

Supplier-assembler Network Structure and Capability Improvement of Suppliers in Newly Emerging Vietnam's Motorcycle Industry

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Summary

By analyzing five in-depth case studies of suppliers in newly emerging Vietnam's motorcycle industry, this paper explores the differences in patterns and processes of capability improvement of suppliers who participate in different kinds of supplier-assembler network with different structures (*arm-length or embedded*).

The paper finds the correlation between the kinds of suppliers' capabilities improved and the structure of networks they participate in. While suppliers in arm-length networks can improve more *upstream* capabilities (structure design, process design), suppliers in embedded networks can improve more *downstream* capabilities (process design, process setup, process maintenance and delivery control).

Two capability improvement patterns of firms in newly emerging economy are indicated. The first pattern is *asymmetrical* improvement, either upstream or downstream capabilities, by participating in either arm-length or embedded networks. This pattern obstructs the suppliers to meet the requirements of new buyers who come from different kinds of network. The second pattern is *symmetrical* improvement by joining both arm-length and embedded networks.

Key Words: network structure, capability building, newly emerging economy, supplier-assembler networks, subcontracting management.

1. Introduction

Supplier-assembler network is long known as a source for suppliers to improve capabilities through approaching, absorbing and accumulating knowledge as well as by activating the motivation

and ideas to innovate and to improve performance (Nishiguchi, 1994; Kohno, 2002; Clark and Fujimoto, 1991; Pittaway et al., 2004). Automotive industry is widely used for the studies on supplier-assembler networks (MacDuffie and Helper, 2006) to analyze the effects of network structure to the capability improvement of suppliers (Nobeoka, 1999; Kohno, 2002; Helper, 1991; Helper and Sako, 1995; MacDuffie and Helper, 2006).

Recent studies on long-term development of firms in oldest emerging economies¹⁾ such as Korea, Taiwan (Kim and Lee, 2002; Mahmood and Singh, 2003), Thailand (Kreinkrai and Thamavit, 2004), Brazil, Mexico (Ivarsson and Alvstam, 2005) or large emerging economies of India and China (Ivarsson and Alvstam, 2005; Odaka, 2004) have described supplier-assembler network as a source to create the capabilities of firms in emerging economies. However, these studies offered little understanding of how and which kinds of capabilities suppliers improve when dealing with different kinds of network. The situation of firms in early phase of emerging has not been considerably analyzed. Furthermore, the recent context of globalization and, particularly regional integration, has not been taken enough consideration.

This paper explores the effects of different kinds of supplier-assembler network structure on the capability improvement of suppliers in newly emerging economies under nowadays context of globalization and regional integration. By examining the different processes of technology and skill improvement in five cases of the suppliers in the Vietnam's motorcycle industry, the paper aims at better understanding of how suppliers can exploit supplier-assembler relationship to improve their capabilities in newly emerging economies.

The effects of supplier-assembler network on the capability improvement of suppliers depend on the relationship between firms in the network. Studies on inter-firm network have pointed out two kinds of network relationship, *arm-length* and *embedded*, which are illustrated by the production systems of the American and Japanese automobile companies respectively (Helper, 1991; MacDuffie and Helper, 2006; Dyer, 1997; Dyer and Ouchi, 1993; Cusumano and Takeishi, 1991).

In embedded network, inter-dependence between firms is strengthened. Assemblers and suppliers are willing to share their experience and knowledge. This kind of structure offers the competitive

1) Emerging economies are defined by two criteria of rapid pace of economic development and government policies favoring economic liberation and the adoption of free-market system (Hoskisson et al., 2000). These economies are increasingly strengthening their position in global economy (Wright et al., 2005). According to Hoskisson et al. (2000), there are 64 emerging economies. This list can be added up by other new countries such as Vietnam, as in the researches of Wright et al. (2005). In emerging economies, *oldest emerging economies* (Humphrey et al., 2000) such as Korea, Brazil, Taiwan, Thailand have more than four decades of economic emerging. Meanwhile other *newly emerging economies* such as India, China or Vietnam have just emerged in recent decades.

advantages to Japanese companies in long-term, particularly in the case of the automobile industry (Clark and Fujimoto, 1991; Helper, 1991; Helper and Sako, 1995; Womark et al., 1990). On the other hand, arm-length structure is characterized by market-based relationship between participants. When products and component parts are standardized (*or modularized*), arm-length networks may have more advantages as stimulating innovation and mass customization in firms (Sanchez, 1996; Beckman and Haunschild, 2002; Kotha, 1995). This structure is widely built in the American companies' production systems. The coexistence of these two kinds of structure raises a challenge to firms in emerging countries in exploiting different networks to improve their capability and grow.

Globalization, which is known as the enlargement of trade and investment liberation, and regional integration are noteworthy factors that lead to the rapid changes of recent business environment in all over the world. Globalization conducts to the expansion of the production systems of the companies from developed economies to emerging economies. Globalization and regional integration force companies to adjust their production systems globally and regionally that influences the roles of local suppliers in the whole production networks (Bartlett and Ghoshal, 1989).

Moreover, the development of firms in oldest emerging economies and the spread of their production systems abroad also contribute to the changes of business environment nowadays. Suppliers in newly emerging economies may simultaneously deal with various production systems, with both arm-length and embedded structures, of the investors from different countries. They also have more sources to obtain knowledge from abroad. In this new context of business environment in newly emerging economies, late-coming suppliers receive different effects from different networks to improve their capabilities.

Firm's capabilities are the core factors of its competitiveness (Barney, 1991; Wernerfelt, 1984; Prahalad and Hamel, 1990). Firm's capabilities include a set of knowledge and skills which enable that the firm can operate different functions smoothly and efficiently. Besides improving capabilities to sharpen the competitive weapon (Fujimoto, 2004), companies also need to have the ability to use their capabilities dynamically to adapt to the changes of internal and external environment (Teece et al., 1997).

On the other words, firms have to select improving different knowledge and skills, i.e. capabilities, in different periods of time. External network can orientate and supply sources of knowledge and skills to firms. This paper, based on the classifying capabilities according to different stages of production process of suppliers, analyzes the improvement of different capabilities in suppliers which deal with arm-length and embedded networks. The study takes five suppliers in the Vietnam's motorcycle industries as case studies. Since capability improvement is an accumulative process,

the case studies are investigated across different stages of the industry's development.

The paper is organized as following. Research framework will be synthesized in Section two. Section three is an overview of the newly emerging Vietnam's motorcycle industry. Methodology and case analysis of five motorcycle part suppliers are described in Section four and five. Conclusion, discussions and implications are in Sections six and seven.

2. Supplier-assembler Network and Capability Improvement of Suppliers

2.1. Supplier-assembler Network Structures: Embedded and Arm-length

In recent decades, the development of the Japanese automobile industry has drawn more attention of researchers on supplier-assembler relationship as a source of competitive advantages. Two kinds of supplier-assembler network structure have been identified to distinguish the differences in inter-firm relationship between suppliers and assemblers as well as the advantages created by different networks.

