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Keiretsu and Its Breakdown in Japanese Automotive Industry

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自動車産業における系列とその崩壊

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日本の自動車産業は、実際のところ戦後成立した産業であり、そして世界的に大きく飛躍を遂げた産業といえることができる。日本経済そのものの成功とあいまって、こうした自動車産業の成功の要因を、日本独自の社会生産システムに求める研究が多くなされてきた。これらの研究の中で、自動車産業における日本独自の社会生産システムとして挙げられたのが、系列システムといえることができる。

現在、自動車産業における系列システムは崩壊の危機に直面しているとの報道が多くなされている。系列システムを日本独自の社会生産システムとして位置付ける場合、その崩壊は日本経済の基本的制度の変化を示していると考えるのが妥当であろう。本研究の目的は、日本自動車産業における系列システムの成立、特徴、崩壊の原因を整理し、日本経済の制度的な側面を再考することにある。

INTRODUCTION

The production of automobile in Japan has been increased successfully since the early 1960's. In the early 1980's, automobile production in Japan surpassed that in the U.S. and Japan became the number one in the world in the automobile production. And passenger car production which was less than 200,000 units in 1960 grew with a reach of 10 million in 1990. Clearly the growth of automotive industry in Japan coincided with her industrial success of postwar period and constituted an important part of it. As a result, the automotive industry in Japan like her post-war economy has drawn the scholastic as well as journalistic interests from all over the world. Essentially the main interest of theirs is whether there were any secrets involved in the success

Key words; Japan, Automotive Industry, Keiretsu, Breakdown, Institution

of Japanese automotive industry as well as the economy as a whole.

Today the variety of each car including options has increased in order to meet with customer needs and tastes. The variety is estimated to reach 4,000 to 5,000 in case of mass production car while a number of parts used in a car also increases over 20,000. Also each production line is designed to output one car every 50 to 60 seconds and several different models of cars at the same time. Engineering technologies involved in manufacturing cars have been getting increasingly complex. In addition the automotive industry in the world has been surrounded by such socio-technological issues as "environment" and "conservation" since the early 1970's. So it can be said that the technological challenges all the automobile assemblers has been facing are enormous and complex. In other words, each assembler has to respond to it efficiently and economically while meeting the market demand.

During the 1970's the Japanese automotive assemblers have entered into the world market with more efficient system of new car development and production than the U.S. or European counterparts. A well known fact is that the efficiency of the Japanese automotive industry has been based upon such systems as *dezain-in* (*design-in*) and *kanban*, which in turn have assumed the extensive use of a larger number of auto parts suppliers with high engineering capability. In order to increase the efficiency, these auto parts suppliers are organized pyramidal or hierarchically and in turn all the subcontracting relations converge into a several assemblers. Such an industrial organization covering the Japanese automotive industry is identified uniquely Japanese and called *keiretsu*. Though often criticized in terms of exclusiveness, thus, *keiretsu* has been considered as a source of efficiency as well as competitiveness of the Japanese automotive industry.

However, the Japanese newspapers began reporting the breakdown of *keiretsu* since the early 1990's. It is widely known that the cross procurement between *keiretsu* of two largest automobile assemblers, TOYOTA and NISSAN, had been "taboo" for a long time. According to the newspaper reports, NISSAN has been increasing parts procurement from some suppliers of the TOYOTA *keiretsu*, while TOYOTA began promoting its *keiretsu* suppliers to increase their sales to automobile assemblers other than TOYOTA itself.⁽¹⁾ The breakdown of *keiretsu* means that the automotive industry and moreover Japanese economy can not deal with surrounding conditions by *keiretsu* and in turn have to replace *keiretsu* with other types of industrial organization. In this sense, it may not be overstated that the breakdown of *keiretsu* in Japanese automotive industry means the institutional changes of the Japanese economy.

Given changing surroundings, the purpose of this paper is to discuss the implication of *keire-*

tsu breakdown for the Japanese economy. For the purpose, the paper is written as follows: In Chapter One, the development of high engineering capability among the auto parts suppliers and pyramidal organization of the industry is discussed in relation to government policies and the assemblers' strategies in the postwar period. In Chapter Two, the characteristics of *keiretsu* is discussed in terms of structure, in contrast to the U.S. industry, and from the viewpoint of economic theory. In Chapter Three, the breakdown of *keiretsu* is discussed in terms of cause and effect.

