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Subcontracting Relationship(Shitauke Relationship)
—The Case of Automobile Industry—

Firms and Industrial Organization in Japan (3)

by

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---The Case of Automobile Industry ---

Firms and Industrial Organization in Japan --(3)

chapter 4 (with the same title),
of the book forthcoming in 1995

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Chapter 4. Subcontracting Relationship (Shitauke Relationship):
The Case of Automobile Industry¹

4-1. Introduction

In chapter 4, I examine the formation and mechanism of the interfirm relationship for division of work, called shitauke(subcontract). I take, as an example, the automobile, especially passenger car, industry which is a representative entity of the fabrication and assembly industry. We observe a recent rise of the public's interest in small and medium-sized enterprises (SMEs), owing to the industrial success of the Japanese economy, which parallels the "spreading awareness that a vast group of SMEs support it"(Sato[1986, p.152]). Since the industrial success of Japan depends, more than anything else, on the success of the fabrication and assembly-type industries, the rise in interest in SMEs is, above all, an interest in SMEs in the "subcontracting relationship" or under the "subcontracting system."

The problem in shitauke manufacturing system has been at the core of the controversy among scholars studying SMEs since the prewar period. As shown in chapter 3, however, a wide gap has existed between the image and reality of SMEs and the image of SMEs began to change only recently. It applies also to SMEs in the subcontracting relationship. It implies that the image, which lots of past studies on the subcontracting relationship or the subcontracting system have held both as the study object and as the premise of the study, diverges greatly from the reality. In particular, the portrayal of powerful large firms and weak SMEs that underlie the image is unacceptable as the premise that is taken for granted in the study.²

Past studies on subcontracting relationship and subcontracting per se have been carried out on this image. Therefore, both the definition of

¹This chapter is a revised version of chapter 4 of Miwa[1990], whose original was published in 1989.

² For a critical review of the past studies, see chapter 3 of Miwa[1990], whose English translation appears in Japanese Economic Studies, Vol. 20, No.2 (Winter 1991-92). The statement in the text is the conclusion of the review.

these basic concepts and the identification of research objects (economic phenomena to be explained) are based on it. Thus, we need reassessment and reidentification of the study themes to the research objects (and, further, also regarding the use of the term "subcontracting".) When we study, for example, both interfirm relationship in automobile industry and that in textile industry, naming both of them subcontracting relationship, we assume that the phenomena are similar in two industries. If either the assumption is invalid or the concept of subcontracting relationship is inappropriate, we cannot reach right conclusion. Most of past studies are based on an image related with control, subordination (dependence), exploitation, and shiwayose, and assume that subcontracting relationship exists in many (most?) industrial sectors and the "substance" is the same. On this assumption, their SME studies choose research agenda: what are the concrete means of control? how serious is the exploitation? how does shiwayose appear? how can the government policies cope with such SME problems? Our conclusion that a wide gap has existed between the image and reality implies that such assumption is invalid and such research agenda are fruitless.

This does not mean that a vast group of SMEs have not contributed greatly to Japan's industrial success, and that such question as to how the formation and mechanism of the interfirm relationship, called subcontracting relationship, is erroneous and void. I examine in this chapter the Japanese automobile industry, with study themes totally different from the traditional ones. The primary concern is the detailed description and analysis of the causes, and the conditions and mechanism in the industry which realized such a remarkable success in a short period. I focus on a series of questions related to what are the incentive system which supported the subcontracting relationship in this industry: why have many SMEs in subcontracting relationship been so active and creative? why have they made continuously such commitment that took long time to collect the rewards? what have assemblers (car manufacturers) done for such creativity and commitment?

The industrial success of Japan, which by itself surprised and interested the public in the world, depends, more than anything else, on

the success of the fabrication and assembly-type industries, of which the automobile industry is the representative. Therefore, the study of the success of this industry leads us to realize the basic conditions and the mechanism for the rapid growth of the economy. The recent rise in the public's interest in SMEs centers on subcontracting relationship, especially that in the fabrication and assembly-type industries, which is backed by the recognition that it is one of the key factors for success.

We have lots of literature based on the wrong traditional view, and section 4-2 is for preliminaries. Readers have to examine own prior knowledge and restructure the direction of interests. Section 4-3 is for the explanation of the industry history. Japanese automobile industry gathers wide attention because of the success, and most readers often mistook that it was powerful and efficient from the start. The focus of this chapter centers on the hard way to the success, and readers have to realize what were the problems to be challenged. Sections 4-4, 4-5, and 4-6 are for the study of the incentive mechanism. In 4-4 I point out four types of popular misunderstanding, in the first part predominance of exploitation of suppliers by an assembler (car manufacturer), strong support of an assembler to suppliers, and lack of suppliers' voluntary efforts, and in the second closedness and exclusiveness of Kyoryoku-kai (cooperative association of first-tier suppliers). In 4-5 I examine subcontracting relationship to answer the questions: under what incentive system have SMEs joined and maintained the relationship, and made continual commitments? how has the system functioned? Subcontracting relationship in this industry quite often has long-term character, which implies that participants of the relationship commit in offering a kind of monopolistic position to the partner. It requires to establish measures to protect each of them from the evils of such monopoly, and the system discussed in 4-5 has to accompany such measures. In section 4-6, therefore, I answer the question: what have been the measures complementary to the incentive system. Section 4-7 is for concluding remarks.

4-2. Preliminaries

Choice of "Subcontracting Relationship" instead of "Shitauke Relationship"

In the following sections, I use "subcontracting relationship," not such expressions as shitauke relationship, shitauke system, and supplier-buyer relationship, for the "interfirm relationship for division of work." This choice needs comment. Japanese word "shitauke" with relationship and system has been used for SME studies, and we have a huge accumulation of such studies. They are, however, based on the wrong traditional view. In what follows, we examine the interfirm relationship for totally different themes, and I choose another expression in order to avoid unnecessary confusion. Readers have to note definitely that Japanese expression "shitauke" is usually backed by the dual-structure-view, even when used in the government statistics.

For example, the primary concern of Watanabe[1985]'s survey, entitled "The Shitauke-Keiretsu Relationship and SMEs," is "a form of interaction between SMEs and large firms, in particular in the manufacturing industries, and its related issues rather than the issue inherent in SME themselves". He states: "Because of the seriousness of its quantitative importance and issues raised..., the Shitauke-Keiretsu relationship has been one of the most important research issues on SMEs. Of 710,000 SMEs in manufacturing, about two-thirds were in the subcontracting is the representative trade relationship in 1981.... The ratio of SMEs more than 80 percent of whose sales are for shitauke orders exceeds 50 percent.... In other words, quantitatively, the subcontracting relationship is the representative tarade for SMEs in manufacturing." Readers have to notice here, however, the figures used for stressing the "quantitative significance" are from the Preliminary Report of the Report of the 6th Basic Survey of the Reality of the Manufacturing Industry in 1981 (Kogyo Jittai Kihon Chosa Hokokusho) which reflects the dual-structure-view.³

³ In the Basic Survey carried out by SME Agency, SMEs and large firms are separated by the number of employees, and a SME employs less than 300 workers. Shitauke is defined as, on requests of a firm with larger amount of paid-in capital or more employees (called "parent firm") than the firm under study, for parent firms (1) to produce goods, parts, accessories, materials, and etc., or (2) to engage in manufacturing and repairing the production facilities, equipments, tools, and etc. By definition large firms are not engaged in shitauke, and the questions regarding shitauke are

The typical image of which shitauke reminds the public is in the statement of Watanabe[1985, pp.389-90]: "The shitauke not only is the most important business relationship for manufacturing SMEs in quantitative terms but also has been regarded to reflect most succinctly the nature of Japanese SMEs with the 'problem.' Furthermore, the shitauke SMEs have been viewed as the main bearers of this 'problem.' Thus, the shitauke relationship reveals most clearly such 'problems' as large firms shifting the burden of hardship due to business fluctuations to SMEs (shiwayose), their exploitation of SMEs, and their subordination of independent SMEs."⁴⁵⁶

addressed only to SMEs. Note that the same type of production ordered by smaller firms is excluded from the survey.