The more familiar networks to the American automobile companies are arm-length ones. This kind of network is characterized by market-based relation between participants. Suppliers and assemblers set up exit relationship (Helper, 1991), which is relatively unstable so that every participants can go into or out of the mutual relation easily. Suppliers and assemblers in arm-length networks have short-term relationship, subcontract small volume of product, and exchange little information. Transactions within these networks occur mainly in bargaining, contracting and payment. The participants are also more independent in asset and management (Helper, 1991; Dyer, 1997; Cusumano and Takeishi, 1991). Due to this kind of relationship, to sustain relation within arm-length network, it needs to have more governance mechanism such as deposits (Dyer and Singh, 1998; Dyer, 1997; Williamson, 1985).

Different to networks of the American automobile companies, the Japanese competitors build up the embedded networks with their suppliers. The fundamental characteristic of this kind of network is that the network is built on trust-based relation between firms (MacDuffie and Helper, 2006). Assemblers and suppliers sustain relationship for long term, with different products. The volume of product subcontracted is large and stable. Participants actively share information about production process, technology and management. Assemblers, who often have better technological and managerial knowledge, are willing to share their experience and knowledge with suppliers. In return, assemblers ask for more information about production process of suppliers, even cost structure (Nishiguchi, 1994; Dyer, 1997; Womark et al., 1990). Inter-dependence between firms

in embedded network is strengthened. Assemblers and suppliers can even cooperate in developing new products (Clark and Fujimoto, 1991), in solving problems during production (Nishiguchi, 1994) or in reacting against struggles of market (Pham, 2005). With this voice relationship (Helper, 1991), participants can get relation (quasi) rent (Asanuma, 1989) and reduce governance mechanism (Dyer and Singh, 1998). That allows embedded networks to have competitive advantages in long term.

Arm-length and embedded networks co-exist in the world's automobile and motorcycle industry since long time. Recently, while the Japanese automotive companies retain their embedded networks, supplier-assembler networks within the Chinese motorcycle companies are based on arm-length relation (Ohara, 2001; Matsuoka, 2002; Sugiyama and Otahara, 2002). Similarly, although the companies in the American automobile industry are improving collaborative relationship within networks (Helper and Sako, 1995), there is still a remarkable gap in embeddedness between the networks of the American automobile companies and those of their Japanese competitors. The relationship within embedded style networks of Japanese companies is based on trust entirely while the collaboration in American networks is without trust (MacDuffie and Helper, 2006). Several other studies have also indicated the modification of network structure in the Japanese automobile and motorcycle companies (Nobeoka, 1999; Pham, 2005). However, in general view, supplier-assembler networks of the Japanese automobile and motorcycle companies are still in embedded style (Fujimoto, 2004; Pham, 2005; MacDuffie and Helper, 2006).

Studies on automobile industry in recent decades indicated the long-term effects of embedded networks to the capability improvement of suppliers. Empirical studies on the Japanese automobile industry evidenced that beside scope of customer, long-term relation with customer (Nobeoka, 1996), and cohesive relation with main customer (Kohno, 2002) help to improve performances of suppliers. Other studies also showed the effects of embedded networks on improving delivery, quality, flexibility (Nishiguchi, 1994), reducing cost and fostering product development (Clark and Fujimoto, 1991).

However, in the other extends, arm-length networks also have positive effects on the capability improvement of suppliers. Research on the late-coming motorcycle industry of China supported the positive effects of arm-length networks to the fierce development of suppliers (Ohara 2001; Sugiyama and Otahara 2002). Even in embedded networks of the Japanese automobile industry, Nobeoka (1996) showed the correlation between number of customer and performance of the suppliers in the Japanese automobile industry.

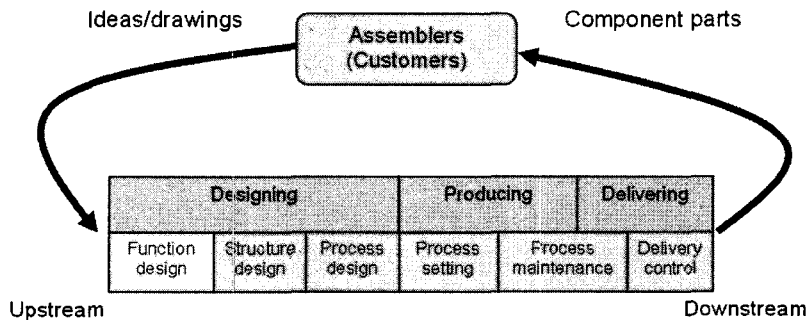
Table 1: Arm-length and Embedded Networks

Relationship	Arm-length	Embedded
Features	<ul style="list-style-type: none"> - Short-term relationship, large distance, small volume of subcontract, less information exchanged, low degree of combination - Unstable, ask for more governance mechanism 	<ul style="list-style-type: none"> - Long-term relationship, proximity, large volume of subcontract, more information exchanged, high degree of combination - Stable due to self-guard mechanism
Example	Electronics industry, American automotive industry (particularly before 1990s)	Japanese automotive industry

Source: Created by the authors based on Beckman and Hauschild (2002), Reagans and McEvily (2003), Dyer and Wright (1998), Nishiguchi (1994), MacDuffie and Helper (2006), Asanuma (1989)

2.2. Production Process and Capabilities of Suppliers

Firm’s capabilities, particularly those related to operational activities (Fujimoto, 2004), are the root of firm’s performance that can be seen in the activities of cost reducing, quality improving and product development promoting (Fujimoto, 2004; Clark and Fujimoto, 1991; Womark et al., 1990). Firm’s capabilities are from a complex set of resources and competences, which can be divided into different elements following to firm’s production process. There is a remarkable difference between the capabilities needed by suppliers and those by assemblers. Since the customers of suppliers are assemblers, who have full knowledge about the products (i.e., component parts), suppliers need more capabilities relating to production activities instead of marketing related ones.



Note: Function design capability glues with radical R&D capability of firm to develop completely new products. Normally, suppliers in newly emerging economies do not have this capability. Thus, this study excludes function design from upstream capabilities.

Source: Created by the authors based on Clark and Fujimoto (1991), Fujimoto (1997), Womark et al. (1990).

Figure 1: Production Process and Capabilities of Suppliers

In a supplier, production cycle starts from receiving subcontracting contract and/or order from a assembler. The assembler can give to the supplier ideas about the product (i.e. component part) or even give to the supplier detailed designing drawings. After receiving the ideas of the component, the supplier starts designing process, which can be divided into three steps of function design (or concept design, to design functional aspect of components), structure design (to design physical aspects of components, including product plan (or basic design) and product design or (detailed design)) and then process design (to design technological process and production layout). Following is producing process which starts by setting up production system (process setting) and then operating ordinary producing activities (process maintenance). After being produced, components are delivered to the assembler. Along with designing, producing, delivering processes, the supplier needs the capabilities of function design, structure design, process design, process setting, process maintenance and delivery control (Figure 1).

Which kind of capability to be improved and how to improve are critical questions to suppliers in their strategy and operation. Surrounding supplier-assembler networks have effects on the strategy and process to improve capabilities of suppliers. Assembler, who plays the role of customer, may become one of main sources offering knowledge to suppliers (Hippel, 1994). Subcontracting with assemblers stimulates suppliers to improve capability, to respond to assemblers' increasing requirements and to compete with other suppliers. Inasmuch as supplier provides input and participates in assembler's production process, assembler may also directly offer producing related knowledge to suppliers. These supports have been recorded in the cases of emerging economies, between local suppliers and foreign assemblers, when the assemblers enlarge their production networks globally (Odaka, 2004; Ivarsson et Alvstam, 2005; Hobday, 1995; Kim and Lee, 2002). However, how assembler influences on the capability improvement of supplier is depended on the relationship between supplier and assembler. In the other words, it is depended on supplier-assembler network structure.