Chapter One: Postwar Development of *Keiretsu*

In contrast to the U.S. the Japanese case shows that the assemblers like TOYOTA and NISSAN utilize the suppliers mostly organized as *keiretsu* extensively. It is often mentioned that this heavy use of the suppliers has been assuming their possession of high engineering capability. Then the questions are why the automotive parts suppliers have developed their engineering capability and in turn why they have been organized into *keiretsu*. The purpose of this chapter is to answer the question through the historical analysis on government policies for the industry and the assemblers' attitude toward their suppliers.

1-1 Government Policy for Automotive Industry

Before the war the Japanese government protected and fostered automobile assemblers because of her lacking an industrial base for machinery. Accordingly the automotive parts industry was founded with the establishment of automotive assemblers and the industry developed as a result of their growth. In other words, the auto parts industry grew indirectly through the government policy to foster the automobile assemblers. The company like Bridgestone, Riken Piston Ring, Nihon Radiator, and Nihon Kika, which have grown successfully and became well known parts suppliers today, began their parts manufacturing during this period.

Though there were interruptions because of the country's war effort, it can be said that the government policy remained basically the same even after the war. The government aim was to develop the automotive industry including its suppliers which was severely damaged by the country's war effort. As the development of auto parts suppliers naturally followed that of automobile assemblers, the government first introduced industrial policy for the assemblers and then for the suppliers.

The rationalization policy for the automobile assemblers had been introduced by 1951, and it

was considered consisting of three aims as follows:⁽²⁾

- 1) Domestic manufacturers would be protected from direct investment by foreign firms and from imports of foreign vehicles.
- 2) Domestic manufacturers would be permitted to import foreign technology under favorable terms.
- 3) The government would provide financial assistance.

So basically the government aims were considered the same for the automotive parts industry.

Accordingly the government introduced the same comprehensive rationalization policy, namely, the Law on Temporary Measures for Promoting Machine Industry in 1956 which is better known as Machine Industry Law. The auto parts industry was selected as one of the 17 industries subject to this Machine Industry Law. The aim of the law was to build rational production system with modernizing facilities, promoting exports, developing new technologies, and setting overall raw material policies. The main measure to promote the law's aim was low-interest loan provided by the Japan Development Bank and the Small Business Finance Corporation.⁽³⁾

In addition, the automotive industry first in 1951 and the auto parts industry in 1956 became industries were designated under Article 6 of the Enterprise Rationalization Promotion Law. Accordingly import tariff exemption were made available for equipment essential for the principle manufacturing processes and technology imports were approved to overcome the quality and cost disadvantages.⁽⁴⁾

Making all these measures available to them, the government explicitly stated its aim to modernize or rationalize auto parts suppliers for lowering cost and improving quality to the international level. For its aim the government intervened directly the business of auto parts suppliers on three points as follows:

- 1) Product ranges the parts suppliers should manufacture;
- 2) Machinery the parts suppliers should import; and
- 3) Technologies the parts suppliers should license.

As its name indicates the Machine Industry Law had a time limited of 5 years. Since its enactment of 1956, the law was revised and extended twice in 1961 and in 1966, but all the measures related to the law were halted with capital liberalization of 1971. It is thus said that "protection and promotion of the auto industry effectively came to an end at that time."⁽⁵⁾

1-2 Industrial Structure and Assembler's Promotion Plan

The government aim was to improve the auto parts suppliers in Japan to the international

level, especially, that of the U.S. Moreover, it planned clearly to raise the suppliers independent from the assemblers in terms of management and technology and to separate their productions completely from those of the assemblers. The division of labor between the assemblers and the suppliers the government planned to promote should have been characterized horizontal rather than vertical. In other words, the government did not plan to foster *keiretsu* in the automotive industry.

