



# Knowledge Transfer Within an Industrial Cluster in the Jakarta Metropolitan Area

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Working Paper Series 5

Institute of Asian Studies, Universiti Brunei Darussalam

Gadong 2013

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# Knowledge Transfer within an Industrial Cluster in the Jakarta Metropolitan Area

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Farah Purwaningrum

## **Abstract**

Foreign direct investment is supposed to stimulate economic growth through the transfer of new technical knowledge and product innovation. This paper deals with the knowledge flow within the Japanese automotive supply chain catalysed by the *keiretsu* network in Indonesia. For this purpose, we analyse the character of the *keiretsu* and we trace how the knowledge flow is managed via the vertical linkage between manufacturers and suppliers within an industrial cluster. By doing so, we intend to contribute to the growing literature on industrial upgrading of the global production network and the use of knowledge for innovation and development. Based on our qualitative study, we show that the process of industrial upgrading is cumbersome for the automotive supplier companies in Indonesia. This is partly due to the fiscal incentive based policy of the Indonesian government and at the micro level due to the *keiretsu* as an institution, whereby knowledge flow is mediated by the restrictive practices of the supplier development programme.

Keywords: Japan, Indonesia, *keiretsu*, automotive supply chain, institution, innovation, knowledge management, government automotive policy, supplier development programme.

## Introduction<sup>1</sup>

Knowledge is often defined as the new production factor of a post-industrial knowledge-based economy (Menkhoff, Evers et al. 2011). This key tenet is evident in Indonesia's science policy, as reflected in the *White Book (Buku Putih) Indonesia 2005-2025 on the Research, Development, and Implementation of Science and Technology* (RISTEK 2006). The current industrialisation strategy followed by Indonesia is sending a positive signal towards the financial market by endorsing the Master Plan for the Acceleration and Expansion of Indonesian Economic Development 2011-2025 (Menko-Perekonomian 2011).

In general, the Association of Southeast Asian Nation (ASEAN) countries have followed a policy of developing industrial zones and knowledge clusters (Evers, Gerke et al. 2011). Malaysia's government policy of *Wawasan 2020* is centred on knowledge development within a "multimedia super corridor" (Evers 2003; Evers, Nordin et al. 2010). Brunei Darussalam is currently pursuing an industrial clustering policy by building the necessary infrastructure for a zone village and infrastructure at the Sungai Liang Industrial Park (SPARK) (Ku 2010). Similar programmes are also found in the other ASEAN states.

Taking into account the lack of university-industry collaboration (or horizontal knowledge flow) in Indonesia (Thee 1998; Purwaningrum 2012) on the one hand, and the global-local production network on the other hand, we pose the following questions: how does knowledge flow from the vertical/global production network of the supply chain into the local economy? What are the institutions blocking and enabling the flow of knowledge? We intend to investigate this by following a systematic inquiry of policy and the flow of knowledge both at the macro and micro level simultaneously. We limit our study to the automotive industry as an important sector of the manufacturing industry in Indonesia, which is dominated by big Japanese companies. Our study is situated within the wider discussion about knowledge for development and the possibility of industrial upgrading within the automotive supply chain network.

This paper concentrates on the issue of *keiretsu* as an institution and how this affects the chances of industrial upgrading for companies in the supply chain network. In so doing, it

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<sup>1</sup> The substantial contribution of Prof. Dr. Hans-Dieter Evers (ZEF, University of Bonn and IAS-UBD) in writing this paper is gratefully acknowledged.

gauges two issues: first, overall policy in the automotive sector, and second, the knowledge flow processes within the vertical linkages. The aim of this paper is to shed light on policy at the macro level and on the linkages and the institutions forging the flow of knowledge.

We argue that while economic liberalisation encourages the flow of capital, tacit knowledge is controlled within the first tier companies and the automotive assembler network. This makes industrial upgrading for suppliers below the first tier strenuous, if not impossible. There are two rationales for this: first, the lack of an organisational set up and the preference towards a fiscal based policy at the macro level; second, the role of *keiretsu* as a norm and the exclusivity of the supplier development programmes.

In Japan, *keiretsu* is a form of a “relational contract” (Nagaoka, Takeishi et al. 2008) or “hands interlocked in a complex network of formal and informal interfirm relationships” (Hatch and Yamamura 1996: 69), binding suppliers to the mother company. This can be traced back historically to the *zaibatsu*<sup>i</sup> holding company, a horizontal group of firms, which is connected vertically to the *keiretsu* firms (Scher 1999). These conglomerates were liquidated after World War II, but the cultural pattern of binding companies together still persists today. Our paper deals with the persistence of this *keiretsu* system among Japanese companies and their suppliers in Indonesia. It traces the impact of the *keiretsu* system on the exchange of technical and commercial knowledge within this system and beyond with local Indonesian firms and research institutes. We have chosen the automotive industry in and around Indonesia’s capital city Jakarta as our field of study.

The term *keiretsu* explains the existing strong ties between automakers and suppliers (Karan 2005) as a vertical asymmetrical relation between the automaker/assembler with the supplier<sup>ii</sup> (Scher 1999). In Southeast Asia, the Japanese automakers dominate the market (Wad 2009). Hatch and Yamamura (1996) referred to the rise of a regionalised *keiretsu* production structure that enabled Japanese automobile firms to expand to Southeast Asia, followed by their Japanese suppliers (Hatch and Yamamura 1996; Wad 2009). The building of production plants by the Japanese, their joint ventures, and in some cases relationships with the locally owned *keiretsu* suppliers in Indonesia, foster learning and knowledge flow within this vertical hierarchical *keiretsu* network (see also Irawati 2012).