2.3. Effects of Supplier-assembler Network Structure on the Capability Improvement of Suppliers in Newly Emerging Economies

It is depended on different stages of development of firms and industries that the effects of network structure on the capability improvement of supplier are different. As in the examples of automobile or electronics industries in developed economies, both the assemblers and the suppliers have long time to accumulate capabilities and possess unique capabilities that sustain their competitiveness. These unique capabilities enable the relative independence between the firms. Meanwhile, in emerging economies, most of and the main assemblers are foreign multinational

corporations, who come from abroad, while most of the local suppliers are newcomers to the industry, who have limited capabilities.

The development of capabilities of these suppliers is strongly depended on external technological sources, mainly from abroad, through foreign direct investment or technology purchasing (Kim and Lee, 2002; Hobday, 1995; Mahmood and Singh, 2003; Xie and Wu, 2003; Odaka, 2004). The low development level of the industries in newly emerging economies does not allow the assemblers ask too much from the suppliers. From this condition, the effects of supplier-assembler networks on capability improvement of suppliers are different between the contexts of developed economies and those of emerging economies, particularly newly emerging ones.

The conditions of business environment are also different between different emerging economies, due to the level and time they develop. Firms in newly emerging economies are in the start-up stage of development so that they receive strong influence from multinational companies to enter the industries which are newly formed by foreign investors. Meanwhile, firms in older emerging economies are in the stages of take-off of simple manufacturing goods or take-off of professional goods (Hobday, 1995; Ohno, 2005). Thus, they are not only improving capabilities by using technological sources from developed countries or by developing by themselves but also are able to export their technologies to newly emerging economies. New flow of direct investment to newly emerging economies from oldest emerging economies has enlarged recently. In Vietnam, for example, foreign direct investment (FDI) from Taiwan, Singapore, Hong Kong, Malaysia holds nearly 50% total ingoing FDI. In many cases, technology from oldest emerging economies is easier to be diffused because business condition in oldest emerging economies is closer to that in newly emerging economies compared to that in developed economies.

Imitating production is a strategy widely used in emerging economies during their development (Kim, 2001; Kim and Lee, 2002; Hobday, 1995; Mahmood and Singh, 2003). Imitating strategy can lead to the modularization (Fujimoto, 2004; Sugiyama and Otahara, 2002; Katsu and Fujimoto, 2005) in which a product is divided into different modules of component. Modularization accelerates numerous companies to join the industry. However, modularization is not only because of imitating production but also a result of a natural development of the industries (Baldwin and Clark, 1997).

Following this path, modularization enlarges worldwide, from developed economies to emerging economies. In the environments where products are modular and standardized, product designing related technologies are also standardized and universalized so that firms can be easier to obtain these technologies. The transfer of these technologies becomes more market-style and asks less specific relation between firms in transferring process. Firms in arm-length networks will be easier to meet and obtain these technologies. Since designing related technology is the content

of firm's upstream capabilities, suppliers which deal with arm-length networks will have more chances to access this technology's sources and to improve their upstream capabilities.

Proposition 1a: In newly emerging economies, suppliers who have more relation with arm-length networks will easier improve upstream capabilities.

Different to designing related technologies, production related technologies, which contribute to firms' downstream capabilities, are less standardized in both developed and emerging economies. The improvement of downstream capabilities is a continuous process (Clark and Fujimoto, 1991; Womark et al., 1990) and asks for the close relationship between firms. Thus, suppliers which have more arm-length relations will have less advantage in improving downstream capabilities.

Proposition 1b: In newly emerging economies, suppliers who have more relation with arm-length networks will more difficultly improve downstream capabilities.

During the process of investing abroad, besides changing their production systems' structure to adapt new business environments, multinational corporations sustain many of their characteristics of production system (Cusumano and Takeishi, 1991; Martin et al., 1995; Pham, 2005; Bartlett and Ghoshal, 1989). Since embedded networks are built in long time, all embedded networks in newly emerging economies are created by foreign multinational corporations, who have long time development in the industry. Assemblers in these networks often have long-term experience in the industry and have high capabilities in production.

To have good output, these assemblers also ask suppliers for high performance of products (components) provided to them. They are also often willing to share their technologies and experience to suppliers if it is needed (Helper, 1991; Clark and Fujimoto, 1991; Womark et al., 1990; Dyer and Singh, 1998). Thus, suppliers in emerging economies, who are in embedded networks, will have chances to obtain fully technology from the assemblers in embedded networks. The gap between technology capability of assemblers and suppliers in newly emerging economies is high so that the source of technology is large. Since technology transfer is an accumulative process, the firms need to decide which capabilities to be transferred in a period of time.

In newly emerging economies, suppliers have limited capabilities. Assemblers, who come from developed economies, have to select which technology to be transferred to or to be required from the suppliers. When the capabilities of the suppliers are not enough, the assemblers will choose to transfer production related technology because this technology is indispensable for suppliers to produce and maintain good performance of component. Designing activities can be covered by the assemblers. In the automotive industries in emerging economies, for example, the serious limit in total capabilities of a supplier discourages an assembler to transfer or stimulate the supplier to improve upstream capabilities, particularly in short term (Humphrey et al., 2000).

Instead, downstream capabilities are prioritized.

Proposition 2a: In newly emerging economies, suppliers who have more relation with embedded networks will easier improve downstream capabilities.

From the suppliers' view, the shortage of capabilities and resources, and the high requirement of assemblers also force them to a selection of improving capabilities. When a supplier becomes a member of an embedded network, it will be more inter-dependent with the assembler and will dedicate more resource for this relation. Since the assembler asks for more downstream capabilities, the supplier will reserve more resource to improve these capabilities and have less resource to develop upstream ones. The supplier also has less motivation to improve upstream capabilities.

Proposition 2b: In newly emerging economies, suppliers who have more relation with embedded networks will more difficultly improve upstream capabilities.