While the government tried to foster independent auto parts suppliers like counterparts in the U.S., the assemblers asked them rationalization of auto parts manufacturing and strengthened business ties with them by sending personnel, providing technology and facilities, arranging necessary capital investment money, and capital participation. There are three reasons why TOYOTA and NISSAN recruited the suppliers during the mid-1950's rather than increasing the levels of vertical integration as follows:⁽⁶⁾

- 1) to avoid the capital expenditures necessary to produce a wider variety of components in large quantities;
- 2) to reduce risk by maintaining low factory capacity in case of sales for the industry slumped; and
- 3) to take advantage of the wage scales in smaller firms.

During the 1960's when the real motorization began in Japan the assemblers had to deal with two tasks: One is the rapid progress of motorization, and the other is the market liberalization for foreign capital. For both tasks they organized and fostered good auto parts suppliers as their *keiretsu* while they concentrated their orders to a few number of suppliers. At the same time the assemblers changed delivery method from single parts delivery (single parts supplied by subcontractors are assembled and then installed to the automobile by the assemblers) to unit part delivery (single parts are assembled by subcontractors and delivered to the assemblers for installation). By doing so they intended to secure the supply of quality auto parts necessary for their increasing production of quality automobiles and increase the efficiency of automobile assembly in order to deal with soon coming international competition. Through these the auto parts suppliers were screened out to primary subcontractors with which the assemblers directly deal and others which were organized under the primaries. In other words, the assemblers intentionally organized the suppliers pyramidal or into *keiretsu*.

In 1962 the passenger car industry became eligible for "organizational development" loan from Japan Development Bank, though actual loans were started from 1963. This loan was intended to establish mass production of passenger car in order to achieve scale merit and in turn to sup-

port explicitly mergers and tie-ups of the assemblers centered around TOYOTA and NISSAN. But this also gave an opportunity for both assemblers to organize the auto parts suppliers around them and, in turns, into *keiretsu*. It can be thus said that contrary to its aim the government helped TOYOTA and NISSAN to organize auto parts suppliers into their *keiretsu*.

Chapter Two: Characteristics of *Keiretsu*

In the previous chapter the historical background in which the auto parts suppliers were organized essentially around two automobile assemblers, namely TOYOTA and NISSAN, is discussed. But as the U.S. government has used Japanese word "*keiretsu*" to indicate the closeness of Japanese auto parts market, it is apparent that *keiretsu* mean not only a tiered or pyramidal organizational structure converged into several assemblers. Thus the purpose of this chapter is to discuss the characteristics of *keiretsu*.