The definition of shitauke is ambiguous. Although it is explained in the attached sheets for the questionnaire as "shitauke is ordered directly by parent firms, with specifying standard, quality, performance, form, design, and etc.," ambiguity still remains. The figures are obtained through sample survey, by asking: "Is your firm engaged in shitauke production? Answer in Yes or No. If Yes, what is the number of parent firms, and what is the ratio of shitauke trades to total sales?" Surprisingly and unfortunately, the corresponding figures in the final report of 1981 Survey are greatly different from those in the Preliminary Report, that is, 710,807, 23.4%, and 18.6%. However, 615,226, 60.7%, and 49.0% are the corresponding figures for the 5th Basic Survey in 1976, and 679,662, 55.8%, and 41.0% for the 7th in 1987.

In addition, the dual-structure-view that strong large firms subordinate weak SMEs influences significantly the Survey, therefore, the figures. Regarding the definition of shitauke, for example, three questions arise: (1) When orders are received from smaller firms, why are they not counted as shitauke? (2) How does shitauke differ from other trades? In most cases, based on own estimates of market demand or orders from distributors based on their estimates, manufacturing firms produce. Does this not mean that almost all manufactures are engaged in shitauke of distributors? (3) Let us consider a charter ship that transports automobiles of a manufacture exclusively. Which of such firms are subcontractors and under what circumstance as automobile users, automobile dealers, automobile manufacturer, shipper, shipping firm, and steel firm? When we note that all production activities are finally for consumers' demands, shouldn't large firms which produce, for example, large computers, semiconductors, steel, cement, ethylene, plate glass, and so forth, be classified as shitauke manufacturers (apart from the size restriction in shitauke definition)? If so, we would face a fundamental question of the analytical efficacy of the concept of shitauke.

⁴ The same view is reflected in a survey of the Research Department of the Central Cooperative Bank of Commerce and Industry[1983, p.71], which questioned and interpreted the result as follows. "How do you evaluate the relative technological level of your firm to that of the parent firm: (1) above the parent firm; (2) roughly the same; (3) below the parent firm; (4) unknown?" "8.1 percent of all responses are answered in (1) and 43.4 percent (2). Thus, 51.5 percent consider that their own technological level is 'roughly the same or above the parent firms.' This indicates rapid improvement of shitauke SMEs' technological level and their self-confidence." In this connection, see Watanabe[1985, p.400]. Based on the dual-structure-view, both the above question and the interpretation consider

Note that we are taking another risk by choosing subcontracting, in place of shitauke. Subcontract reminds readers of certain type of contract typical in such industries as construction and shipbuilding.⁷ Since we are here interested in the formation and mechanism of the interfirm relationship for division of work in automobile industry, this choice might distort readers' image of the object of the study in two points: (1) The products are typically made to order in the industries where "subcontract" is popular, however, passenger cars are standardized and ready-made products. This suggests that the basic character of the transaction and relationship between an assembler and parts suppliers in this industry is not the same as the typically understood subcontract; (2) "Subcontract" corresponds to "prime contract," which suggests a strong leadership of the latter to the former. This implied preoccupation will work as an obstacle in what follows, as it is not the case in every relationship.⁸ I choose "subcontracting relationship" only for readers' convenience.

that the gap in the "technological level" is an obstacle for the formation of an "equal business relationship." Note, however, that division of work usually depends on economies of specialization which assume difference among participants. For this point, see Miwa[1990, p.59].

⁵ Though based on the wrong view, strong interest among scholars and the public on SMEs accumulated detailed studies on them. In the postwar period, the automobile industry was one of the industries of the prime concern, and some of them, especially field surveys and questionnaires, are valuable as will be shown below when used with care.

⁶ When Dore[1983, p.463] states as follows, he seems to depend on the dual-structure-view: "Transaction costs for large Japanese firms may well be lower than elsewhere. 'Opportunism' may be a lesser danger in Japan because of the explicit encouragement, and actual trade relationship of mutual goodwill./ The stability of the relationship is the key. Both sides recognize an obligation to try to maintain it." An economists's intuition, when free from the view, leads us to a simple fact that there is no heaven even for large firms and to look closer how the stability of the relationship is maintained and what are their costs. I follow it in this chapter. I will come back on Dore's statement in Part IV.

⁷ Subcontract is "a contract subordinate to a previous or prime contract and made one or more parties to the original contract or a third party; esp: an agreement to perform all or a specified part of the work or to provide all or a certain specified materials required in another contract" (Webster's Third New International Dictionary).

⁸ "Interfirm relationship," and "supplier-buyer relationship" seem too general. "Interfirm relationship for division of work" is too tedious.

Definition of the Problem

The definition of "Japanese automobile industry" needs three comments: (1) As for the products, I focus mainly on four wheel passenger cars, and exclude such products at least from the bounds of prime concern as trucks, buses, three-wheel automobiles, motorcycles, etc; (2) As for the production stages, I focus not only on the firms which is on the final stage of production and sell passenger cars in the market (assemblers) but also on the firms which supply car parts to assemblers, firms which perform machining works for the orders from assemblers and parts-suppliers, and firms which supply materials for production to those firms⁹; (3) In many cases, the activities and the nationality of stockholders of firms are not limited in one country, and the definition of "Japanese" is not always clear. In what follows, I follow the custom. Although GM, holding 41.5 percent of the stock, is the largest shareholder of Isuzu and Ford, with 23.6 percent, is that of Mazda, they are Japanese.

With "industrial success of the Japanese automobile industry," I refer to the fact that it has acquired a large share of the world passenger car market, through supplying cars with qualities consumers support at a price they accept. Most people agree, I believe, that the basic reason of this success is simple. They supplied cars at lower prices than competitors, satisfying basic demands of the average consumer of the developed countries, with low trouble rate and good fuel economy. Though founded on the technological basis of the industry in prewar and wartime economy, at the start of passenger car production, for example, in 1945-55, Japanese car manufacturers had a lot of problems to overcome both in product quality and productivity.¹⁰ In a short time, however, attaining

⁹ Since we are interested in the interfirm relationship for division of work, this point has critical importance.

¹⁰ The situation of this industry at around 1950 is "symbolized by the statement of Ichimanda, the Chairman of the Bank of Japan, famous as 'No passenger car industry argument': 'It is useless to raise passenger car industry in Japan. Now is the time of international division of labor, we can buy from US.'... The number of passenger cars imported from Europe and US in 1951-3 was 30,463, 64 percent of the Japanese market. Furthermore,

high product quality and high productivity, they expanded production and export. This is the essence of the "industrial success," and the primary concern of the following sections is to answer questions: who played the crucial roles on the process? what did they do? how was interfirm relationship for division of work formed and how did it function?

Looking at closely the development process of the automobile industry, and fabrication and assembly-type industry in general, we find its basic character as a continuous accumulation of small innovations, for which it was crucially important to solve two problems: (1) to give incentives to a large number of economic agents, both within and out of a firm, to be continuously active and creative; (2) to make communication between agents smooth and dense, and to coordinate appropriately the direction of creative activities of agents. The subcontracting relationship was one of the key factors for the industrial success of Japanese automobile industry, which implies that it suited to solve these problems. Thus, the followings are of our primary concern: what was the incentive and communication system suitable for stimulating agents in accumulating detailed skills and know-how and in transferring and exchanging them, through which cost reduction and quality improvement of the product was continuously realized? how was this system formed and maintained? who had taken the leadership?

Note five points, before going to the details: (1) Subcontracting relationship has not been equally effective for all car manufacturers.¹¹ For the explanation of the industry history in section 4-3 I focus mainly Toyota which is regarded as the most successful. In 4-4 and after, I focus on the mechanism common to all subcontracting relations in Japanese

Japanese car manufacturers clearly recognized the seriousness of the huge gap between imported and Japanese car in performance, styling, and price." (Miwa[1976, pp.348-49].)