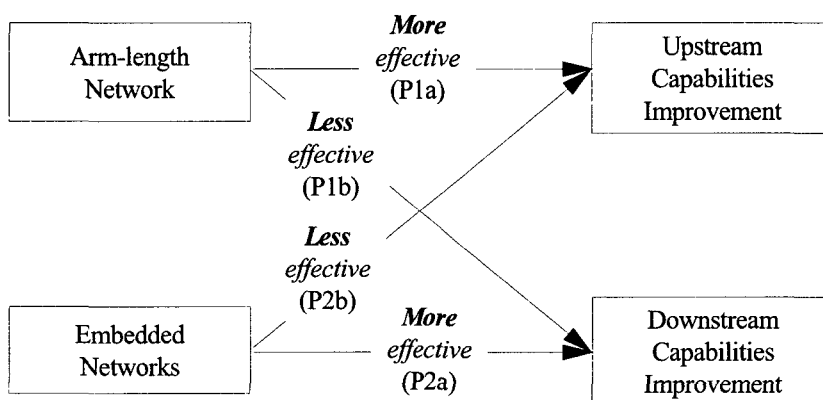
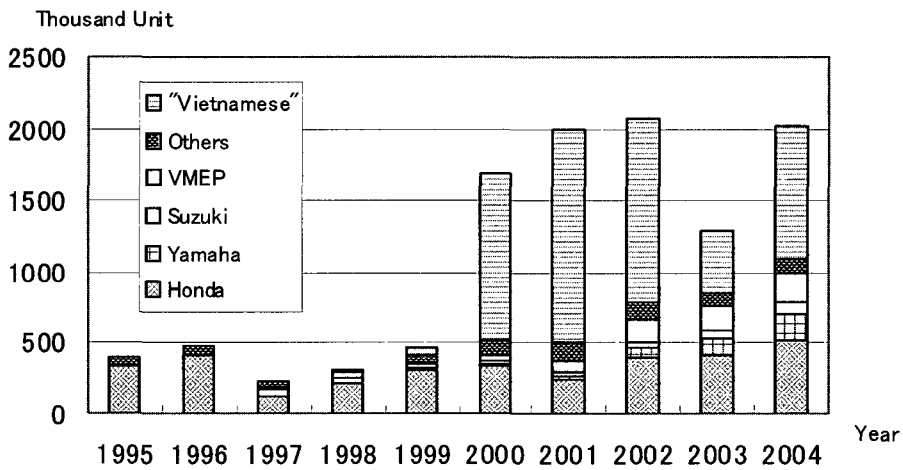


Figure 2: Propositions about the Relation between Network Structure and the Capability Improvement of Suppliers in Newly Emerging Economies

3. Newly Emerging Vietnam’s Motorcycle Industry

With the population of more than 80 millions and annual income per capita of US\$ 550 (in 2004), Vietnam is a potential market for motorcycle. Annual motorcycle sales are about 1.5 to 2 million units in recent years and ranks eighth in the world’s motorcycle market. However, it was just since 1998 that motorcycle industry grew briskly in Vietnam. From 1999 to 2002, the motorcycle market multiplied by six times.

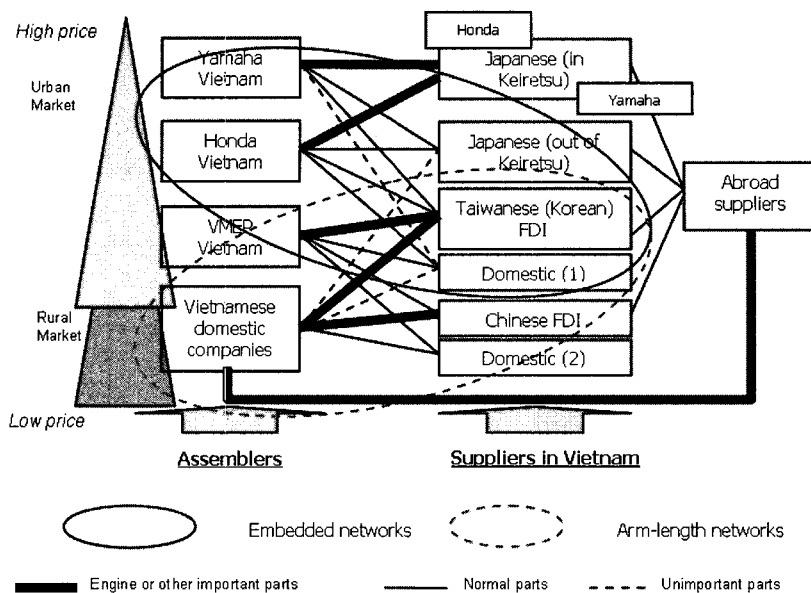
One of the reasons lead to the booming of the motorcycle market in Vietnam is the emergence of the low-priced motorcycles. Although the first Taiwanese motorcycle assembler and then Japanese Suzuki, Honda and Yamaha established their factories in Vietnam during 1993-1998, it was until 1999 that motorcycle manufacturing really boomed in Vietnam with the penetration of the Vietnamese motorcycle assemblers in the low-priced motorcycle market segment. These newly born assemblers, whose number reached to 54 in 2000, started their business by importing component parts from China and assembling in Vietnam. They even took more than 70% market share in 2001.



Source: Ministry of Industry, Ministry of Policy of Vietnam (unpublished data)

Figure 3: Sales of New Motorcycles in Vietnam

The emergence of the motorcycle industry of Vietnam is known as "Chinese shock" due to the expansion of the Chinese component motorcycles. After the Vietnamese government heightens the localization rate requirement since 2000, component part production, particularly for non-engine part, has been developed in Vietnam. The "Chinese shock" was over after Honda enlarged its local supply network, modularized its production system and regained the market share since 2002 (Pham, 2005). Foreign invested assemblers, particularly the Japanese ones, come back to penetrate the market. A number of Vietnamese domestic assemblers gradually withdrew from the market while several others continue to develop.



Source: created by the authors based on interviews and Pham (2005).

Figure 4: Different Supplier-assembler Networks in the Vietnam’s Motorcycle Industry

The mix of different supplier-assembler networks in the Vietnam’s motorcycle industry can be seen clearly since 1999, when the supply networks of Vietnamese domestic assemblers were formed (Figure 4). Supply networks of the different assemblers are sorted into two groups. The Japanese motorcycle assemblers in Vietnam (Honda, Yamaha, and Suzuki at some level) have built embedded supplier-assembler networks. In contrast, supplier-assembler networks of the local Vietnamese motorcycle assemblers are arm-length. The same structure of network exists in Taiwanese invested VMEP Company although this company has created its own supplier network since long time with the participation of Taiwanese invested suppliers (Pham, 2005).

The brisk development of the Vietnam’s motorcycle industry has challenged suppliers to have an efficient strategy to exploit resource from supplier-assembler networks for improving capabilities. The following session analyzes case studies of five suppliers in the Vietnam’s motorcycle industry to explore the effects of the network structures to the capability improvement of the suppliers.

4. Methodology

Case studies of five suppliers in the Vietnam’s motorcycle industry are provided to test the

propositions proposed in Session two. (For more details on this method, see Yin, 1994). Forty eight in-depth interviews (including repeated interviews) with managers of these suppliers, of the Japanese motorcycle assemblers in Vietnam and local Vietnamese assemblers were carried out from September 2004 to March 2006. Each interview lasted from 90 to 150 minutes, including factory visits. Five suppliers were chosen from six groups of the suppliers.

The suppliers in Keiretsu and out of Keiretsu (but in the Japanese companies' Kyoroyukukai 2) have been taken out of the analysis because they are affiliates of abroad suppliers, who have possessed matured capabilities. Most of capabilities of these suppliers are transferred from their headquarters. The Taiwanese suppliers, whose headquarters are newly emerged and are being in the processes of accumulating capabilities, have not been dropped out. Moreover, for the purpose of time-scale analysis, Chinese invested suppliers have not been taken into account because most of them came to Vietnam since 2001 or 2002.