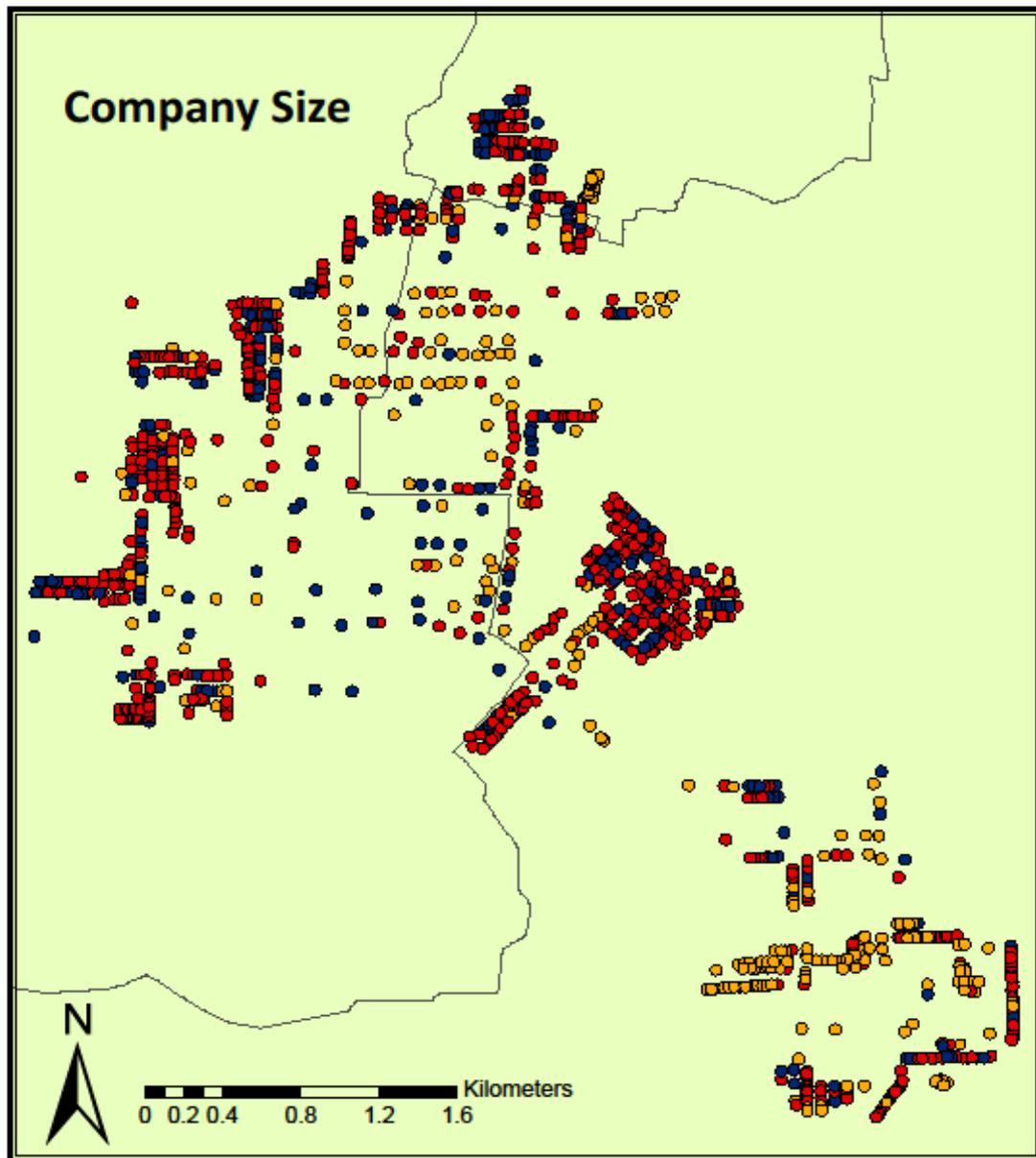
Our analysis indicates that the following are the features of the vertical Japanese *keiretsu* in Indonesia: first, important decision making pertaining to purchasing is likely to be done not in Indonesia, but in the automaker's principal company. This could be in Japan or another important geographical site, such as the Japanese R&D center in Bangkok, Thailand. This important decision making includes issues such as the customer's disappointment with the performance of the top-level management of the supplier company. With the exception of the Operations Management Consulting Division (OMCD) – Toyota in Indonesia (Interview, Jakarta, 25.01.2010), the supplier development programme is often linked with the purchasing department. Second, the relationship between the automaker and the suppliers is an asymmetrical vertical relationship. The automakers wield significant power to reprimand the suppliers if parts are not delivered on time, or if there is a misreading of *kanban*<sup>iii</sup>. Thus, these suppliers are relationally attached to the automakers. In turn, the know-how for lean manufacturing and long-term cooperation for the subcontracting of parts is provided. Tacit knowledge as capital is controlled and passed on in this chain of the vertical *keiretsu* network.

What are the features of this *keiretsu*? Knowledge flow is enabled along the vertical network supply chain of the Japanese *keiretsu* of assemblers. It should be noted that the analysis presented in the coming passages departs from Mari Sako's three classifications of *keiretsu* and suppliers' associations (Sako 1996). In general, she categorised three viewpoints in regards to the function of supplier associations (see Sako 1996: 667). The first one is an economic theory emphasis on bilateral contracts, which causes supplier associations to be irrelevant. The second one is that associations are useful for improving supplier efficiency, but they no longer do so in the present. The third one regards a supplier association as resembling the exclusionary *keiretsu*. We intend to depart from these said classifications, and present, based on our data, how *keiretsu* serves as a normative blockage and functions as an identity marker.

This paper is based on seventy-four semi-structured interviews with a total of forty-four supplier companies, two customer companies (Yamaha/PT. Yamaha Indonesia Motor Manufacturing and Honda/PT. Astra Honda Motor), and an industrial ethnographic research in a Japanese transplant company. Additional statistical data, government reports and company records have been analysed to round of study. The fieldwork was carried out from May 2010 to February 2011. The supplier companies are located in the Jababeka Industrial Cluster (see figure 1). The customer companies (i.e., assemblers) are located in MM2100

Industrial Estate, Cibitung, and in Pulogadung and Karawang, in West Java, Indonesia. The majority of companies located in the Jababeka Industrial Cluster is manufacturing companies (see: Purwaningrum 2012).