2-1 Structural characteristics of *Keiretsu*

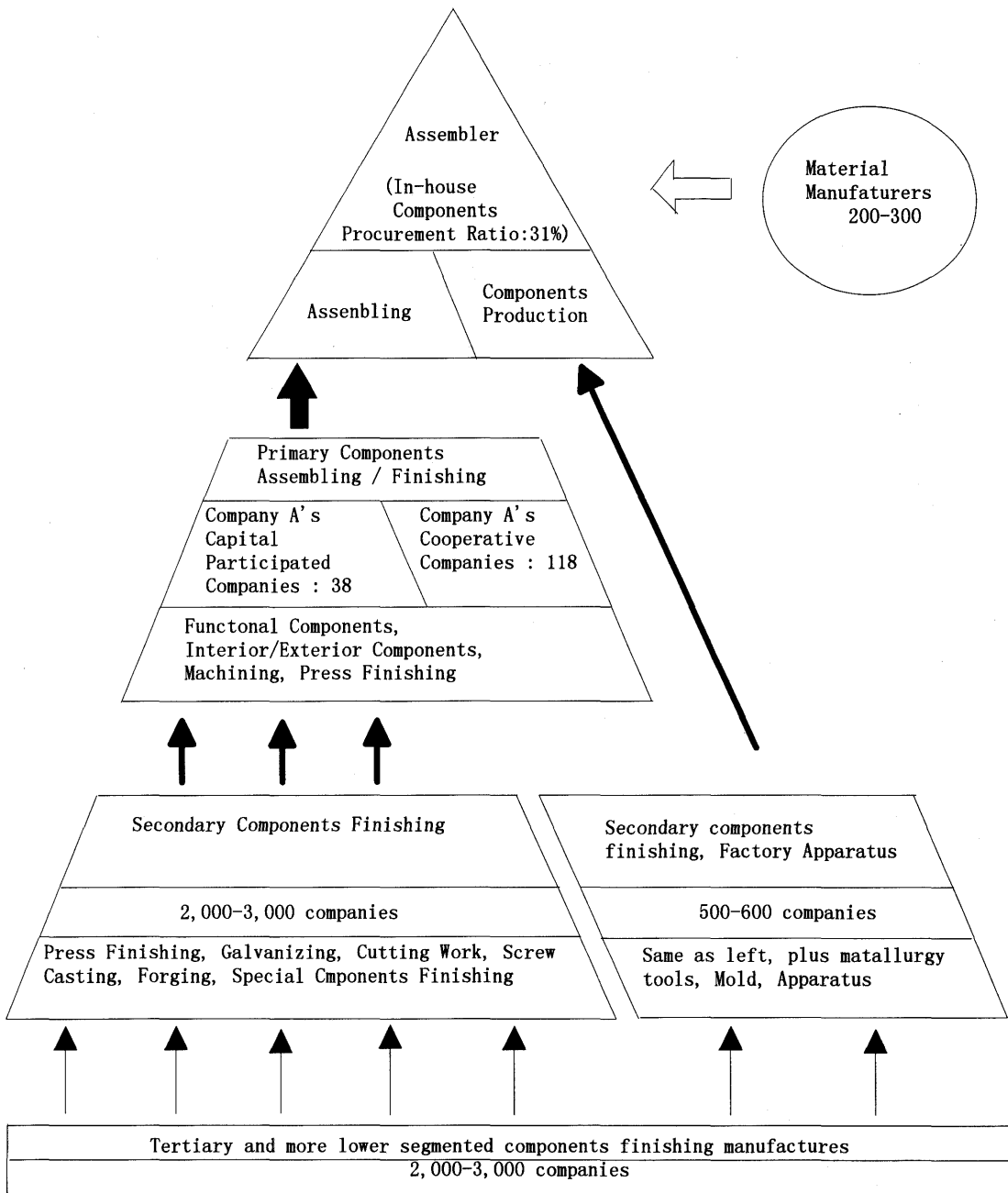
According to the 1981 White Paper of Medium and Small Scale Enterprises the division of labor between an automobile assembler and its suppliers is described pyramidal (see Figure 1). This figure have been used repeatedly and it is still considered to show the structure of subcontracting relation in the automotive industry. In their book "Product Development Performance" Kim B. Clark and Takahiro Fujimoto discuss this pyramidal structured subcontracting relations in the automotive industry of Japan as follows:⁽⁷⁾

Parts suppliers ranges from family shops with a single machine tool to diversified companies as large as automobile companies. Some are affiliated with a single car maker, while others belong to coherent groups organized around assemblers (e.g., Kyoryoku-kai in Japan). Still others are fully independent. First-tier suppliers deal directly with assemblers; lower-tier suppliers deliver piece parts to upper-tier suppliers.

In other words, there are differences in company size and in turn subcontracting relation among the auto parts suppliers. As discuss above, moreover, this pyramidal structure does not necessarily to show that one auto parts supplier has only one subcontracting relation with the assembler.

The U.S. government has been criticizing the automobile industry in Japan. Because *keiretsu* characterizing the industry indicates this tiered or pyramidal structure in which the business relations between the assembler and its suppliers have been formed upon long-term basis and in

Figure 1. Automotive Parts Procurement Structure of Japanese Assembler



Note 1: In House Components Procurement Ratio = $[1 - (\text{Purchasing Cost} + \text{Manufacturing Cost of Suppliers}) / \text{Total Production Cost}] * 100\%$

2: The first-tier autoparts manufactures may have one or more clients.

3: This chart was prepared on the basis of the survey of production system of major automobile manufactures of 1981.

However, the basic structure has never been changed until now.