Table 2: Summaries of Five Suppliers' Profile

	Co. A	Co. B	Co. C	Co. D	Co. E
Nationality	Vietnamese	Vietnamese	Vietnamese	Vietnamese	Taiwanese
Establishment	1968	1969	1974	1967	1994 (in Vietnam)
Entrance	1994	1997	2000	1995	1994 (in Vietnam)
Labor	850	2000	400	350	1200
Motorcycle related products (and share of different customers in the firm's sales)	– Engine gear-wheel, shaft (Honda 35%, Yamaha 15%, Suzuki 15%, other first-tier suppliers 15%)	– Frame parts (for Honda 30%); – Muffler (Suzuki, Yamaha) – Rim (domestics)	– Rollers, handle shaft (Honda 30%) – Rollers, clutch (Domestics 10%)	– Cylinder, engine related parts, other parts	– Rear forks, main stand, handle pipe comp., pedal comp., fuel tank comp., rim... (Yamaha, Suzuki) – Fuel tank comp., bracket, frame comp., rim (VMEP) – Rear carrier (Honda), brake comp., (Nissin)
Other products (and their share in the firm's sales)	– Agriculture used machines, piston ring, and piston pin (20%)	– Home used metal ware (60%)	– Bolt-bearing (30%) – Gear box (30%)	No	– 4-wheel motorcycle (OEM production) – Spring house (export) – Consuming products
Relationship with FDI assemblers	VMEP (1994) Honda (1998), others (later)	Honda (1997), others (later)	Honda (2003), others (later)	Taiwanese VMEP (1994)	Taiwanese VMEP (1995), Suzuki (1996), Yamaha (2000), Honda (2001)
Relationship with domestic assemblers	No	2001	2000	1998	2001
Other non-motorcycle customers (products)	Japanese companies (Kubota)	Sweden home-used products (OEM)	Domestic consumers (other products)	No	Plastic components

2) *Kyoroyukukai* is Japanese style subcontracting and production system (*shitaue seisan sisutemu*), organized in both integral (*suichokuteki*) and pyramidal structures. Under this system, suppliers and the core producer cooperate as if they constituted one organization. *Keiretsu* is defined as a collection of Japanese enterprises with a long-term mutual relationship and inter-dependence in capital and technology. This study uses the capital holding relationship to determine whether a firm belongs to *keiretsu*. (See more Pham, 2005)

Four of the five case studies are Vietnamese companies. All of them have decades of development in mechanical industry and established in 1960s, 1970s. Companies A, B, C are state-owned, with the labors of 850, 2000 and 400 people, respectively. They inherit large investments of the government and well-training labors, particularly during 1960s-1980s, before Vietnam switches to market economy. Companies A and B are Honda Vietnam Company's suppliers as soon as Honda started operating in Vietnam in 1997 and 1998. They also became the suppliers of Yamaha and Suzuki in Vietnam. Company C participated in the industry since 2000 and set up the relationships with the Japanese assemblers since 2003. Company D is a private company, has 350 labors and is the earliest company entering the motorcycle component production industry since 1960s when the company was a small repairing workshop. Recently, the products of this company are mainly for motorcycle repairing market and it has never had any subcontracting relation with the Japanese assemblers.

Company E is Taiwanese, invested in Vietnam since 1994. With 1200 workers, this affiliate in Vietnam is even bigger than its headquarters in Taiwan. The company started its subcontracting business with Taiwanese VMEP in 1994 and then Suzuki, Yamaha and Honda in Vietnam and started selling components to local assemblers since 2001. Although all products (components) of these five companies are metal ware, company A produces more engine related components than companies B, C and E. Following are companies B and E. Meanwhile, company D produces various components.

Two dimensions are used in the case analysis. The first is subcontracting relationship and its effects on capability improvement of suppliers. Further evaluation of performance (cost, product quality, delivery and lead-time of new product development) is used to make clear the process of improving capabilities. The second dimension is time-scale, due to the accumulation of capabilities in firms. Effects of supplier-assembler networks are examined in four stages of development of the motorcycle industry in Vietnam: before 1998, 1998-2001, 2002-2003 and since 2003.

5. Case Analysis

Since 1998 (and since 2000 for Company C), the five investigated suppliers have improved their capabilities remarkably by the evaluation of themselves and by the evaluation of the assemblers in the Vietnam's motorcycle industry. However, which capability and how much they can improve are depended on which assemblers they deal with and how they retain these subcontracting relationships. Based on relationship with kind of assemblers (i.e. kind of network) three groups

of suppliers are categorized.

Group one includes suppliers having subcontracting with the Japanese motorcycle assemblers, it means, belonging to the embedded networks. Company A³⁾ (since 1998) and company B (before 2002) are in this group. These two suppliers started subcontracting with Honda Vietnam Company (HVN) since 1997 and 1998. In the beginning, they received full supports from Honda through groups of dispatching engineers who brought structure designs (with technical drawings) to the suppliers and assisted them to design production process. These engineers were staying for several months in the suppliers to control the production processes, to transfer knowledge related to production process maintenance and delivery control until "the companies can get the standard of Honda" (quoted from interview with HVN). After these long-term visits, HVN needs only short frequent visits, which last for one or two hours for every month, and longer time visits for cooperating in solving trouble if it occurs. In 2002, when HVN ordered the new components, it sent only one engineer for each of these two suppliers and the engineers stayed for one or two weeks.

The improvement of process design, process setting, process maintenance, and delivery control capabilities has been appreciated by HVN. "Before working with us, factory B is really untidy and unclean...With such a factory, it could not manage quality or delivery. But the factory is really good now" (quoted from interview with HVN). The managers of companies A and B said that "we can learn a lot about setting up the factory, about 5S, about making production plan and checking quality" (quoted from interview with Company B); "we can improve our factory remarkably, improve quality and delivery" (quoted from interview with Company A). However, up to now (for Company A) and up to 2002 (for Company B, when it started dealing with local assemblers), the two suppliers have not had designing capabilities. These two suppliers receive designing drawings (white and blue drawings) from Japanese companies like HVN.

Group two includes suppliers dealing with the local Vietnamese (and/or Taiwanese) assemblers (Company D, Company C before 2003, company E before 1998). These suppliers belong to arm-length networks. Different from suppliers in group one, those in group two need to have capability of designing when they enter motorcycle supplying industry and deal with the local Vietnamese and Taiwanese assemblers. This capability enables the firms to carry out *reverse engineering* through which they reversely design drawings from existing components, and then

3) Although Company A had subcontracting relationship with the Taiwanese VMEP since 1994, the component provided to VMEP was not a new product to the supplier. Moreover, the subcontracting volume was "too small and take a tiny ratio in the company's sales". This subcontracting "drew a little attention of the company and had unremarkable effect on the company" (quoted from the interview with Company A).

manufacture imitating components. Although the suppliers in group two do not have function designing capability, they have structure and particularly process designing capabilities independently.

For the case of company E (Taiwanese), the capabilities are transferred from the headquarters in Taiwan. For the Vietnamese suppliers, designing related capabilities are accumulated by purchasing machinery from manufacturers in China and Taiwan, and diffusing technologies from these manufacturers. Upstream capabilities are also developed internally such as in the case of company C. For years of developing new (imitating) products by themselves, these suppliers can complete re-designing and preparing for production of a new product in 2-3 months after receiving the sample of the component. However, downstream capabilities are improved slowly in the cases of the suppliers in group two. These suppliers can produce with low cost but it is mainly because of the use of low quality materials. Quality and delivery are lowly evaluated by assemblers. "They can not keep their quality", "quality of the first 500 units is alright, but the next 500 units or 30.000 units are really low", "to prepare for peak season, we need to buy components for several months before" (quoted from interview with domestic assemblers) are the common comments of local assemblers to suppliers in group two.