**Figure 1** Location of Companies in the Jababeka Industrial Cluster



**Legend**

**Jababeka Industrial Zone**

- Large
- Medium
- Small

We organised this paper in the following manner. Section two discusses the upgrading of companies in the industrial cluster and the vertical network; the literature review and analysis provide the basis for the subsequent parts. Section three sheds light on the Indonesian government's automotive policy. Section four outlines the impact of *keiretsu* as a norm in the Indonesian-Japanese automotive industry. The mechanism of knowledge flow from the automakers to the first tier suppliers is sketched in section five. The last section sums up the discussion.

### **Upgrading Companies in the Industrial Cluster and the Vertical Network**

The establishment of free trade zones and the removal of trade and non-trade barriers are expected to enable the movement of foreign capital into a state's territory as well as the transfer of technical know-how. Economic analysis has yielded different empirical results on knowledge spill-overs induced by foreign direct investment (Smeets 2008). The relative effects of worker mobility and horizontal (intra-industry) and vertical knowledge sharing are not fully understood. Nevertheless, many countries in Asia have built industrial parks to attract foreign direct investment (FDI) and make use of the expected transfer of knowledge and expertise to stimulate economic growth in the country as a whole. The extent to which the establishment of industrial parks and the attraction of FDI have enabled companies to move up the supply chain ladder by utilizing knowledge is under-researched, at least in the case of Indonesia.

Indonesia's foreign and domestic capital both play a role in terms of investment in the industrial sector. Domestic capital in 2010, as shown by the National Coordinating Board for Investment in Indonesia (BKPM/*Badan Koordinasi Penanaman Modal*) data, was IDR 60,626 billion (ca. USD 6.5 billion) for 875 projects in the primary, secondary, and tertiary industries. Foreign capital, i.e., foreign direct investment (FDI), in 2010 involved 3,081 projects in the primary, secondary, and tertiary industries, totalling a sum of USD 16, 214 million (BKPM 2010a; BKPM 2010b).

The flow of FDI fostered the growth of manufacturing in particular, as it attracted the lion's share of FDI. The BKPM data in January-March 2011 indicates an uneven regional distribution in the location of FDI projects. Investment was concentrated in the West Java and

Jakarta metropolitan regions. These two regions accounted for 45% of the top five projects in January-March 2011. The extent to which FDI is an effective channel of “technology transfer” is contentious. Thee (2001), for instance, has reviewed whether FDI has been an effective channel for the transfer and dissemination of product knowledge and technological process to local firms in the regions of Indonesia (Thee 2001; Thee 2005). His analysis suggests that Indonesia has not been successful in utilizing FDI to promote the local industrial and technological capabilities. According to Thee (2001: 592), Indonesia’s lack of success in taking advantage of FDI is based on the following factors: high facilitation payments required to realise an FDI project; steep costs for infrastructure services and leasing land; the cumbersome process of approval, as well as minimum transparency; not taking a more proactive stance in bringing in the FDI that Indonesia needs to strengthen its industrial technological base; and the existing lack of a skilled labour force. Indonesia has, therefore, embarked on the path of industrialisation by importing knowledge (brought in from this FDI) rather than developing the necessary knowledge base with its own Indonesian human resources (HAQ 2003; Thee 2005).

The influx of capital, particularly FDI, has increased the agglomeration of industries located in industrial estates (Kuncoro 2002; Irawati 2008; Kuncoro and Wahyuni 2009; Dahrul and Raybould 2011; Irawati 2012), particularly in the urban area of the Jakarta metropolitan region. These industrial clusters function as a regional production network connected to the global production network (For a discussion of global production network see : Yeung 2000; Dicken, Kelly et al. 2001; Henderson, Dicken et al. 2002; Liu, Dicken et al. 2004; Yeung, Liu et al. 2006; Yeung 2008). The spatial clustering of production networks in Southeast Asia occurs due to the alteration of global production networks and location-specific elements (see also : Menkhoff, Evers et al. 2011; Irawati 2012), namely government policy, market conditions, existing physical infrastructure, and costs. A frame was developed by Dicken et al. (2001) by drawing upon Gereffi’s triangular organisational geography (Gereffi and Pan 1994; Gereffi 1996) of production linkage (Dicken, Kelly et al. 2001). Based on this frame, it is vital to observe the clusters and their differing links namely; the local link in the cluster and the non-local links arising due to the value chain (Yeung 2008). An emphasis on linkages is indeed useful, as the study of clusters cannot be made in isolation. Clusters are “effective clusters” due to their internal networks. They require internal and external linkages to develop into a knowledge hub (Evers, Gerke et al. 2010). Linking global and local

manufacturing, for example, has been a key strategy for the expansion of Japanese automobile makers (Tarmidi 2004; Irawati 2012).

However, one issue remains unresolved, namely, to what extent does this increase of FDI in the manufacturing sector and the importation of knowledge enable local industries in the industrial cluster areas to capitalise on this flow of knowledge? We deal with two issues in this part: the issue of industrial upgrading and the issue of vertical/horizontal linkage.

Industrial upgrading may be the focal point in observing the extent to which knowledge is capitalised by industries, particularly supplier industries. Gereffi (2005: 171) defines industrial upgrading as “the process by which economic actors – nations, firms and workers – move from low value to relatively high-value activities in global production networks.” The types of upgrading include: product upgrading, by means of shifting into more sophisticated product lines; process upgrading, whereby processes are upgraded by changing inputs into outputs in an efficient manner through superior technology or the reorganisation of the production system; intra-chain upgrading, in which firms move backward or forward to different stages in a supply chain; and inter-chain upgrading, in which firms utilise the competence attained in a particular function of a chain in a new sector (Gereffi, Humphrey et al. 2001: 5). One may ask why the focus is on upgrading. To this question, we posit that industrial upgrading is an entry point to understand the capacity and restriction of automotive supplier companies in accessing and attaining knowledge from the supply chain for them to develop, or in this sense, for them to upgrade.