Source: Mikio Matsui, "Jidosha-Buhin" p.12. Original Information from Small Business White Paper, 1981

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turn very exclusive. But in contrast to the U.S. criticism, the survey conducted by the Japan Auto Parts Industrial Association shows no simple pyramidal industrial structure in where all the subcontracting relations are gradually converged into one assemblers. In other words, the auto parts suppliers have subcontracting relations with multiple number of assemblers as their capital sizes get larger (see Table 1). In short, it is common for one supplier to deal with sever-

Table 1. No. of Automobitive Assemblers with Business Relations

(by capital)

Class of capital	No. of Automotive Assemblers						total
	0	1	2-4	5-8	9-12	13	
more than 10 bil.	4	3	4	10	14	6	44
5 bil. — 10bil.	1	0	2	15	11	5	34
2 bil. — 5 bil.	3	0	8	16	14	3	44
1 bil. — 2 bil.	6	4	15	6	7	1	39
500 mil. — 1 bil.	1	4	5	5	4	0	19
100 milo. — 500 mil.	17	26	33	24	9	1	110
less than 100mil.	56	55	49	20	4	0	184
total	88	92	116	96	63	19	474

Source: Japan Auto Parts Industries association and Auto Trade Journal Co., Inc.

“Japanese Automotive Parts Industry '92/'93”

al companies at the same time, even though most key suppliers have been organized into *keiretsu* of one assembler or another. The fact supports that the auto parts suppliers in Japan has been said to be a common asset for all the assemblers.

2-2 Differential Characteristics of *Keiretsu*

Whether auto parts supplier system based upon *keiretsu* is more efficient or not, it is clear that there are sharp differences between the automobile industries of the U.S. and Japan. Based up the study of Clark and Fujimoto, three basic differences between them are discussed in order to clarify the characteristics of *keiretsu*.⁽⁸⁾

Difference in Business Relations:

In the U.S. a large number of parts suppliers deal directly with automotive assemblers like GM, Ford, and Chrysler, on the basis of short-term contracts. It can thus said that auto parts supply system in the U.S. is characterized by its market orientation. Contrarily the Japanese industry is characterized by a tiered or pyramidal structure in which long term business relations

are emphasized.

Difference in Manufacturing Parts:

According to who takes responsible for the development work of parts there are three types of parts described as follows.

1) Supplier Proprietary Parts

The supplier is responsible for both development and manufacturing.

2) Black Box Parts

Both the assembler and the supplier share responsibility of development work.

3) Detail-Controlled Parts

The assembler does in-house development and accordingly the supplier manufactures.

According to Clark and Fujimoto, 62% of all the parts produced by the Japanese suppliers is Black Box type, while over 80% of the parts produced by the US suppliers is Detail-Controlled Parts. This difference in types of parts produced by the Japanese and the US suppliers is clearly coincides clearly with the difference in the industrial structure.

Difference in Expected Capacities:

It is often said that there is a difference in the volume of auto parts manufactured in-house between the Japanese and the US assemblers. Naturally the US assemblers manufacture more parts in-house than the Japanese counterparts do. This difference essentially show a difference in what the assemblers expect from their suppliers between them. As shown in a difference in manufacturing parts between the suppliers of two countries, the Japanese assemblers ask their supplier engineering contribution to the development and manufacturing of parts while the U.S. assemblers regard and utilize the suppliers "as a source of manufacturing capacity."⁽⁹⁾ In other words, the auto parts suppliers in Japan contribute much more to the total engineering works of vehicle development than those in the U.S. do.

2-3 Theoretical Characteristics of *Keiretsu*

Among three major differences the high reliance on the engineering capability of the supplier by the assembler in Japan is significant. Clark and Fujimoto explain this phenomenon in terms of industrial structure as follows:⁽¹⁰⁾

... Japanese suppliers do four times more engineering work for a typical project than U.S. suppliers.

The difference ... do not reflect marginal choices. They reflect suppliers with very different capabilities. More over, they reflect a difference system of supplier relationships that

includes different communication channels, contracts, and incentives. . . .

