IMPLICATIONS

In sum, from the demand side, the Indonesian automotive market is booming while from the supply side, production could still be boosted due perhaps to the current limited number of automotive establishments. At present, one of the study's firm respondents is Indonesia's only producer of propeller shaft, a part that is absolutely needed in every car. This opportunity should draw the government's attention to create a conducive policy environment that would attract business to tap this chance.

The study also reveals the importance of foreign investors' role, particularly the Japanese, in this industry. Their large ownership shares in the Indonesian automotive firms require their role as principals to manage the firms' activities in each part of the world. As such, Indonesia should therefore open up its economy, particularly in terms of the investment and trade policies in order to keep them doing business in the country.

Furthermore, the significance of the Japanese's role in the industry jibes with the UNIDO study (2004) which indicates that MNCs allocate their production base and

R&D centers in the most suitable and favorable location for each activity and coordinate the global value chain's process for their corporate purposes. Consequently, Indonesia should offer enough attraction to influence the MNCs' decisions to locate the high value generating activities in Indonesia. Measures to build up its attractiveness could be categorized according to Deardoff's study (2001) on GPN, namely production block and service links. Constructing an established production block may mean making attempts to have areas with easy access to capital, market and information of products, market condition, and technology. The country's education system is vital in order to produce qualified human resources. High-skilled human resources and protection of intellectual property rights are critical factors needed by companies carrying out R&D and innovation. In addition to these, international-quality service links should be ensured by providing inexpensive telecommunication and transportation.

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