¹¹ "The industrial success of Japanese automobile industry" does not imply that every automobile manufacturer has made a great success. Among the five firms which began passenger car production in the first half of 1950s, for example, only two have made remarkable success. Of the remaining three, one made only a modest success, another exited, the other was merged by one of the successful firm.

automobile industry, and therefore "an assembler" stands for the average figure of Japanese assemblers; (2) I investigate neither why it was more effective for Toyota than for other Japanese assemblers nor why it was effective for Japanese assemblers than for those in other countries; (3) I neither ask why Japanese assemblers chose subcontracting relationship than making by themselves nor why they chose their present locations¹²; (4) I focus mainly on assemblers and machining firms. Among subcontractors I choose machining firms, not suppliers of unit-parts (often called "vendors"),¹³ since a machining firm is more tightly related to an assembler,¹⁴ and therefore more close to the public's view of a subcontractor; (5) The purpose of this chapter is not a complete study of factors supported the industrial success of Japanese automobile industry, but limited to a study of the working mechanism of one of such factors. I do not intend to argue that the target of this chapter is the only or the most important factor for the success.

4-3. Industrial Success and Illustration of the Problems

The Reality of the Success

¹² "Because it was rational" cannot be a satisfactory answer, and it is not easy to explain why to choose Toyota-type subcontracting relationship was not rational for other assemblers in and out of Japan.

¹³ "Some of the purchased parts need additional machining works and preparatory assembly to be put on the assembly line. Of the machining works for products made by itself from basic materials, and machining works and preparatory assembly for purchased parts, an assembler orders to subcontracting firms those possible with simple technology and relatively small machinery." (Takeshita[1967, p.282]) The ratios of the value of materials, parts of vendors, and payment for machining works to total value of all purchase of assemblers are roughly 10%, 60%, and 30% (p.106 of the 1984 Yearbook of Japanese Association of Automobile Parts Industry, hereafter 1984 API Yearbook). Vendors also maintain long-term trade relationship with many machining firms, under which works the same mechanism as with that between an assembler and machining firms. Therefore, the value weight of machining works within the whole automobile industry is higher than 30%. Of course, in many cases, the relationship between an assembler and a vendor has the same character.

¹⁴ This applies more clearly to the latecoming assemblers which could purchase from the vendors supplying to the incumbents.

It is hard for readers familiar with the success story of Japanese automobile industry and Japanese cars on the road to imagine the reality of the industry on the process to the success. The chairman of Toyota Motor Corporation, Eiji Toyoda, states in his memoirs, "Our first true car was the Crown, unveiled in January 1955" (Toyoda[1985, p.172]). As shown in chapter 1 (Table 1-x), the number of passenger car production in Japan this year was only 20 thousand.¹⁵ In ten years the number grew up to 696 thousand, and in twenty years 4,568 thousand, of which forty percent were exported.¹⁶

At the start of the development process, there was a tremendous gap in productivity and product quality between Japanese manufacturers and non-Japanese, and protective policies were adopted: "By adding import restriction through foreign currency quota, a higher wall was erected to protect domestic cars from the import competition. Foreign currency quota was adopted with the import increase in 1952-53 of European compact cars even with 40 percent of tariff, and was reinforced with the general import restricting policy for the depression in 1954. For example, foreign currency quota for car imports decreased from US\$13.74 million in 1953 to US\$0.61 million in 1954 and US\$0.92 million in 1955, and the number of import cars from 5,900 in 1953 to 370 and 545." (Ueno and Mutoh[1973, pp.126-27]).¹⁷

While the domestic market was protected from import competition, Japanese automobile manufacturers increased their production, and began and expanded their exports. As shown in Table 1-xx, the number of passenger car export was nearly zero in mid-50s, but increased to more than 10 thousand

¹⁵ However, there is a famous story that, even in a few years later, an exported car immediately broke down on a US free way. See, for example, Wada[1991, p.36].

¹⁶ For a brief description of the industry history, see Itami et al.[1988, ch.1]. Also see, Toyota: A History of the First 50 Years (Toyota City: Toyota Motor Corporation [privately published], 1989) and Wada[1991].

¹⁷ In June 1960 the government decided on a "Trade and Capital Liberalization Plan," and in October 1965 passenger car import was liberalized. The tariff rate on small cars, 40 percent in 1965, decreased to 36 percent in 1969, further to 20 percent in 1970, 10 percent in 1971, and finally to zero in 1978. See Table 13.6 of Nakakita[1993, P.353].

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in 1961, more than 100 thousand in 1965, and more than 1 million in 1971. As the export market was not protected from competition with non-Japanese manufacturers, it implies that Japanese manufacturers achieved the productivity increase and product quality improvement in a short time, and at the same time overcame the disadvantage of new entrants. In this period, productivity in other countries also increased with production expansion,¹⁸ and productivity of Japanese manufacturers increased at a faster speed.¹⁹

A passenger car is composed of more than 5,000 kinds and 20,000 items of parts, and a huge number of firms take part in and share their production. Therefore, a dramatic quality improvement of the final product implies simultaneous dramatic quality improvement in parts, materials, machine tools, and production equipment. As all the materials, machinery, parts, and etc., except for rare cases where the import of technology, machinery, and parts was permitted,²⁰ were produced in Japan because of chronic foreign currency shortage in Japan, quality improvement and productivity increase was realized in Japan in such wide area as from stamping and machining to production of tire, bearings, glass, steel, and machine tools.

¹⁸ The ratio of passenger car production in 1968 to that in 1954 is 8.5 in Italy, 2.4 in UK, 4.1 in France, 5.1 in West Germany, and 1.6 in USA.

¹⁹ Even Toyota, which symbolizes the success of Japanese automobile industry, needed special efforts to pass the APA's (U.S. Army Procurement Agency in Japan) inspection as their quality requirement was so strict in 1958 when Toyota made a successful bid for special procurement. APA requested Toyota to enforce a quality control system to its suppliers, and in 1959 Toyota presented a plan and began the program. It found great difficulty, however, because there was formidable disparity among suppliers in the understanding of quality control and its enforcement. As will be discussed later, in 1953, just after the "keiretsu diagnosis" of SME Agency in 1952-53, Toyota's Quality Control Committee began the activity, but the above fact suggests that it did not work well. See Wada[1991].

²⁰ At the beginning of reinforced foreign currency quota period, "the amount of quota for the import of automobile parts increased. This was for the increase of assembled part imports caused by the technical tie-ups between Nissan and Austin (Dec. 1952), Isuzu and Rootes (March 1953), Hino and Renault (March 1953), and Shin-Mitsubishi and Willyz Jeep (Sept. 1953). It ended with the increase of domestic production" (Ueno and Mutoh[1973, p.127]).

Problems for Industrial Success

At the start, technical and management level of subcontractors were low.²¹ Besides, automobile industry has peculiarities not so popular at that time and requests participants ability to meet them: (1) mass production type; (2) assembly industry with so many parts; (3) high precision requirement for fabrication; (4) high durability requirement; (5) continual product improvement requirement through that of parts and production process. Thus, assemblers had to begin with raising the technical and management level of subcontractors, instead of choosing them among incumbent firms. To be chosen as a subcontractor, a firm had both to change the mind of owners and managers and to restructure every side of management, such as production, inventory, materials, quality control, product development, labor relations, accounting, and etc, which apparently was not easy.²²

²¹ Honda's experience in building mass-production plant for motorcycles in Suzuka symbolizes the situation. In August 1960 Honda began the production of the best seller motorcycle, "Super-Cub," in Suzuka in Mie Prefecture, 40 kilometers west of Nagoya. The government of Suzuka asked Honda to choose local firms as subcontractors, however, few cleared Honda's requirement in precision, cost, and production capacity. 60 percent of 250 subcontractors were in Keihin District, the area around Tokyo and more than 400 kilometers east of Suzuka, and those both in Osaka area and in Nagoya area followed. 4 firms in Suzuaka applied for zero, 8 in Kuwana area in Mie for 3, and a large number in Mie only for 10. As Honda is famous for "apres guerre rationalism" and does not establish inflexible keiretsu relationship, it implies that even with transportation cost advantage local firms could not compete. (Aichi Economic Monthly Review, December 1960.)