It can be thus said that engineering capability characterizing the Japanese suppliers clearly assumes *keiretsu*. Yoshiro Miwa summarizes reasons for the historical development of *keiretsu* as follows:⁽¹⁾

It was necessary that the Japanese automotive industry, though starting from the low technological level, had to deal with both tasks: One is to increase productivity very fast, and the other is to improve quality rapidly. This resulted in slight difference in the assemblers' response to the situation. They did not depend upon an increase either in internal manufacturing or in the market transactions. Rather they selected to deal with the situation by establishing long-term, very intimate business relations with many companies (in other words, *keiretsu* relation) and in turn they have succeeded.

In relation to the Theory of Network Kenichi Imai also describes *keiretsu* between the pure market and the hierarchical system in terms of information coordination, and in turn explains its importance as follows:⁽²⁾

If all the factors necessary to corporate activity, capital, labor, resources and service, and information, can be procured temporarily and instantaneously as we buy daily necessities, then (*keiretsu*) is not necessary. However, many important production factors involve complicated business transaction, and in turn the transaction of continuous rather than temporary can save the cost. Moreover, (*keiretsu*) becomes essential in order to create "*ba*" (i.e., place or base) for the transaction of technology or information, which can not be procured in open market.

Summarizing the statement of both Miwa and Imai in simpler term, *keiretsu* is a very unique transaction system assuming long term or continuous relation. In other words, *keiretsu* implicitly assumes that the assemblers grant the suppliers long-term guarantees and in turn demand them to take significant responsibility.

Chapter Three: Cause and Effects of *Keiretsu* Breakdown

In the development history of the automotive industry in the world, the Japanese was undoubtedly a late comer. But like her economy, the automotive industry in Japan had spectacularly grown after the World War II and became one of the automobile production centers in the world. The success of automotive industry in Japan has been discussed in the same context as that of her economy. That is, to discuss the industrial success in relation to unique Japanese so-

cial organization. Accordingly *keiretsu* has been identified as an unique industrial organization for automotive industry and in turn as a key to its success.

According to various newspaper reports, however, *keiretsu* in the automotive industry is breaking down now. There are a number of reasons for the breakdown of *keiretsu*. Maturing domestic market, globalization of competition, high value of yen, and so on. In short, it is because the assemblers is facing a different kind of competition both domestically and internationally.

Today the Japanese assemblers first time in their history face price competition. Till recently the assemblers have been taking advantage of the consumption behavior among the Japanese to value quality over price in their market strategies. In other words, the price of car went up as the quality of car increased. But because of change in consumption behavior the price and the quality do not go up simultaneously any more. In other words, it is getting difficult for the assemblers to raise car price according to improvements in car quality.

Looking at the automotive industry of the world, it has been said that by the end of this century there will be a dozen or less automobile assemblers left in the world. Given technological developments and world trade system, it is unavoidable that the competition between the assemblers from the U.S., Europe, and Japan, increases and becomes globalized. In other words, the world market is getting too small for all the assemblers presently in the world from the viewpoint of investment capital and manufacturing scale necessary for new car development and production.

As stated previously, *keiretsu* gave opportunities the suppliers to acquire engineering capability which in turn promoted *kanban* and *dezainn-in* (design-in) effectively. In other words, *keiretsu* played an important role in reducing production cost and increasing manufacturing efficiency. But considering changing competitive environment both domestically and internationally the automotive industry, the newspaper reports are clearly suggesting that *keiretsu* is breaking down because it results in over capacity and inefficiency today. Given changes in both domestic and international competition the Japanese assemblers face, their suppliers are forced to be involved in industrial reorganization.

Keiretsu can be found ubiquitously in its pyramidal structure. But it is easy to assume that the strength of *keiretsu* between a contractor and its subcontractor differs based upon engineering capability of a subcontractor. In relation to its tiered or pyramidal structure, Masahiko Aoki also points out that the suppliers at lower-tiers of *keiretsu* do not possess engineering capability high enough to become irreplaceable.⁽¹³⁾ Thus, it is clear that the breakdown of *keiretsu* appears differently for each supplier based upon its engineering capability.