These comments reduce recently not because of any remarkable improvement of the suppliers but because a lot of suppliers in group two are moving to group three (dealing with both arm-length and embedded networks) like company C and E. The situation is worse in company D, when it cannot involve in any embedded network. The company gradually loses their customers as assemblers and return partly to repairing market. Dealing with arm-length networks limits the suppliers to improve downstream capabilities.

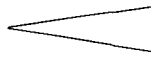
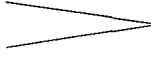
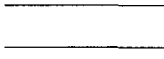
Group three includes suppliers dealing with both the local and Taiwanese assemblers, and the Japanese assemblers. It means that these suppliers involve in both arm-length and embedded networks. We can see the cases of company B (since 2002), company C (since 2003) and company E (since 1998) in this group. With the history of having subcontracting relationship with assemblers in arm-length or embedded networks, the suppliers in group three had only good upstream or downstream capabilities respectively. By setting up relationship with the other kind of network, the suppliers can improve capabilities entirely. Company B, for example, has strongly invested in Project Department since 2000 to research and develop a new product (rim) to supply to the local assemblers. It took nearly two years with a lot of trial-and-error until this product can successfully be developed. As a result, the capability of this project department was improved significantly and the company can develop other new products.

Above situation can also be seen in company E. The company is able to develop various

products for the arm-length networks in Vietnam. It also produces OEM motorcycles for overseas markets and quickly fulfilled QCD (quality, cost, delivery) requirements of HVN in 2002.

Company C also had many customers as domestic assemblers before subcontracting with Honda since 2003. The company had accumulated the capability to develop many (imitating) components. But production and delivery related capabilities were low. The manager of Company C said that "having relationship with local domestic assemblers made our workers worse because they were familiar with producing low-quality products and had too bad habit and attitude to produce a good product". Since 2003, "getting subcontracting relationship with HVN, we can learn a lot about quality and delivery management" and "we know that our production process still have a lot of problem...We are receiving a lot of comments of HVN and researching to improve our system" (quoted from interview with Company C). Receiving helps and knowledge transferred from HVN, the company has reached the QCD requirement of Honda in 2003 and then that of Japanese suppliers of HVN and Yamaha Vietnam companies. Improving entirely capabilities allowed the suppliers to meet new customers since the assemblers in one kind of network require the similar capabilities of suppliers. That is why the suppliers in group three could rapidly enlarge their markets and respond to the assemblers' diversified requirements.

Table 3: Capabilities Improvement in Five Suppliers in Different Periods

	Network	(Capabilities)	
		Upstream	Downstream
Co. A (from 1998) Co. B (before 2002)	Embedded only		
Co. D Co. C (before 2003) Co. E (before 1998)	Arm-length only		
Co. E (from 1998) Co. B (from 2002) Co. C (from 2003)	Both embedded and arm-length		

6. Conclusion

Five case studies of the suppliers in the newly emerging Vietnam's motorcycle industry provide evidences supporting the propositions in Session two. Different to suppliers in oldest emerging or developed economies, suppliers in newly emerging economies have limited capabilities and they need to select the way to improve their capabilities. The emergence of late-coming assemblers

creates more chance for suppliers to find suitable customers and to enter the industry. Suppliers in newly emerging economies have more choices to improve capabilities by exploiting different supplier-assembler networks. Arm-length networks tend to have more effects on improving upstream capabilities (structure design, process design), which are related to designing function. Embedded networks, on the other hand, support significantly suppliers in improving production related downstream capabilities (process design, process setup, process maintenance and delivery control).

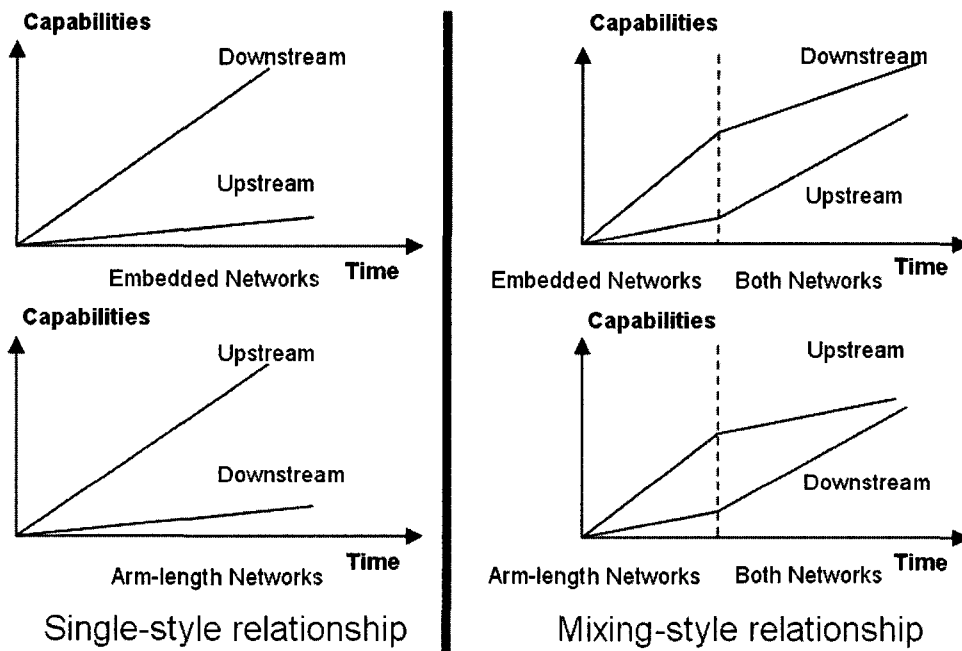


Figure 5: Two Patterns of Capability Improvement of Suppliers in the Newly Emerging Vietnam's Motorcycle Industry

The case studies of suppliers in the newly emerging Vietnam's motorcycle industry also propose two patterns of capability improvement of suppliers in newly emerging economies. In the first pattern, suppliers involve in only one kind of production system, either arm-length or embedded. Using this pattern of development, suppliers can develop different capabilities asymmetrically. However, they are slow in reacting against the changes in business environment of newly emerging economies. Following this pattern reduces the ability of suppliers to meet new customers' requirements.

Switching dynamically from involving in one kind to two kinds of production system is

the other pattern of capability improvement of suppliers. Advantage of this pattern is that it allows suppliers to improve both upstream and downstream capabilities symmetrically and to meet different customers' needs. Following this pattern of capability improvement, suppliers need to have long-term strategy. Case studies show the strong orientations to long-term development of top managers of the suppliers.

7. Discussions and Implications

Nowadays business environment has been changing under the effects of globalization and regional integration. The development of oldest emerging economies makes competition fiercer with more diversified production systems. In this new condition, suppliers in newly emerging economies have more chance to enter newly formed industries with different patterns of exploiting supplier-assembler networks. They can engage to embedded networks of several foreign invested assemblers or participate in arm-length networks created by other foreign or even newly coming local assemblers. In short term, suppliers in newly emerging economies can participate in the industry without close inter-firm relationship with foreign assemblers.