For the terms “vertical” and “horizontal” linkages, we will draw on the insights of the research on industrial clusters (see Maskell 2001; Bathelt, Malmberg et al. 2004). The vertical linkage connects the industries that are “complementary and interlinked through a network of supplier, service and customer relations” (Bathelt et al. 2004: 35–36). Conversely, in the horizontal linkage, the industries are engaged in “the process of learning and continuous improvement” (Maskell 2001: 929). The necessity is that many industries engaging in similar activities are situated in co-located conditions whereby they can observe their counterparts continuously, in close distance and with hardly any cost or effort (Maskell 2001: 930). In this paper, the vertical linkage of knowledge flow will be used to allude to the automotive sector’s supply chain linkage (For a discussion of the traits of automotive supply chain see: Cox 1999). In the supply chain linkage, the word *customer* will be used to refer to

the Japanese automakers, *first tier* refers to the supplier companies providing parts for the customer, and *second tier* refers to the supplier companies supplying parts to the first tier (and in some cases to the customer).<sup>iv</sup> We shall restrict our attention to the assembler/first tier suppliers in the discussion of knowledge flow in the vertical linkage.

Studies have been carried out in regards to the linkage of knowledge flow as mediated through the vertical linkages in the automotive sector. To begin with, a study carried out by Irawati (2012) focuses on the knowledge transfer process within Toyota and Honda in Indonesia (Irawati and Charles 2010; Irawati 2012). Herein, knowledge transfer is regarded in terms of modernised skills and experience relating to the methods of standardised production (Irawati 2008). This work finds, *inter alia*, that Japan is not only tapping into the Asian and ASEAN regions' economic energy; it is also transforming and encouraging the host country to have linkages in the technology based production in the automotive sector. Yet, these linkages and investments are no more than the regionalisation of Japan's vertical *keiretsu*. The tightly knit network of dedicated suppliers from Japan and the wider network of domestically owned suppliers practicing "multiple sourcing," as argued by Irawati, halts the nurturing of local suppliers (Irawati 2012: 54). These essentially act as a deterrent to industrial upgrading (Irawati 2012). This does not mean that the local transplants of Toyota or Honda are carrying out bench work solely. In fact, they have shown an indigenous initiative, and were able to initiate local projects for cars and motorcycles (Irawati 2012). The rubrics of Irawati's study focus on the two local transplants, namely Toyota and Honda, instead of on supplier companies located in a specific industrial cluster. The standpoint thus is from Honda and Toyota transferring lean production-related knowledge to the suppliers.

Yuri Sato (2001) carried out another substantial study. She observed the character of the vertical linkage of the automotive industry. Dealing with the issue of firms' development from the perspective of inter-firm linkage, she looked at the subcontracting linkage of Honda's motorcycle industry, machinery component industry, and the clusters in Ceper, Central Java and Sukabumi, West Java. Several of her key findings are as follows: first, her study shows that the feature of the backward subcontracting linkage (from Honda to its subcontractors) is flexible and open nature (Sato 2001), not governed by the *keiretsu*. Second, the forward subcontracting linkages are likely to provide an impetus in regards to technology, quality control, and management. Furthermore, her study pointed out how the subcontracting linkages with the assemblers tended to bring technological and managerial stimuli for the

upgrading of the suppliers' capacities. Her work was carried out before and during the monetary crisis in 1998, yet it is important to note how she came to a different conclusion from Irawati's study (2012) in regards to the upgrading of the suppliers and the non-exclusivity of the automotive supply chain network. However, she does not focus on knowledge transfer within her analysis, and the economic approach does not capture the micro level of the knowledge sharing processes between the engineers on the shop's floor.

In Indonesia's Competitiveness Programme funded by US-Aid or referred to as SENADA, there was a designated study of automotive component value chain. Layton and Rustandie (2007) acknowledge that the dominant industry drivers of foreign manufacturers, such as Honda, Yamaha, and Suzuki, control the replacement component markets as well as the highest value segments of vehicle assembly (both for domestic and export). Indonesian second and third tier component suppliers, on the other hand, are facing the possibility of a race to the bottom due to the existing low quality, cut-rate imported parts and the genuine branded parts produced by the first tier suppliers (the original equipment manufacturers) (Layton and Rustandie 2007). The study asserts that the second and third tier suppliers hence have significant aftermarket potential, and have the most to benefit from upgrading (Layton and Rustandie 2007: 12). They propose three models for upgrading, each of which aims at accreditation, the transfer of standards, access to the market, and a seal of quality. The study points out the possibilities of upgrading, yet it does not provide insights about the conditions of organisational receptiveness towards external standard norms. Purwaningrum's study (2011), for example, reveals the lack of ISO 9001 standard adoption in the second and third tier automotive supplier companies in the Jababeka Industrial Cluster.

A fairly recent study was completed by Aswicahyono and Kartika (2010) on production linkages and the automotive industry. Their analysis brings forth that while Indonesia's automotive industry is involved in the global automotive production network, its engagement is in the lowest position in the value chain linkage, namely in assembling (Aswicahyono and Kartika 2010: 58). The common form of knowledge being shared is limited, i.e., training local engineers on machines (Aswicahyono and Kartika 2010: 58). Their work pointed out that despite being part of the larger global production network, innovation, drawings, R&D, logistics, and global marketing are taken care of mostly by the parent companies located in Japan (Aswicahyono and Kartika 2010: 68).

This array of studies, except for the one carried out by Yuri Sato (2001), share a skeptical tone in regards to the possibilities of upgrading through the vertical network of global-local automotive manufacturing. However, these studies did not clarify how the lack of professional associations in Indonesia that provide training and certification in relation to machining, moulds, dies, or plastic injections – the basics within automotive manufacturing – affect upgrading. Additionally, the character of *keiretsu* as a norm was not sufficiently elaborated. The actual knowledge flow in the form of supplier development programmes between assemblers and suppliers, from the viewpoint of the suppliers, is not captured in the analyses of these studies. At this juncture, the next sections will deal with these three issues consecutively: automotive sector policy, the trait of *keiretsu*, and knowledge flow by means of supplier development.

### **Indonesian Government Automotive Policy: The “Import” of Knowledge from Japanese Automakers**

The government of Indonesia, through its policies, shows its commitment to economic liberalisation through 1) reliance on fiscal policies, rather than integrating investment-related policy with standardisation norms; and 2) dependence on knowledge transfer from abroad brought about by the process of foreign capital flowing in from the investment, as reflected in the automotive policy.