²² In an assembly-type industry like automobile, keeping exactly the scheduled appointed date of delivery makes possible smooth production and considerable inventory cost reduction, however, it is not easy. Let me take the case of Mitsubishi Motors (Mizushima plant). Mizushima plant, built in 1943 for aircraft production, was destroyed at the end of the war. After the war they produced three-wheel automobiles, began 360cc wagon car production in 1960, 360cc passenger car in 1962, 800cc passenger car in 1965, and 1000cc passenger car in 1967. Isobe[1964, p.25] reports that Mitsubishi had reduced remarkably the irregularity of orders to machining subcontractors. The lead time for delivery centered on 20 days to one month and one month to two months. Frequent delays for the appointed date of delivery and their causes call our attention. 20 local firms out of 25 regarded the frequent delays as a serious problem. About 70 percent of 52 firms under survey answered in yes to the occurrence of delays, which had no relation to firm size. This case illustrates that a machining firm with enough production capacity could not easily keep the appointed date of delivery and needed improvement of management capability.

The actual content and required level of "keeping the appointed date of delivery" objective has continuously changed. The history of Japanese

Also an assembler (and a group of subcontractors) must try hard to establish and maintain a dense and good communication with subcontractors (among participants) for knowledge transfer, exchange of intention and understanding, and interests coordination,²³ since such a huge number of firms share the production of parts for an passenger car.²⁴ Today's dense and good communication relationship between an assembler and subcontractors is the product of hard efforts over a long period.

Many people, including managing directors of rival automobile manufacturers,²⁵ argue that there is a wide gap of productivity both between Toyota and rivals and between subcontractors of Toyota and those of rivals, and that it is a result of the gap of the quality of communication and cooperative effort. This is why I focus on Toyota, and it symbolically

automobile industry is that of the increase in the number of product items and the expanding varieties of optional accessories, and that of the fight against the increase of production-inventory cost caused by them. On this process the importance of keeping the appointed date of delivery tremendously increased, and required level of accuracy jumped up. All the firms in subcontracting relationship had to achieve this objective at the same time and without much cost. Each machining firm was required to achieve not only keeping the appointed date of delivery objective but also improvement on such aspect as productivity, quality, performance, price, product development capability, and etc. It must be a long and hard way to clear these requirements without large cost increase.

²³ Production process in an assembly-type industry like automobile consists of a long sequence of machining and assembly stages. Total production cost heavily depends on how those works were shared among participants. In automobile industry, many parts are assembled on the middle; otherwise the assembly line is so long and complicated that physical distribution cost is tremendous and inspection difficult. See Tomiyama[1978, pp.94-97].

²⁴ As shown in Table 4-1, the number of firms directly and indirectly in trade with an assembler (Toyota) was larger than a total of 40,000. Also see notes 4 and 5 of Wada[1991, p.25]

-----Table 4-1-----

²⁵ For instance, Mr. Masaoka, managing director of Mazda in charge of purchase department, answers in an interview: "The biggest problem in production which confronts us now is the development of effective use, especially of tools and dies. We are trying to reduce the cost, by finding how to change them quickly....On this point, there is a tremendous gap between subcontractors of Toyota and those of rivals. Toyota's subcontractors make efforts everyday for efficient use of production facilities and reduction of fixed costs" (1985 API Yearbook, p.79). Also Mr. Endo, senior managing director of Nissan, states at the meeting of Takara-kai (See 4-4 below): "Members of Toyota's Kyoho-kai apparently make much harder efforts for rationalization.... To us, Takara-kai members, it has been a matter of indifference, I should say. The biggest problem for Takara-kai members is the reduction of steps on the production line" (1986 API Yearbook, p.88).

suggests the difficulty of the problems assemblers had to challenge to solve at the start. The principal way for cost reduction is through effective use of production facilities and reduction of fixed cost, which have been realized by improving production process through changing the shapes and use of tools and dies. Therefore, still existing wide gap implies three points: (1) even with continuous hard efforts it is not easy to reach the target level; (2) it is true for rivals even when they observe the process through which one firm has done it; (3) rivals praise not only the achieved level of efficiency but also the posture of Toyota and its subcontractors for higher efficiency.

Thus, it is a hard and long way to have firms improve their technical and management capability to the required level, to establish dense cooperative relationship with them, and to use it effectively for drastic productivity increase and dramatic quality improvement.²⁶

an Illustration of the Hard Way: the Case of Toyota

For an illustration of the hard and long way,²⁷ let me see the case of Toyota chronologically, which is regarded as the most successful.²⁸

²⁶ What follows is the essence of an answer of Ryojiro Kojima, president of Kojima Press Co. and the chairman of Tokai Kyoho-kai, to an interview. This firm is regarded as one of the representative subcontractors of Toyota, and the answer illustrates well the hard process: "Toyota production system reminds people of Kanban system, under which firms have simply made continuous efforts for 'just-in-time, just amount of requested parts' objective. Only recently we have at last got a satisfactory score. This system totally depends on the assumption that all the parts delivered with kanban have no defect; otherwise each defective part stops the flow of production line, which very frequently happens as a passenger car is composed of a huge number of parts, thus, 'just-in-time, just amount' is not an appropriate objective. The no-defect-assumption naturally leads us to no-inspection-on-delivery policy, which again assumes buyer's absolute confidence both in the relationship with a supplier and in technical and management capability for making a part without defect, which needed two or three years, for instance. Therefore, such a system should be established step by step, not at once" (1985 API Yearbook, pp.162-63).

²⁷ An assembler could reduce the hardships neither by manufacturing those parts by itself nor by locating the plant in the developed region, which has been clearly revealed by the history of assembler's choices.

²⁸ This part entirely depends on Wada[1984, 1991].

In November 1939 the suppliers and Toyota held the First Meeting of Toyota Motor Subcontractors at Kuramae, Tokyo, and decided to form an association and call it Kyoryoku-kai (cooperative association), which was reorganized and named Kyoho-kai in 1943. With the formation of Tokyo (later, Kanto) Kyoho-kai in 1946 and Kansai Kyoho-kai, it changed the name to Tokai Kyoho-kai, meaning Kyoho-kai members in Tokai district where Toyota is located.²⁹

In 1952-53 Toyota and twenty-one members of Tokai Kyoho-kai were subjected to keiretsu diagnosis of the Small and Medium Enterprise Agency.³⁰ A party from the Manufacturing Industry Guidance Center and the Commerce Department of Aichi Prefecture, with people from Toyota's Purchase Department, visited each firm for a few days, from factory to factory.³¹ They produced a "Factory Diagnosis Report" for each individual supplier, and for the keiretsu as a whole a "Keiretsu Diagnosis Summary." Among the proposals was "to increase the number of personnel in the Purchase Department and strengthen their technical guidance capability,"³² which was, according to Wada[1991], vital for the relationship between Toyota and its suppliers. At that time, only forty employees in the Parts Section and

²⁹ As Wada[1991, p.29] states, suppliers in Tokyo and Kansai Kyoho-kai were relatively large-scale businesses. They mostly supplied specialized parts, and their dependence on Toyota was low. Most of the suppliers in Tokai Kyoho-kai were medium and small machine factories, mostly engaged in stamping and machining work, with high dependence on Toyota. While Tokai Kyoho-kai members supplied in 1966 no more than 20 percent of Toyota's total parts purchases in value, but 80 percent in terms of the number of types.