However, capabilities of firms are diversified and developed in cycle-style. Due to the limit of resource, when a firm gets an acceptable level of a capability, it will change its focus and reserve resources for improving other capabilities. It will turn back to improve the previous capability when the other capabilities have reached to a new acceptable level. Since each kind of inter-firm network (arm-length or embedded) has more effects on a group of capability, firms need to have a strategy for setting and changing inter-firm relations efficiently. Deciding which capabilities to improve in each stage of development is one part of company strategy.

Supplier-assembler network can be regarded as the market's factor affecting the capability improvement process of suppliers. Besides, the case studies of the suppliers in the Vietnam's motorcycle industry also showed other non-market factors. Embedded network is known to have significant effects on the capability improvement of suppliers, particularly capability related to tacit knowledge (Reagans and McEvily, 2003). But it is not the exclusive source. Joint venture and alliance between companies, for example, are also the important sources of tacit knowledge transferred. Effects of these sources are observed in the cases of companies B and C. In company B, knowledge diffused from its joint venture with a Japanese company helped it to develop new product successfully. In company C, the new general manager who come from company A (company A and C are in the same state-run corporation) has brought a lot of tacit knowledge

to company C. With this knowledge, a new strategy has been created since 2001 targeting at relationship with HVN. Before gaining relationship with HVN, the new manager has already navigated the company toward improving downstream capabilities to orientate to the requirement of Honda. In company E, knowledge resource from headquarters also plays the important role in the process to develop downstream technology.

Several implications can be seen from this study. Understanding the effects of different kinds of network, firms in newly emerging economies may have more effective strategy to access the relationship with their customers and build more effective internal organization to absorb different knowledge. Other implications are also for policy makers. While technology from other countries is the critical source of technology for newly emerging economies, the governments of these countries must have an efficient way to encourage foreign firms to transfer their technologies to the countries. Since firms in different foreign countries have different production systems that have different effects to the capability improvement of local firms, the policy maker need to have different strategy orienting to different countries and firms. This study suggests the policy maker better understanding on the needs and effects of different firms and their production systems, supports the process of making short-term and long-term policies.

This study still has several limitations. First, although motorcycle industry in Vietnam is a typical newly emerging industry which includes diversified firms from different economic areas and shows clearly the effects of globalization and regional integration, the analysis of a unique industry in this study limits a clear understanding of the effects of industry and product's characteristics. It may also lead to the bias of one industry.

Secondly, this study mentions mainly to only two main factors of globalization and regional integration in present business environment, but not other institutional factors such as government policy, country's geographic position or the country's technological capabilities. These factors may have many effects on the formation and development of an industry in a country or region as well as capability building of firms (Humphrey et al., 2000; Lall, 1992; Mahmood and Singh, 2003). Patterns and processes of the capability improvement of suppliers in newly emerging economies explored in this paper also suggest further studies on firm's organization to efficiently absorb different sources of technology.

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References

- Asanuma, B. (1989), "Manufacturer-Supplier Relationships in Japan and the Concept of Relation-Specific Skill", *Journal of the Japanese and International Economies*, Vol. 3, pp. 1-30.
- Baldwin, Y. C. and Clark, B. K. (1997), "Managing in an Age of Modularity", *Harvard Business Review*, September-October, pp. 84-93.
- Barney, J. (1991), "Firm Resource and Sustainable Competitive Advantage", *Journal of Management*, Vol. 17, No. 1, pp. 99-120.
- Bartlett, A. C. and Ghoshal, S. (1989), *Managing Across Border*, Harvard Business School Press.
- Beckman, M. C. and Haunschild, P. R. (2002), "Network Learning: The Effects of Partners' Heterogeneity of Experience on Corporate Acquisitions", *Administrative Science Quarterly*, Vol. 47, pp. 92-124.
- Clark, B. K. and Fujimoto, T. (1991), *Product Development Performance-Strategy, Organization and Management in the World Auto Industry*, Harvard Business School Press.
- Costa, I. and Reis de Queiroz, S. R. (2002), "Foreign Direct Investment and Technological Capabilities in Brazilian Industry", *Research Policy*, Vol. 31, pp. 1431-1443.
- Cusumano, A. M. and Takeishi, A. (1991), "Supplier Relations and Management: A Survey of Japanese, Japanese-transplant and U.S. Auto Plants", *Strategic Management Journal*, Vol. 12, pp. 563-588.
- Dunning, H. J. (1998), "Location and the Multinational Enterprise: A Neglected Factor?", *Journal of International Business Studies*, Vol. 29, No. 1 (first quarter), pp. 45-66.
- Dyer, H. J. (1997), "Effective Inter-firm Collaboration: How Firm Minimize Transaction Value", *Strategic Management Journal*, Vol. 18, No. 7, pp. 535-556.
- Dyer, H. J. and Singh, H. (1998), "The Relational View: Cooperative Strategy and Source of Inter-organizational Competitive Advantage", *Academy of Management Review*, Vol. 23, No. 4, pp. 660-679.
- Dyer, H. J. and Ouchi, R. G. (1993), "Japanese-Style Partnerships: Giving Companies a Competitive Edge", *Sloan Management Review*, Fall, pp. 51-63.
- Fujimoto, T. (2004), *Nihon no Mono Tsukuri Tetsugaku* (Philosophy of Japanese Manufacturing Industry), Nihon Keizai Shinbunsha (in Japanese).
- Fujimoto, T. (1997), *Seisan Sisutemu no Henka Ron* (Evolutionary Theory of Production System), Yuhikaku (in Japanese).
- Helper, R. S. (1991), "How Much Has Really Changed Between U.S. Auto-makers and Their Suppliers?", *Sloan Management Review*, pp. 15-29.
- Helper, R. S. and Sako, M. (1995), "Supplier Relations in Japan and the United States: Are They Converging?", *Sloan Management Review*, pp. 77-84.
- Hippel, V. E. (1994), "Sticky Information and the Locus of Problem Solving: Implications for Innovation", *Management Science*, Vol. 40, No. 4, pp. 429-439.
- Hobday, M. (1995), "East Asian Latecomer Firms: Learning the Technology of Electronics", *World Development*, Vol. 23, No. 7, pp. 1171-1193.
- Hoskisson, E. R., Eden, L., Lau, C. M. and Wright, M. (2000), "Strategy in Emerging Economy", *Academy of Management Journal*, Vol. 43, No. 3, pp. 249-267.
- Humphrey, J., Lecler, Y. and Selerno, M. S. (2000), *Global Strategies and Local Realities*, Macmillan Press.