A liberalisation agenda is further pursued by a greater reliance on fiscal policy through tax incentives and the absence of the usage of technical standards in the investment-related laws. This absence is notable in the manufacturing sector. The tax incentives currently offered by Indonesia’s government are stipulated in the Government Regulation No. 52 Year 2011 on the Second Amendment of the Government Regulation No. 1 Year 2007 on Income Tax Facilities for Regional Investment in Certain Business Lines and/or in Particular Regions. Article 2 Section (d) provides a tax allowance in the form of compensation for loss (*kerugian*) longer than five years yet no more than ten years, in addition there are certain conditions for these specified seventy-seven business lines (*bidang usaha tertentu*).<sup>v</sup> Article 2 further states that the Ministry of Finance will decide on the tax incentives given later, based on the recommendations of the National Coordinating Board for Investment in Indonesia (BKPM).

When discussing the non-fiscal policy, we refer specifically to the absence of any reference pertaining to the usage of technical standards in the regulations. The explicit references made by the government to non-fiscal policies are to labour policy and licenses (Menko-Perekonomian 2011). The various regulations pertaining to the thematic clusters as incorporated in the roadmap for cluster development in Indonesia (Ministry-of-Industry 2009) do not make direct references to the nationally developed SNI (*standar nasional indonesia*) standards or any other technical standards. Regarding technical standards, our findings in the Jababeka Industrial Cluster analysis suggest that there are no engineering standards for materials for automotive parts. This area appears to be regulated by companies such as Toyota, Honda, and Yamaha. The drawings of the parts to be manufactured on the shop floor usually incorporate the technical standards of engineering, which are outputs of the standardisation process. Standardisation and its legitimacy depend on expert knowledge (Jacobsson 2000; Borraz 2007). There is a lack of development of technical standards for the materials being processed. This was acknowledged by one of the directors dealing with R&D and industry in the National Development Planning Agency (BAPPENAS) during an interview. He emphasised how the standards in Indonesia focus more on products (*produk jadi*), and less on the materials that come prior to the product (*produk setengah jadi*) (Interview, Jakarta, 31.05.2010). The lack of integration of standardisation norms with overall industrial policy may infer a constrained use of the local knowledge base.<sup>vi</sup>

The Ministry of Industry (MoI) is also in charge of the policy regime for the automotive component/supplier industry. In the next passage we briefly review MoI's policies beginning in 1977, with the intention of providing context before moving to the current policy established in 2011.

It has been said that automotive policy in Indonesia lacks efficiency due to a highly distorted past policy regime (Aswicahyono, Anas et al. 1999; Feridhanusetyawan, Aswicahyono et al. 2000). The initial policy in 1977 was a deletion programme, which was intended to encourage domestic car producers to use domestically produced components and provide incentives to industry. However, this policy never fulfilled its intended aim, and was replaced by an incentive programme in 1993 (Feridhanusetyawan, Aswicahyono et al. 2000), which aimed at the usage of domestic components as stipulated in the Ministry of Industry Decree No. 114/M/SK/6/1993 (Feridhanusetyawan, Aswicahyono et al. 2000). In 1995, a package was introduced to deregulate investments in the automotive industry for the production of

new cars, and to also set a target for lower import duties in 2003 (Feridhanusetyawan, Aswicahyono et al. 2000). However, what was seen as a significant liberalisation in the 1990s was later turned into a different version of business patronage. The Soeharto family entered the business in a rather spectacular manner by introducing the “national car” or *mobil nasional*<sup>vii</sup> (Aswicahyono 2000). After a case filed with the World Trade Organisation (WTO) Dispute Panel by Japan, the European Union, and the United States (U.S.) against Indonesia’s plan, Indonesia lost and subsequently backed down (Tarmidi 2001). The incentive system based on local content fulfilment was then erased, and in 1999 no specific formal industry policy was endorsed (Tarmidi 2001). It is clear, however, that the Indonesian government has relied on import duty in its automotive policy from 1999 to the present. In 2011, the policy as stipulated by the Ministry of Finance Regulation<sup>viii</sup> was based on an import duty for sedan-based cylinders for a complete knock-down (CKD) range of 10%, and for a complete build-up it was set at 40%. The luxury tax was set in 2011, ranging from 30-74% based on the cylinders. Based on this, it is possible to infer that the process of knowledge transfer from the customer or the principal to the supplier relies more on FDI, or in other words, relies on the major automakers, such as Honda and Yamaha.

The Indonesia-Japan Economic Partnership Agreement, signed by both parties in November 2007, was an important milestone for automotive sector policy. Both countries recognised that the driver sectors of interest are automotive, electrical and electronic, heavy tools and construction machines, and energy (Atmawinata, Irianto et al. 2008). The Manufacturing Industry Development Centre (MIDEC) was established by the MoI to upgrade the manufacturing industry’s industrial capacity in Indonesia (Atmawinata, Irianto et al. 2008). It is working on three main aspects: basic study, training, and technical assistance. However, based on the fieldwork, it is the Indonesian Mold & Dies Industry Association (IMDIA) rather than MIDEC that facilitates the automotive sector’s knowledge transfer (Purwaningrum 2012). Our analysis demonstrates that the training organised by IMDIA is often linked with the Japan External Trade Organisation (JETRO) and receives support from Japanese experts in molds and dies (Interview, Cikarang, 29.10.2010). This shows that while the automotive policy supports knowledge transfer from the major automakers, the knowledge base itself reflects continuous support from Japan.

Indonesia is consequently embarking on an economic liberalisation agenda with a fiscal policy that relies on tax incentives, rather than nationally developed standardisation norms.

The automotive policy reinforces the usage of incentive-based fiscal policies, and thus welcomes the process of knowledge transfer from the Japanese automakers. The automotive knowledge base is supported not by the organisation set up by Indonesia's government, but by IMDIA, which receives support from and reflects the interests of Japan.