³⁰ The Agency had extended its management diagnosis from those of individual enterprises (particularly manufacturing plants) to those of groups, among which it included "keiretsu diagnosis," or "diagnosis of groups affiliated with large enterprises." Wada[1991, p.30] argues that this event "marked a turning point in relations between Toyota and its suppliers."

³¹ Besides gathering information on sales, costs, etc., the party made advice for the factory improvement. It assessed each factory in seven categories, scoring out of 10,000 points in total, and added short comments. The list of categories and points for each were: management (3,000pts); production (2,500 pts); labor (800 pts); marketing and purchasing (1,500 pts); finance (600 pts); accounting (1,200 pts); research (400 pts).

³² For the other seven proposals and Table for Conspectus of Keiretsu Diagnosis for Each Enterprise, see Wada[1991, pp.31-33].

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the Chassis Section within the Purchase Department were for the direct deal with suppliers. Although suppliers were clamoring for technical guidance of Toyota, only three out of forty were in charge of technical guidance, and moreover they were always busy in handling design changes. The Summary also advised to redefine Kyoho-kai's activity from promoting mutual friendship to improving management capability of each member by holding seminars and factory visits. For Toyota itself, it was a wonderful opportunity to learn how to make a factory diagnosis. Seventeen members of Tokai Kyoho-kai joined the second keiretsu diagnosis in 1954.³³

After the keiretsu diagnosis Toyota became more active in contributing to suppliers' working process, and planned to introduce quality control into every step of the production process. In 1953 they established a new section for quality control within Inspection Department, and newly organized Quality Control Committee in it. Shoichi Saito, a managing director of Toyota, made a speech at the Kyoho-kai autumn meeting and requested the members to cooperate in implementing quality control (hereafter, QC) and in improving inspection and delivery. Toyota sent instructors to Kyoho-kai seminars on QC, which were followed up with Toyota staff's visits to suppliers' plants to survey their QC implementation. In 1954 Inspection Department put an end to the distinction between own-make parts and purchased and abolished the QC section, the function of which was transferred to each section for related technology. Thus, this Department began to be in charge of the inspection over the whole process, from raw materials to assembly, and consistently gathered information on quality was disseminated to every section to Toyota and every subcontractor.

In the process of rapid production expansion since 1956, however, the suspension frequency of production line due to defective parts increased. As mentioned above, in 1958-59 Toyota needed special efforts to pass the U.S. Army quality requirement. In 1960 problems arose with the introduction of New Corona model, and during 1960-62 Toyota was outstripped by Nissan in

³³ Wada[1991, p.35] emphasizes the importance for the revitalization of Kyoho-kai of the competition among members resulting from their ranking in the Summary, though to a lesser degree prompted by Toyota.

domestic passenger car sales race. The problems were expressed as "the office work can't keep up with the increase in production," or "communication between sections isn't going smoothly as before," and also resulted from a relaxing of control over suppliers. As a solution Toyota introduced in 1961 a program of Total Quality Control (hereafter, TQC) and declared to promote company-wide QC as the backbone of management control. In 1963 inspection activity was transferred from Quality Control Department to each factory, which later developed to no-inspection-on-delivery policy. In 1964 Quality Control Head Office was newly organized, and QC Department was renamed Quality Guarantee Department. The activities related to suppliers were step by step concentrated to Purchase Department.

Not only within own walls but also among its suppliers Toyota tried to spread QC consciousness. Between September 1960 and May 1961 personnel both from QC Department and Technology Section (of Purchase Department) visited and gave guidance in QC to 68 suppliers. They calculated marks³⁴ for each supplier, then classified them into groups with different QC level, and applied different guidance for each and conducted short training courses accordingly between 1961 and 62. Toyota also vitalized the activities of Kyoho-kai which had been an autonomous supplier organization, and took an active part in the Kyoho-kai seminars. It had own personnel in each of eleven committees newly organized by Kyoho-kai in 1961, among which Coordinating Committee for Rationalization, QC Committee, and Technology Committee were important. Besides inspection tours of individual factories, Coordination Committee, consisting of Toyota director, head and section chiefs of Purchase Department, and Kyoho-kai officials of section head level or higher, carried out a survey of 56 member suppliers of Tokai Kyoho-kai.³⁵ QC Committee was in charge of TQC education for the top

³⁴ The marks were based on seven headings: statistical QC (20 pts) and organization related to QC (15 pts); internal planning (15 pts); equipment control (10 pts); control on the manufacturing process (15 pts); quality guarantees (15 pts); storage education (10 pts).

³⁵ They surveyed each supplier's management indices, debt-equity ratio, sales ratio to Toyota, conditions of labors, labor cost, cost structure, content analysis of value added, equipment-labor ratio and its relation to sales, production volume etc., and investigated their

management of suppliers, and Technology Committee was for the introduction and education of Value Engineering technique.

Thus, the activity of Kyoho-kai and its Committees was vitalized and carried out extensively in close connection with Toyota's TQC. This process was accelerated step by step and called "the synchronization" of production schedules. In 1963 Toyota introduced a "Kanban System" with some of its suppliers, and in the next year it appealed to suppliers to establish no-inspection-on-delivery system and asked as a step to increase the number of parts directly deliverable to production line with on the spot inspection.³⁶ Toyota upgraded the internal setup and pushed forward the synchronization of Toyota and suppliers' production schedules. It also systematize supplier evaluation and a comprehensive evaluation system was in place in September 1966,³⁷ more than ten years later than the keiretsu diagnosis.³⁸³⁹

correlations. This large-scale touring study session was epoch-making for Kyoho-kai. See Wada[1991, pp.39-40].

³⁶ Tokai Rika realized no-inspection-on-delivery of all parts for Koromo factory of Toyota (59 items) in May 1965. See fn.74 of Wada[1984, p.90].

³⁷ See Wada[1991, pp.41-42].

³⁸ In 1966 Toyota and its seven affiliates organized Shacyo-kai (presidents' meeting), and began to meet periodically to show Toyota's production plan, make systematic coordination with other's long-run plans, and discuss other problems. Also in February 1966 "Eight Firms' QC Connection Group," composed of "QC Managers' Committee" and "QC Section Chiefs' Meeting," was organized, under which were organized "Toyota VA Connection Group," "All Toyota Statistical QC Study Group," and each occupation's "QC Circle Interchange Group." The QC Connection Group became active in 1967. See Wada[1984, pp.92-93]. Here let me comment on such expressions as Toyota Group, Affiliates, Subsidiaries, Kyoho-kai, etc., each of which is loosely defined and causes confusion. Toyota use "Toyota Group" for the group of 14 firms: Toyoda Automatic Loom Works, Aichi Steel Works, Toyoda Machine Works, Toyota Auto Body, Toyoda Tsusho, Aishin Seiki, Toyoda Spinning & Weaving, Kanto Auto Works, Towa Real Estate, Toyota Central Research & Development Laboratories, Toyoda Gosei, Hino Motors, Daihatsu Motor, and Nihon Denso. Of 14 firms, only 10 have direct dealing with Toyota, and 7 firms for parts and body manufacturing, the first four and Aishin, Kanto, and Nihon Denso, belonged to the above mentioned QC Connection Group. Each Japanese assembler has its first-tier suppliers organization called "Kyoryoku-kai[Cooperative Association]." (About Kyoryoku-kai, see 4-5.) Kyoho-kai is Toyota's Kyoryoku-kai to which 190 firms (112 in Tokai, 57 in Kanto, and 21 in Kansai) belonged in 1963 and 223 (136 in Tokai, 62 in Kanto, and 25 in Kansai; 171 when double counting omitted) in 1984. Though Toyota Group is united both funding-wise and personnel-wise, only 25 (when ten from Toyota Group are excluded) out of 171 can be explained in terms of financial and personnel ties (Shiomi[1985,

4-4. Preliminaries for Study of Incentive Mechanism

Sections 4-4 to 4-6 are for the study of incentive mechanism which supported the productivity increase and product improvement in Japanese automobile industry.⁴⁰ This section is the preparation for the next two sections. The first part points out three types of popular misunderstanding, that is, predominance of exploitation, strong support of an assembler to suppliers, and lack of suppliers' voluntary efforts, and the second part is for the fourth type, closedness and exclusiveness of Kyoryoku-kai (cooperative association of first-tier suppliers).