At the first tier, the suppliers with engineering capability, who can achieve scale merits in both development and production, will gain independence from their assemblers. In turn their relation is characterized more like equal partner and becomes more market oriented. But some suppliers without such capability will be screened by the market and the others will be reorganized as subcontractors of those with engineering capability. On the other hand, only those suppliers at lower tiers who have engineering capability to manufacture critical parts strengthen their relation with their contractors by making them in essence subsidiaries, the relation with those suppliers without such know-how will be weakened and will be replaced market transaction.

Keiretsu once supported efficient development and production of car is gradually replaced by market transaction and/or de facto vertical integration. In other words, it can be said that the automotive industry is moving away from the industrial organization of the Japanese style and in turn toward the industrial organization of the Western style. The breakdown of *keiretsu* in the automotive industry should be understood as a part of institutional changes the Japanese economy is facing today.

Footnotes:

- (1) _____, *Magarikado-no-Keiretsu-Sisutemu: Endaka, Kyozon-Kyoei-Kuzusu (Keiretsu System at Corner: High Yen Evaluation, Breakdown of Prosperous Coexistence)*, Nikkei-Sangyo-Shinbun, April 13, 1995
- (2) Hiromichi Mutoh, "The Automotive Industry," in *Industrial Policy of Japan*, edited by Ryutaro Koiya, Masahiro Okuno, and Kotaro Suzumura, (Tokyo: Academic Press Japan, Inc., 1988), pp. 312-313
- (3) The most significant example of automotive part manufacturer during the first stage is Nihon Denso, a member of TOYOTA group and presently the largest part supplier in Japan. Nihon Denso which became a separate entity from TOYOTA in 1952 started importing advance machineries in order to establish its position in the industry. It bought 160 million yen worth of machineries from the U.S. while its capital worth was only 90 million yen. More importantly Nihon Denso formed technical tie-up covering manufacturing and sales of Bosch electrical parts in Japan, import agency for all Bosch products, utilization of all the patents of Bosch and opening all the Bosch technologies, and so on, with Robert Bosch in 1953. For the tie-up Nihon Denso provided 800,000 new stocks to Bosch and paid 10% of the total sales of products under the tie-up contract. It is easy to assume that this kind of large scale contract could not be made without the government support. See Shogo Mamaya, *Nihon-Jidosha-Kogyo no Shiteki-Tenkai (Historical Development of Japanese Automotive Industry)*, (Tokyo: Akishobo, 1982), p. 165-166
- (4) Hiromichi Mutoh, op. cit., p. 316
- (5) Ibid., p. 317
- (6) Michael A. Cusumano, *The Japanese Automobile Industry: Technology and Management at Nissan and Toyota* (Cambridge: The Harvard University Press, 1991), p. 244
- (7) Kim B. Clark and Takahiro Fujimoto, *Product Development Performance: Strategy, Organization*

- in the World Auto Industry (Boston: Harvard Business School Press, 1991), p. 136
- (8) Ibid., p. xx
- (9) According to the survey conducted by the Aichi Prefecture Industrial Information Center, the average percentage of black box parts suppliers is 26.5%. Among the first-tier suppliers 47.5% answered as black box parts suppliers while 15.8% of the second-tier suppliers are black box parts suppliers. Aichiken-Sangyo-Joho-Senta, Aichiken no Jidosha-Buhin-Sangyo (Automotive Parts Industry of Aichi Prefecture), (Nagoya: Aichiken-Sangyo-Joho-Senta, 1993) p. 17
- (10) Clark and Fujimoto, op. cit., p. 138
- (11) Ibid., p. 136
- (12) Yoshiro Miwa, "Shitauke-Kankei: Jidosha-Sangyo (Subcontracting Relation: Automotive Industry)" in Nihon no Kigyo (Japanese Company) edited by Kenichi Imai and Ryutaro Komiya, (Tokyo: Tokyo University Press, 1989), p. 184
- (13) Kenichi Imai, Shihonshugi no Sisutemukan-Kyoso (Competition Among Different Systems In Capitalism), (Tokyo: Chikumashobo, 1992), p. 26
- (14) Masahiko Aoki, Nihon-Kigyo no Soshiki to Joho (Organization and Information of Japanese Company), (Tokyo: Toyokeizaishinposha, 1989), p. 50

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