### **The Dominance of Japanese *Keiretsu* Linkages in the Automotive Supply Chain**

*Keiretsu* norms are strictly observed by the Japanese automobile companies and their Indonesian suppliers. If a first tier supplier supplies parts to a Japanese automaker, it generally cannot supply them to another automaker. This is the first “rule of the game” that we found firmly established in the automakers. A supplier company stated there is a “code of ethics” that they (the employees working in the company) have to adhere to. In an effort to retain Yamaha's trust, they cannot supply Honda. The engineering manager explained this in an interview:

“We understand the rules of the game, that there is the factor, namely that if we supply a specific product to Yamaha there will be a specific evaluation. This is why we never make a move to Honda” (Interview, Cikarang, 25.11.2010).

Apart from the function of *keiretsu* as one of the rules of the game, this also creates a norm that gives a sense of identity to the suppliers. This sense of identity is that they are members of a certain group. Indeed, *keiretsu* has been useful in promulgating a shared frame of reference and social context that accords meaning to the knowledge within the industrial clusters located in Java (Irawati 2009). However, in some cases we found that *keiretsu* is also shaped by social practices, whereby they are “beyond the grasp of consciousness, and hence cannot be touched by voluntary, deliberate transformation, cannot even be made explicit” (Bourdieu 1977: 94). This dispositional practice may shape the “supplier's identity” (for a discussion see : Bottero 2010). These social practices are also evident in terms of the practices of parts production. We shall substantiate this in the case of *keiretsu*, which while it is a term known among the top management of supplier companies and automakers, may not be a term known among the employees of the supplier companies (Observation and informal discussion, February 2011). However, these employees *do identify themselves* as belonging to

the group/cluster of Toyota, Honda, or Yamaha. Some of the produced parts are referred to not as *keiretsu*, but as “vendor to vendor.” In the case of the production of a bracket part, we asked a Toyota Production System (TPS) member if it was possible to have the outer part produced by supplier companies, and not from a Toyota supplier group. The reply that we received was fairly stern. This is captured in the following dialogue:

Respondent: “No, that part is vendor to vendor. Toyota specifically requested the part from one vendor to be used by another vendor. We are the vendors supplying Toyota.”

Researcher: “Why not use the outer part from a Honda supplier?”

Respondent: “That is impossible, their specification will not match the required standard.”

Researcher: “Is that the only reason?”

Respondent: “It is the *norm*, the *practice*, that we produce with vendor to vendor, between the suppliers of Toyota. This is as requested” (Informal discussion, February 2011).

Hence, *keiretsu* acts as a normative blockage that can restrict the process of tacit knowledge flow. It provides a sense of identity that the supplier belongs to a certain group. Keiretsu also enhances the process of knowledge flow within the supplier development programme, but at the same time it excludes access to this knowledge for other supplier companies that do not belong to this network.

### **Supplier Development Programme within the Vertical Network**

We provide two case studies of supplier development programmes within the automotive industry’s vertical network, i.e., Honda’s supplier development programme and Yamaha’s supplier development programme. In the supplier development activities, tacit know-how relating to lean production, quality control, and the manufacturing process in general are exchanged, and to a certain degree transferred, from the automakers to the suppliers. Sako suggests that supplier development is a capability-enhancing activity that fits neither “market” nor “hierarchy” (Sako 2004: 282). One might ask why supplier development is important from the supplier’s standpoint? This question is useful for gaining insights into the knowledge flow process, especially bearing in mind that these suppliers are mostly located in a cluster (the Jababeka Industrial Cluster).

Admittance to, or to be more precise membership in, this supplier development is dependent upon first, the cost structure of the parts produced by the first tier supplier companies. Most of the first tier companies engaged in this supplier development already have the capacity to carry out mass production. They can, in some cases, position themselves as second tier companies on a parallel basis in the supply chain. Indeed, there is flexibility in this sense, as suggested by Yuri Sato (2001). Second, the approval (and selection) of the assembler is vital. In this case, the automakers have a preference to work with the *keiretsu* suppliers. The approval would be likely to be made by the purchasing division of the Japanese transplant company in Indonesia (Interview, Cikarang, 20.01.2011).

### **The Honda Supplier Development Programme**

Honda (PT. Astra Honda Motor or AHM) produces motorcycles as its main product. One motorcycle requires a considerable number of parts, with each part in turn requiring dozens of subparts/components. Such parts containing different subparts or components are produced by the first tier industries, with Honda acting more as an assembler.

Honda suppliers are grouped according to sector-specific technology. For example, stamping-based companies will be grouped with other similar companies (Sako 2004), and this is also the case in Indonesia. Honda's suppliers are differentiated based on the product, namely, welding, standard components, machining, and electric. Besides this, Honda also makes five differentiations on the basis of engineering competence: casting, machining, press, painting, and assembling (Interview, Cikarang, 25.01.2011). One of the supplier companies explained how this grouping enables the company to assess and evaluate the type of material used for the part (Interview, Cikarang, 06.12.2010). This is the particular strength of Honda's supplier development activity; due to the sector-specific grouping, the company can assess and evaluate the strengths and weaknesses of the produced part.

Interestingly, it is as if there is no barrier that would stop Honda from accessing the supplier companies' factories/shop floors for an inspection of its products. An engineering manager in a supplier company described this to us in an interview:

Respondent: “To Honda, this factory is like a second home for them. We are also close with Honda’s local experts. Our language is the same. Also, we have frequent meetings. This helps knowledge transfer. For a quality problem, before it snowballs and becomes troublesome, they (Honda) will give advance warning. Honda treats our products just like they were their products. Our products indeed are their products.”

Researcher: “Is this because your company is part of the Honda *keiretsu*?”

Respondent: “Yes, that helps the personal proximity (*kedekatan personal*) between us. We are a local company, not like the supplier company, which has a parent company based in Japan. If there is a problem, the parts will be put aside before the problem trickles into a voluminous issue. Then we discuss it with them” (Interview, Cikarang, 06.12.2010).

By viewing the produced parts as similar to their products, Honda’s experts have access to them in the supplier’s factory.