- Ivarsson, I. and Alvstam, C. G. (2005), "Technology Transfer from TNCs to Local Suppliers in Developing Countries: A Study of AB Volvo's Truck and Bus Plans in Brazil, China, India and Mexico", *World Development*, Vol. 33, No. 8, pp. 1325-1344.
- Katsu, H. and Fujimoto, T. (2005), "Giji Opun Akitekucha to Gijutsu Teki Rokkuin" (Quasi Open Architecture and Technological Lock-in), in Takahiro Hujimoto and Junjiro Shintaku (eds), *Chuugoku Seizogyo no Akitekucha Bunseki (Architecture-based Analysis of Chinese Manufacturing Industries)*, Toyokeizai Shihousha (in Japanese).
- Kim, Lisun (2001), "The Dynamics of Technological Learning in Industrialization", *International Social Science Journal*, Vol. 53, No. 168, pp. 297-308.
- Kim, Y. and Lee, B. (2002), "Patterns of Technological Learning among the Strategic Groups in the Korean Electronic Parts Industry", *Research Policy*, Vol. 31, pp. 543-567.
- Kohno, Y. (2002), "Jidousha Buhin Torihiki no Nettowaku Kouzou to Sapuraiya no Pafomansu" (Structure of Networks of Automobile Outsourcing and Suppliers' Performance), *Soshiki Gakkai (Academy of Organization)*, Vol. 35, No. 3, pp. 83-100 (in Japanese).
- Kotha, S. (1995), "Mass customization: Implementing the Emerging Paradigm for Competitive Advantage", *Strategic Management Journal*, Vol. 16, pp. 21-42.
- Kreinkrai, T. and Thamavit, T. (2004), "Historical Development of Supporting Industries: A Perspective from Thailand", *Annual Report of Industrial Research Institute*, Obirin University.
- Lall, S. (1992), "Technological Capabilities and Industrialization", *World Development*, Vol. 20, No. 2, pp. 165-186.
- Langlois, N. R. and Robertson, L. P. (1992), "Networks and Innovation in a Modular System: Lessons from the Microcomputer and Stereo Component Industries", *Research Policy*, Vol. 21, pp. 297-313.
- MacDuffie, J. P. and Helper, R. S. (2006), "Collaboration in Supply Chains: With and Without Trust", in Charles Heckscher and Paul S. Adler (eds), *The Firm as a Collaborative Community: Reconstructing Trust in the Knowledge Economy*, Oxford University Press.
- Mahmood, P. I. and Singh, J. (2003), "Technological Dynamics in Asia", *Research Policy*, Vol. 32, pp. 1031-1054.
- Martin, X., Mitchell, W. and Swaminathan, A. (1995), "Recreating and Extending Japanese Automobile Buyer-Supplier Link in North America", *Strategic Management Journal*, Vol. 16, pp. 589-619.
- Matsuoka, K. (2002), "Chugoku Otobai Meka no Torihiki Kankei" (Motorcycle Component Purchasing Relationship in Chinese Motorcycle Manufacturers), *Ryukoku Daigaku Keizai Gaku Ronshu (Annals of Economics Faculty of Ryukoku University)*, Vol. 42, No. 1, pp. 63-83 (in Japanese).
- Nishiguchi, T. (1994), *Strategic Industrial Sourcing*, Oxford University Press.
- Nobeoka, K. (1996), "Koukyaku Hani no Keizai: Jidousha Buhin Sapuraiya no Koukyaku Nettowaku Senryaku to Kigyuu Seika" (The Influence of Customer Scope on Supplier's Performance in the Japanese Automobile Industry), *Kokumin Keizai Zassi (Journal of National Economy)*, Vol. 173, No. 6, pp. 58-72 (in Japanese).
- Nobeoka, K. (1999), "Nihon Jidousha Sangyou ni Okeru Buhin Choutatsu Kouzou no Henka" (Change in Structure of Subcontracting in Japanese Automobile Industry), *Kokumin Keizai Zassi (Journal of National Economy)*, Vol. 180, No. 3, pp. 57-69 (in Japanese).
- Ohara, M. (2001), "Chugoku Otobai Sangyo no Sapuraiya Sysutemu" (Supplier System of the Chinese Motorcycle Industry), *Azia Keizai (Asian Economy)*, Vol. 42, No. 4, pp. 2-38 (in Japanese).
- Ohno, K. (2005), "Designing a Comprehensive and Realistic Industrial Strategy", in Kenichi Ohno and Nguyen Van Thuong (eds), *Improving Industrial Policy Formulation*, The Publishing House of Political Theory, pp. 1-28.
- Okada, A. (2004), "Skills Development and Inter-firm Learning Linkages under Globalization: Lesson from Indian Automotive Industry", *World Development*, Vol. 32, No. 7, pp. 1265-1288.
- Pham, T. H. (2004), "The Evolution of Business Architecture and the Chances for Vietnamese Enterprises:

- The Case of the Vietnamese Motorcycle Industry", *Economics and Development*, Vol. 16, December, pp. 28-33.
- Pham, T. H. (2005), "The Competition and Evolution of Business Architecture: The Case of Vietnam's Motorcycle Industry", in Kenichi Ohno and Nguyen Van Thuong (eds), *Improving Industrial Policy Formulation*, The Publishing House of Political Theory, pp. 235-266.
- Pittaway, L. et al. (2004), "Networking and Innovation: A Systematic Review of the Evidence", *International Journal of Management Reviews*, Vol. 5/6, Issue 3&4, pp. 137-168.
- Prahalad, C. K. and Hamel, G. (1990), "The Core Competence of the Corporation", *Harvard Business Review*, May-June 1990, pp. 79-91.
- Reagans, R. and McEvily, B. (2003), "Network Structure and Knowledge Transfer: The Effects of Cohension and Range", *Administrative Science Quarterly*, Vol. 48, pp. 240-267.
- Sanchez, R. (1996), "Modularity, Flexibility, and Knowledge Management in Production and Organization Design", *Strategic Management Journal*, Vol. 17, Winter Special Issue, pp. 63-76.
- Shusa, Y. (1998), "Higashi Azia Nikkei Kigyuu ni Okeru Gijutsu Iken" (Technology Transfer in Japanese-Affiliated Firms in East Asia), *Yokohama Keiei Kenkyu (Journal of Yokohama Business Research)*, Vol. XIX, No. 2, pp. 39-52 (in Japanese).
- Sugiyama, Y. and Otahara, J. (2002), "Chugoku Kigyo no Kyosoryoku to Seihin Akitekucha" (Competitiveness and Product Architecture of Chinese Enterprises), *Akamon Bijinesu Rebyu (Akamon Business Review)*, Vol. 1, No. 8, pp. 625-632 (in Japanese).
- Teece, J. D., Pisano, G. and Shuen, A. (1997), "Dynamic Capacities and Strategic Management", *Strategic Management Journal*, Vol. 18, No. 7, pp. 509-533.
- Teece, J. D. (2000), "Strategies for Managing Knowledge Assets: The Role of Firm Structure and Industrial Context", *Long Range Planning*, Vol. 33, pp. 35-54.
- Ulrich, K. (1995), "The Role of Product Architecture in the Manufacturing Firm", *Research Policy*, Vol. 24, pp. 419-440.
- Wernerfelt, B. (1984), "A Resource-based View of the Firm", *Strategic Management Journal*, Vol. 5, pp. 171-180.
- Williamson, E. O. (1985), *The Economic Institutions of Capitalism*, The Free Press.
- Womark, J. P., Jones, D. and Roos, D. (eds.) (1990), *The Machine That Changed the World*, New York: Rawson Associates.
- Wright, M. et al. (2005), "Strategy Research in Emerging Economies: Challenging the Conventional Wisdom", *Journal of Management Studies*, Vol. 42, No. 1, pp. 1- 33.
- Xie, W. and Wu, G. (2003), "Differences between Learning Processes in Small Tigers and Large Dragons: Learning Process of Two Color TV (CTV) Firms within China", *Research Policy*, Vol. 32, pp. 1463-1479.
- Yin, K. R. (1994), "Case Study Research", *Design and Methods*, Second Edition, Sage Publications.