Three Types of Popular Misunderstanding

First, the conventional view of Shitauke relationship with such key words as "exploitation," "burden-shifting," and "subordination (or dependence)" is not effective in explaining the productivity increase and product improvement. Note that we are talking about the Japanese economy before 1970, to which, as shown in the previous chapter, the dual-structure-view is still dominant. A rational reaction to the fact that "exploited" firms continuously supplied the rapidly expanded demands is to deny the prevalence of "exploitation." As shown in the next section, active contribution of suppliers supported by the incentive mechanism was one of the key factors for the success, which is inconsistent with the assumption of its prevalence⁴¹.

pp.85-86]).

³⁹ Note that in 1966 Toyota newly set up Purchase Control Department to spread TQC know-how to the first-tier suppliers, since the first-tier suppliers themselves increased in 1966-67 the use of suppliers which Toyota adopted a policy neither to deal directly with nor to exercise direct control over. The company's historians states that 1970 is the year when the "fundamental ideas and diverse methods" in the "Toyota production system" had become systematized (Wada[1991, pp.44-45]).

⁴⁰ Recall the last part of 4-2 for the basic problem, that is, the importance of the incentive and communication system.

⁴¹ Remember the point (1) on Logical Consistency in section 3-4.

Second, although there was close relationship between an assembler and suppliers, the former's support to the latter was not critically important for their productivity increase and product quality improvement. For instance, a questionnaire in December 1963 (Mitsubishi Economic Research Institute[1965]) asked to suppliers whether they were receiving a support of a specific assembler. It asked to answer in Yes or No on seven forms of "cooperation," whose results are summarized in Table 4-2. No item got Yes from the majority of respondents, and the highest ratio of Yes was for Technical Guidance with 26/56. Advance Payment got the lowest ratio of 3/57, and other forms follow in the order of Personnel Interchange, Bank Loan, Lease and Disposal of Equipment and Tools, Investment, and Materials.⁴²

---- Table 4-2.-----

Third, suppliers took decisions voluntarily for cost reduction and quality improvement, rather than strongly forced by an assembler. Even when the latter requested the former, it could be only within a strict limitation as such request would accompany commitment for the future. The questionnaire also asked what had initiated the supplier's efforts for rationalization and cost reduction, and requested to choose among alternatives: (1) guidance of "parent company"; (2) own initiative; (3) others. 47 of 58 answers chose(2), 8 chose both (1) and (2), and only 3 chose (1).⁴³⁴⁴

⁴² Of 58 respondents, 11 are with more than 2,000 employees, 11 with 1,999-1,000, 7 with 999-800, 13 with 799-500, 7 with 499-300, and 9 with less than 300. Therefore, the size of the respondents is larger than that usually imaged with "suppliers" and "SMEs." Also note that answers to Yes-or-No questioning is sensitive to the expressions, and "cooperation" is used instead of "support," "subsidy," "guidance," or "control." One of the latter group would make the ratio of Yes lower, I guess. This study also asked the same question to suppliers in such industries as sewing machine, bicycle, and camera, and got a result with similar tendency but lower ratio of Yes.

⁴³ See Mitsubishi ERI [1965, p.53]. For their production expansion, assemblers strongly required subcontractors for synchronization of production schedule, which Toyota called "super-market method" and Nissan "just-in-time method (or action plate method)." In order to deliver the just amount of parts just on the appointed date, subcontractors had to modernize and rationalize management (Sei et als.[1975, p.80]). Toyota

Kyoryoku-kai (Cooperative Association)

applied step by step the just-on-time just-amount delivery requirement under the super-market method. Inside Toyota, the application to production process began in 1952 and completed in 1956. Application to subcontractors began after that, however, at the start it was limited to such bulky parts as to take much time for transportation, and expensive key components. Only 30 out of 120 Kyoho-kai member firms delivered some of their parts on this method in November 1959, and all the parts were delivered on this method since 1961 when Toyota's monthly production volume exceeded 20,000 (Monthly Research Report of the Long Term Credit Bank, November 1963, p.15). Mitsubishi ERI[1965] listed means for rationalization in each of machine and equipment, production method, and scientific management method, and asked the year of introduction, whose answers illustrate subcontractors' voluntary decisions. For instance, 36 firms out of 58 answers by 1960, and 50 by 1963, to "the introduction of special purpose machine to the core production process," which is independent of the firm size. On the assumption that the adoption of scientific management method is indispensable for rationalization and production expansion, they asked the year of adoption of schedule management, production control, quality control, materials management, personnel management, suggestion system. The result is shown in Table 4-3. For example, 38 of 44 firms adopted schedule management by 1958, 29 of 46 for production control, 29 of 49 for quality control, 24 of 39 for materials management, 24 of 38 for personnel management, and 30 of 48 for suggestion system. No difference between firms with different size, either.

-----Table 4-3.----

⁴⁴ We can easily find cases which suggest it. For instance, Yasusada Nobumoto, the chairman of Japanese Association of Automobile Parts Industry and the president of Akebono Brake Industry, answered to the question, "Although assemblers need cooperation of suppliers for their production in North America, they do not ask you to come together. Is it true?": "They do not ask. Asking to come together means the guarantee, therefore, they cannot. When suppliers invest there, they say 'welcome,' but not 'we will buy'" (1987 API Yearbook, p.57). Likewise, Mr. Endo, senior managing director of Nissan, answers to the question, "Japanese parts suppliers succeeded in production process improvement, but not yet in purchasing, indirect sections, and management itself. Do you agree?": "Yes, I agree.... We have achieved the objective for the production process. The next step is related to purchasing, financing, and the management itself, however, we cannot and will not do it as we will be unable to do it without going too far. Nobody can do such a job except them by themselves.... We talk with them when requested, of course. For instance, we talked intimately on such important matters as their new plant investment in US" (1987 API Yearbook, pp.65-66).

We can also easily find cases which suggest that subcontractors voluntarily made their own important decisions. For instance, in 1959-62, in response to Toyota's plans for monthly output of 30,000 vehicles, "two collective industrial areas were born in Toyota city, the big one composed of plants by firms out of Toyota and the small one by the collective removal of local ironworkers. In neither case Toyota formally requested such collective action." "As in neither case Toyota made direct request for collective decision, the relationship between Toyota and firms in these areas has not such character of subordination as that of 'parent and child,' but such an equal one like man and wife." (Nihon Keizai Shimbun[1963] No.24).

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Each Japanese assembler organizes its first-tier suppliers' cooperative association called Kyoryoku-kai, and Toyota's Kyoho-kai, whose history I mentioned in the previous section, and Nissan's Takara-kai and Shoho-kai are the representatives. Let me make several comments on the reality and actual role of Kyoryoku-kai, as it is a big source of misunderstanding and mythification on the Japanese industrial organization. What follows also is the rejoinder to the comment on the above second and third points: even if suppliers' voluntary decisions, not an assembler's strong guidance and support, were decisive, hasn't Kyoryoku-kai played an important role? hasn't an assembler guided and strongly supported suppliers by controlling the activity of Kyoryoku-kai? didn't above mentioned Toyota's case suggest it?