The experts’ visits to the factories enable knowledge exchange within the quality control system. During such visits, the experts perform *genba*, which is a walk around the shop floor to evaluate the flow of production. If there is a problem due to, for example, several processes in the parts manufacturing that are being missed, a meeting would be held with the experts from Honda. The supplier companies often adopt Honda’s quality system and kanban internally (Interview, Cikarang, 06.12.2010). Thus, the tacit knowledge exchanged (and, to a certain degree, transferred) from Honda is in the form of their quality control system and lean production tool, i.e., kanban. The implementation of kanban in their warehouse enables timely delivery by managing the required stock to be picked up by the assembler.

Furthermore, Honda also carries out supplier training for new projects or new products. An improvement assessment system is applied, enabling knowledge to be exchanged both ways between Honda and its suppliers (Interview, Cikarang, 06.12.2010). The know-how regarding the product is usually retained by the supplier, yet Honda gains mastery of the quality system.

There is a Maru I Study Group in Japan, which is a supplier forum for upgrading parallel engineering (Sako 2004). Conversely, the one that is available in Indonesia is not a study group but a meeting between the assembler and suppliers once or twice a year in an Astra Honda Technical Meeting. This meeting is attended by approximately 120 suppliers from a range of different areas in Indonesia (Interview, Cikarang, 08.10.2010). The Honda supplier’s

meeting takes place to discuss specific matters. The knowledge exchange process among the suppliers and the assembler covers a range of issues, including mechanical problems, advice on how to react to and handle customer complaints, and handling customers responsively (Interview, Cikarang, 08.10.2010).

Despite this frequent interaction through expert's visit in the shop floor, it does not mean that there are no limits in the knowledge exchange between Honda and its suppliers. Honda's factory is only open in its production line (Interview, December 2010, August 2010). Suppliers are not allowed to access the first and second pilot products for mass production, as the two areas are restricted. The capacity building and review of the suppliers as well as supplier development is managed by Astra Honda Motor's procurement division (Interview, Cikarang, 25.01.2011), akin to that practiced in Honda's headquarter base in Japan (Sako 1999; 2004).

Thus, the interaction between Honda's assemblers and its suppliers takes place predominantly through the engineering/expert visits dispatched to the suppliers' shop floors. Through such face-to-face meetings, advice on issues relating to quality or tools pertaining to a lean production system is provided. Know-how relating to the products and drawings is usually transplanted from the principal company of the first tier companies to their subsidiary branches.

### **The Yamaha Supplier Development Programme**

Before delving into our analysis, it is vital to show that in the research there has not been much grounded empirical work on Yamaha's manufacturing system in English. There have been studies carried out in the U.S., including a study of the conceptual framework for managing value-delivery system lead-time reduction-related activities in manufacturing firms including the Yamaha Motor Manufacturing Corporation of America (Lockamy 1993), and work by (Schonberger 1982) that stated how Yamaha in Japan has devised a creative fusion of kanban and material requirements planning (MRP), which is an American innovation of kanban based on the required parts for the week. However, research on knowledge transfer between Yamaha and its suppliers in Indonesia remains a gap in the relevant literature.

Yamaha is an automotive Japanese transplant company. The company manufactures motorcycles. It has factories located in Pulogadung and in Karawang – both are in West Java, Indonesia. Its supplier development programme is referred to as Yamaha Manufacturing Improvement (YMI); it started in 2010. One of the employees of a supplier company supplying Yamaha explained it to us:

“The programme is referred to as the manufacturing improvement programme. The background is more about Yamaha as a company, whereas they need to cut costs for the components, lower prices, and to improve selling which makes their companies competitive and successful. The main goal for the vendor is that there should be a cost reduction target. The aim is to reduce costs, similar to Toyota” (Interview, Cibitung, 25.11.2010).

Distinct from the “just in time” (JIT) system used by Toyota, YMI transfers information about time ratios, quality ratios and equipment control effectiveness. Time ratios concentrate on productivity, namely, how productive a process is with the available resources. Quality ratios focus on the acceptance of the quality level. Whilst, equipment control effectiveness ensures that the tools and equipment in the shop floor including the improvement effort is utilised. Each resource should be dedicated to making parts with minimum waste and loss.

Knowledge and know-how regarding the processes of manufacturing and lean production are exchanged through the visits of technical experts. This was explained by a QC manager in a supplier company:

“The emphasis in here is on technical experts; the style of Yamaha is distinctive in that the focus is on direct meetings where the experts come to us. The experts were there for three days and in every day we join them on the shop floor; every day we have knowledge-sharing sessions. And then again back to the shop floor to practice. They would share the flow and problems with our production line in here. Some of these experts are dispatched from the Yamaha Motor Corporation in Japan. We have hosted experts in welding and in the stamping process” (Interview, Cibitung, 25.11.2010).

Thus, knowledge is exchanged directly through face-to-face meetings with technical experts from Yamaha. The frequency of the technical experts’ visits is dependent, to a certain extent, on whether there is a new motorcycle project from Yamaha.

YMI is managed not by a separate department, but by the purchasing/procurement division. One Yamaha representative would be in charge of several suppliers in one designated area, such as Bekasi (located in West Java, Indonesia) (Interview, Cibitung, 25.01.2011). He or she would be fluent in terms of the problems relating to production in the supplier companies. The feedback and input provided by Yamaha's representative are usually documented in written form through meeting minutes.

Apart from YMI, informal meetings with the representative dispatched from Yamaha for auditing also act as knowledge sharing. This normally takes place after an audit or visit. In these informal meetings, valuable information on the problem-solving activities relating to capacity or quality is shared. The informal meetings also act as the sharing of Yamaha's experiences with overcoming issues pertaining to production. This nurtures the network between the supplier company and Yamaha and enables the sharing of information and problem-solving experiences on the shop floor.

Yamaha monitors their suppliers closely. It asks suppliers to reduce costs and actively follow the production plan that is set on a yearly basis. These supplier companies are usually open to Yamaha to discuss the problems pertaining to the parts they are producing for Yamaha. An engineering manager of a supplier company stated:

“There are no barriers between Yamaha and our factory; this factory and shop floor are like their own factory and shop floor” (Interview, Cikarang, 25.01.2011).