Let us see briefly, first of all, the history of Takara-kai and Shoho-kai of Nissan which has been the rival of Toyota and during 1960-62 outstripped Toyota in domestic passenger car sales race.⁴⁵ In 1987, Takara-kai has 104 members and Shoho-kai 58. Most of large scale representative parts suppliers belong both to the latter and Kyoho-kai as shown below. Therefore, compared with the average figure of Kyoho-kai members, that of Takara-kai is smaller and more closely connected with Nissan.⁴⁶ Nissan organized Takara-kai in 1951, and began their activity in subcontractor education for the improvement of production and management technology. Starting with Industrial Engineering education for work standardization, they began QC education in 1958, and VA education in 1960. Nissan intended to change the basic character of Takara-kai from association for friendship to that for management control improvement and

⁴⁵ These two firms occupied 74.9 percent of the domestic passenger car production in 1963, and 70.4 percent in 1964.

⁴⁶ In the spring of 1991, Takara-kai and Shoho-kai were reorganized into Nissho-kai.

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strengthen the activity since April 1963.⁴⁷ Thus, the role of Takara-kai was smaller than that of Kyoho-kai, and Shoho-kai was much smaller.⁴⁸

In the cases of Mazda, Mitsubishi, and Honda, the role of Kyoryoku-kai is less impressive. Mazda organized a cooperative named Toyu-kai in 1952 with 20 first-tier local machining subcontractors (50 Years of Mazda, p.310), however, it organized Yoko-kai, Kyoryoku-kai of vendors, only in May 1981, to which 40 members of Toyu-kai joined (1981 API Yearbook, p.85). Both vendors and machining subcontractors belong to Mitsubishi's Kashiwa-kai. For vendors it is the place only for communication, and study group is organized only by machining firms (1985 API Yearbook, p.94). Honda maintained an "open policy" and has no Kyoryoku-kai, however, it recently declared a purchasing policy "to strengthen the relationship with firms which need Honda and Honda needs too" (1981 API Yearbook, p.93 and 100). In 1987 Yoko-kai had 177 members in total (60 in Nishi-Nihon, 61 in Kanto, 56 in Kansai), Kashiwa-kai 347, and Honda showed a list of 300 main parts suppliers (1987 API Yearbook).⁴⁹

Thus, Toyota and its Kyoryoku-kai is rather exceptional: Toyota's Kyoryoku-kai had closer mutual relationship among members than in others; it also supported the most actively members' efforts for cost reduction and product quality improvement. Thus, Toyota made exceptionally stronger influence on its suppliers than the other assemblers. Therefore, even when Kyoryoku-kai has played an important role in influencing and an assembler guided and strongly supported suppliers' voluntary decisions in the case of

⁴⁷ Nihon Keizai Shimbun, 25 March 1963. At this time, the number of Takara-kai members was 107, and the average amount of paid-in capital was about ¥50 million. See also pp.320-321 of 1967 API Yearbook.

⁴⁸ Shoho-kai began the activity materially in 1966 for the managers' communication among member firms (1968 API Yearbook, p.281).

⁴⁹ Even in 1991 Honda has no organization called Kyoryoku-kai, however, following API Yearbook, I use the group of firms in this list as the proxy.

Toyota, at least before mid-1960s it cannot be true for the case of other assemblers.⁵⁰

Next, let us see the "closedness" and "exclusiveness" of Kyoryoku-kai. Kyoryoku-kai and its relationship with an assembler is regarded as a symbol of the "Japanese-style production system" and quite often, being called "production Keiretsu," criticized because of its "closedness," however, most of the argument is based on misunderstanding. Note the following three points, of which the third is the most important. For an illustration, again, I take the most extreme example of Toyota. First, an assembler normally transacts business directly with Kyoryoku-kai member suppliers, but even Toyota has direct transaction with firms which are not members of Kyoho-kai. Although no exact data is available, 1967 API Yearbook states that Toyota buys 80 percent of the total purchase from Kyoryoku-kai members (p.312), which means 20 percent from non-members.⁵¹ Second, though the position as a member of Kyoryoku-kai has been quite stable, it has accepted not a few firms as new members. As Wada[1991, p.40] points, in the process of production expansion in 1960s, Toyota increased parts purchase without increasing the number of suppliers, which accelerated the formation of tiered interfirm relationship. Even in Kyoho-kai, however, of 171 members in 1984, 153 had been continually members since 1973, whereas 21 newly entered and only 3 exited.⁵²

Third, though the position as a Kyoryoku-kai member has been stable, the membership is not always exclusive, therefore, Kyoryoku-kai is not an exclusive organization. For an illustration, let us see the number of suppliers which are members both of Toyota's Kyoryoku-kai and Nissan's,

⁵⁰ In Japan, many suppliers' cooperative associations exist outside of automobile industry, however, those in the automobile industry are the most famous and relatively the most active. Note that, therefore, even when such an association has worked well in the case of Toyota and its success story is so impressive, it cannot be true for the whole of the Japanese economy.

⁵¹ Here, "Kyoryoku-kai" includes, in addition to Kyoho-kai, Seiho-kai for suppliers of die and tools and Eiho-kai for constructors and construction machine suppliers. Asanuma[1989, p.5] also reports that Nissan buys 10 percent of parts from non-members.

⁵² Shiomi[1985, p.97].

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which is supposed to be rare because of the long history of rivalry. In 1987, for instance, 7 of 104 Takara-kai members and 38 of 58 Shoho-kai members also belong to Kyoho-kai.⁵³ So many suppliers as Akebono Brake, Ichikoh Industries, NOK, Kayaba, Koito, Tokico, NGK Spark Plug, NHK Spring, Mitsuboshi Belting, Yazaki Corporation, etc. belong to Kyoryoku-kai of Big 5 (Toyota, Nissan, Mazda, Mitsubishi, and Honda) and other assemblers in 1987. Even Nihon Denso, the largest among "Toyota Group" firms and Toyota holds 23 percent of its stock, belongs to Kyoryoku-kai of all assemblers except Nissan.⁵⁴

4-5. Study of Incentive Mechanism

Let us study the mechanism which supports the subcontracting relationship in the Japanese automobile industry. Note four points: (1) Throughout the industry, from an assembler and vendors to machining firms, all the firms almost simultaneously began their efforts enthusiastically for modernization and rationalization of production equipment and management; (2) such efforts of vendors and machining firms were begun and maintained voluntarily, not initiated and guided by an assembler; (3) it was a hard way and took long time, as shown in 4-3, to establish close cooperative relationship among firms and to make it effective for productivity increase and quality improvement; (4) as suggested in the case study of Toyota, at

⁵³ Firms which belong both to Takara-kai and Kyoho-kai: Ichikoh Industries, Usui Kokusai Sangyo, Sanoh Industrial, Topura, Fuji Bellows, Fuji Vulbe, and Marui Industrial. The list of double membership firms for Shoho-kai and Kyoho-kai includes, in addition to the manufacturers of glass, tires, bearings, and batteries, Akebono Brake, NOK, Kayaba, Kawashima Textile, Koito, Jidosha Kiki, Sumitomo Electric Industries, Chuo Spring, Tokico, Topy, Nifco, NHK Spring, NGK Spark Plug, Nippon Piston Ring, Matsushita Electric Industrial, Mitsuboshi Belting, Meiwa Industry, Yazaki Corporation, Riken and etc. (1987 API Yearbook). In 1967 the corresponding numbers are 3 of 119 and 29 of 40. Odagiri[1992, p.163] made an apparent mistake in saying, "though some suppliers joined up to six associations (apart from Toyota's), only three belonged to either of Nissan's two associations. It must be that Toyota is particularly nervous of information leaking to Nissan, its arch-rival, through the suppliers."

⁵⁴ 1987 API Yearbook. Also, Aishin Seiki, 21 percent of whose stocks holds Toyota, is a member of Kyoryoku-kai of Toyota, Mitsubishi, Honda and others, and Toyoda Gosei, Toyota holds 46.2 percent of the stock, belongs additionally to Mazda's.