Conversely, Yamaha is quite restrictive in terms of opening up their line processes to suppliers (Interview, 27.08.2010). In fact, for critical components, such as electrical panels or pistons for the motorcycle being produced, they still rely on their Japanese supplier counterparts (i.e., when it is necessary to import such components) or they produce them in-house in their headquarters in Japan. Local suppliers supply non-critical components/parts (Interview, Cikarang, 27.08.2010).

In summary, the Honda supplier development programme and the Yamaha supplier development programme share one similarity: both of them are associated with their purchasing divisions. This is a stark difference to the approach that Toyota has. Toyota's

supplier development programme is managed by OMCD – a separate division from the purchasing division (see : Purwaningrum 2012; Purwaningrum, Evers et al. 2012). One difference between Honda and Yamaha lies in the group meeting, which is a part of Honda's supplier development programme, whereas in Yamaha the process of knowledge sharing/exchange is mediated by face-to-face communication between the engineers and the quality control team members.

These automotive supply chains include *keiretsu* suppliers as well as other fully Indonesian supply companies, but when all of them are positioned as first tier suppliers in the supply chain, they are treated as if all of the companies are part of the *keiretsu* system. One could therefore talk of “pseudo-*keiretsu* companies.”

## **Conclusion**

In this paper we focused on tacit knowledge related to the production process. The analysis suggests that knowledge in the automotive supply chain network does not flow freely. In fact, *keiretsu* as a norm acts as a blockage, and the Japanese assembler companies wield a significant amount of power in terms of the flow of knowledge. This makes industrial upgrading difficult, as the first tier companies are usually the ones bound firmly into the Japanese *keiretsu* system.

The flow of FDI into the manufacturing sector increased in Indonesia during the period of 2006 to 2010. This FDI increased the agglomeration of industries in industrial clusters, particularly near the urban area of Jakarta, Indonesia. The linkage of automotive supply chain with the global production network is the subject of inquiry in this paper.

Scholars have probed into the prospect of industrial upgrading relying on supply chain linkage in Indonesia ( see: Sato 2001; Layton and Rustandie 2007; Aswicahyono, Kartika et al. 2011; Irawati 2012). These studies hinted that it is difficult for supplier industries to capitalise on knowledge within the trajectory of upgrading. They did not point out, however, what restricts the knowledge flow and how knowledge is unevenly distributed within the automotive supply chain network. Our study intends to provide an empirical contribution in this area. We also direct our analysis to the overall government policy in the automotive sector on the national level.

Our policy analysis suggests that the Indonesian state relies more on fiscal policies than on integrating investment-related policy with the norms of engineering standards. These norms, as shown by our data, are regulated by the automakers. They “enforce” this through the drawings and the manufacturing, which must follow certain production processes. In addition to this, there is a dependence on knowledge transfer from abroad.

*Keiretsu* may well be the norm harnessing the linkage between Japanese automakers and suppliers. The character of the vertical hierarchical keiretsu linkage is that the essential decisions pertaining to purchasing are likely to be made outside of Indonesia. These may be in other cities, such as Bangkok, or in other countries (generally, in Japan). The relationship between an automaker and its suppliers is an asymmetrical hierarchical one. The rules of the game outline, in general, that once a supplier supplies a particular automaker, it cannot make a move to another automaker. This norm also provides a sense of identity for the group of suppliers.

The cases of Yamaha’s and Honda’s supplier development programmes further highlighted how the process of knowledge flow remains exclusive and relies on face-to-face meetings. Expert advice is provided by the engineering/technical expert who visits the supplier companies. Access to the automaker’s production plant is usually restricted, even for the suppliers. The supplier development programme, which aims to reduce costs, is linked with the automakers’ purchasing divisions. Honda has a different touch to it, due to its sector-specific grouping. Yamaha’s audit mechanisms provide room for informal discussions between the auditor (from Yamaha) and the engineers/quality control staff in the supplier companies.

Our study has thus highlighted that a benevolent nod towards the market brings its own baggage. Indeed, the more investment that comes in, the more attractive it is for the creation of industrial cluster areas, or free trade zone areas. Yet, with the existing condition where tacit knowledge flow from the automakers is restricted to the first tier suppliers, one would be tempted to bring into question the extent of the overall (vertical) flow of knowledge for the development of companies outside of the first tier. These small and medium companies, which usually take subcontracting jobs, are outside of and excluded from the network. Moreover, the absence of the state’s norms within the practices of manufacturing on the shop floor continues to prevail. The norms are regulated by international standards, such as ISO, or

by the automakers. Further study of these global and local production networks and the flow of knowledge should first pay keen attention to this process of exclusion (and inclusion) in the access to knowledge, and second look at the role of the state and other actors (such as multinational companies) in the permeability of norms' internalisation.

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<sup>i</sup> The Zaibatsu generally refers to the Japanese business conglomerates. They owned holding companies. They were abolished after World War Two (Scher 1999: 309).

<sup>ii</sup> It is, according to Scher (1999), an asymmetrical power relation, subsidiary-like affiliations. *Keiretsu* is marked by the following features: first, information dissemination is limited by lack of codification to face-to-face relationships. Second, relationships are personal and hierarchical. Third is submission to super-ordinate aims. Fourth is hierarchical coordination. Fifth is the need to share beliefs and values. Sixth, monitoring of the operations is assumed (Scher 1999: 312).

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<sup>iii</sup> *Kanban* is a piece of paper or a card containing production information.

<sup>iv</sup> There are also third tier companies supplying to the first tier and/or second tier companies. These third tier companies are also part of the supply chain linkage.

<sup>v</sup> This includes “an extra one year will be given if there are costs for research and development in the country (Indonesia) to develop a product, or efficiency of production at least 5% from the 5 year investment”.

<sup>vi</sup> By local, we refer to the standards developed by R&D institutes or other agencies in Indonesia.

<sup>vii</sup> This programme aims to lead to an accelerated local content target for a car. A car is bestowed a “pioneer status” entailing a full exemption from all import duties, a waiver of the luxury car tax, and financial assistance (AswicaHyono 2000: 224).

<sup>viii</sup> Ministry of Finance Regulation No. 241/PMK.011/2010.