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the beginning even an assembler did not clearly realize the importance of such efforts, therefore, what efforts it should make and how. it realized step by step the importance and what it should do, and changed the direction of their efforts by trial and error. This point applies more critically to suppliers, for whom, especially for small machining firms, it was not easy even to realize what was requested by an assembler and what type of efforts were necessary for their work.⁵⁵

It is useful for the study of the mechanism which supported subcontracting relationship between an assembler and a supplier to distinguish the two view points: (a) what did firms in the relationship? (b) what did function as an incentive and what type of incentive was provided by an assembler to draw the efforts of firms, especially of machining firms? Also it is effective for discussion to distinguish the process into two stages: (i) the starting stage; (ii) the developing stage.

What was Done at the Starting Stage

For establishing a mass-production system for car manufacturing, an assembler had to show, first of all, to suppliers, with which it intended to make longstanding relationship for division of work, what was this industry, what would be the future, and what was the role it expected them to play. It had next to make efforts in three points: to indicate the role requirement and its level of technology and management to be achieved (presentation of the temporary objective); to persuade and give them an incentive to make decision to participate in the project and begin and

Kanto Kyohokai organized the Cost Reduction Study Group. They studied Toyota-production-system and interchanged information with Tokai Kyohokai members, and made remarkable success. See p.11 of 10 Years of Kanto Kyohokai: 1976-86. As mentioned above, Kanto Kyohokai is the association of large-scale businesses, and Kyohokai activities were developed mainly by Tokai Kyohokai and its members. Kanto kyohokai's action since 1976 suggests that even between Toyota's two Kyoryoku-kai it was not easy to understand what was necessary and what had the other group done for it, though several firms, for example, Akebono Brake, join both.

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maintain the efforts for the required role; to support their efforts and guide them for the effective achievement of the objective.

Automobile industry has peculiarities not so popular at that time as mentioned in 4-3, and to make owners and managers of suppliers realize exactly the meaning of the decision for participation needed long time and much energy, since it requested a fundamental change of their minds. A supplier had to spend long time and much energy, too, for understanding accurately the requirement, in realizing changes necessary for participation, and it had also to spend much both on the increase of employees and their education and on plant and equipment.

What an assembler did at the starting stage was to provide incentive for suppliers' efforts and to repeatedly give them concrete guidance for their efforts to achieve the requirement in cost reduction, better product quality, and the accuracy in appointed date of delivery.

Incentive System at the Starting Stage

What was the incentive system which made a supplier continuously commit resources to the project? Let us divide into two parts what the supplier realized (hereafter, "skill") by own commitment and with an assembler's support and guidance, the part (hereafter, assembler-specific) which entirely loses or reduces drastically the economic value when the trade relationship with the assembler ends and the remaining part (hereafter, general). Comparing with the next stage for development where the supplier was more strongly requested investment on large-scale production equipment, especially on special purpose machine, and synchronization of production schedule with the assembler, the relative share of the latter was higher. By the end of this stage, supplier became able to play a part in this modern mass-production assembly-type industry, which implies that it became

attractive also to other assemblers and even to firms in other assembly-type industries.⁵⁶

The supplier's loss from ending the relationship with the assembler depends on the size of commitment, the relative share of assembler-specific commitment, and the length of time to search for other purchasers.⁵⁷ Note that it is relatively smaller than that of the assembler, which is composed of cost for securing alternative supply sources and loss from the influence on the total production system in this period.⁵⁸ The fruit of the assembler's continued effort in supporting and guiding the supplier's commitment to raise the "skill" quality to the required level entirely disappears, and it has to follow again the same process by choosing from three alternatives: to select and support another new supplier; to increase purchase from other suppliers now trading; to make by itself.

An assembler had to achieve the objective under such constraints. What was the incentive system it should adopt and actually adopted? The objective it should follow was fourfold: to have the supplier make participation decision; to maintain the relationship with the supplier (to protect itself against supplier's run away); to draw supplier's continuous effort to play the required role; to establish close relationship with a

⁵⁶ Such a supplier is attractive for other assemblers even when it maintains close relationship with an assembler. As shown in 4-4, the relationship between an assembler and a supplier is not always exclusive. It is typical even for a small scale machining firm with such high ability not to depend 100 percent of orders to an assembler. For instance, in the above mentioned collective industrial areas in Toyota city, "Toyota requested the suppliers not to depend 100 percent of orders on Toyota, and reduce the Toyota dependence ratio to the level of 60 to 70 percent by finding outside markets through specialization. Thus, the majority of firms receive orders from other assemblers, though known as Toyota's collective industrial area "(Nihon Keizai Shimbun[1963] No.24). However, the Basic Survey of SME Agency shows that in transportation machinery industry, not limited to automobile industry, ratio of SMEs which depend 100 percent of subcontracting works to one purchaser is 88.4 percent in 1976 and 90.4 percent in 1981 (note, however, that 86.2 percent and 43.9 percent of SMEs in each year are engaged in subcontracting works). For an introduction to this statistics, see fn. 3 above.

⁵⁷ For example, it takes longer time to find other purchasers when a supplier (and an assembler), as in the case of Toyota, made plants out of the well-developed industrial area like Tokyo district. Also the higher the dependence ratio on the assembler, the longer the time for new purchasers.

⁵⁸ The higher the assembler's purchase ratio of some specific part from the supplier, the larger is the loss.

group of suppliers with which well-functioning system for division of work is organized.

The most fundamental problem was to show the profitability of the business and persuade the supplier for participation. What the assembler had to show was fourfold: (1) that the automobile industry had a bright future; (2) that this assembler would make success in this industry; (3) that it would not take such opportunistic behavior as to exploit the supplier after commitment (no holdup problem). To assure, for instance, not to change ex post for the assembler's advantage such terms of contract as price, quantity, lead-time for delivery, term of validity, and etc.; (4) that it would provide appropriate and necessary support and guidance. At the starting stage of the automobile industry, it was not easy to persuade suppliers on the first point, and much harder on the second point.⁵⁹ What it could do, therefore, was only to make guarantee repeatedly on (3) and (4) and accumulate their trust by its achievement.⁶⁰

Thus, an assembler had to make a long-run program, show it to suppliers, and accumulate their trust by following it sincerely. A supplier, in contrast, was on a relatively advantageous position: (1) as the process to meet the assembler's demand took long time and it could be achieved only step by step, the supplier could choose at each step whether to take the next one; (2) even when the trade relationship was to be broken, it would not lose all the economic value of the "skill." As mentioned above, at this starting stage, the ratio of assembler-specific

⁵⁹ Even in 1960, Toyota appeared to be not so promising, as suggested by an episode. A Toyota manager who spent all his career in Toyota since his graduation from Kyoto University, one of the best universities in Japan, once told me, "When I decided to get a job in Toyota, all of my friends, supervisor, and relatives asked why and advised to choose other promising firms."

⁶⁰ It was not easy for an assembler to acquire and maintain the trust of suppliers. For instance, the biggest problem for Mitsubishi (Mizushima plant) in establishing a mass-production line was to recover the trust of suppliers by wiping out their distrust caused by Mitsubishi's burden-shifting action in 1958-59 when three wheel automobile production, their main production item at that time, decreased drastically. See Takizawa[1966, pp.16-17].

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skill was low, and the assembler's loss would be larger than the supplier's.

What was Done at the Developing Stage

By the end of starting stage, a supplier became able to play a part in this modern mass-production assembly-type industry. The assembler's next objective was to request a supplier to restructure production capacity to meet a dramatic expansion of automobile production and to improve efficiency of the whole division-of-work production system. The assembler's request was fourfold: to expand the production capacity by active investment and employees increase; to invest in modernized and large-scale equipment for better efficiency and precision; to contribute for the improvement of the whole production system through synchronization of production schedule and introduction of specific use machine; to meet positively the requests for the common objective of an assembler and members in Kyoryoku-kai.

A supplier had to spend much time, energy, and money, and proceeded step by step as at the starting stage. However, it had to commit further into the trade relationship with the assembler at this stage, as the scale of commitment became tremendously bigger and the ratio of assembler-specific skill (especially the above third point) was higher. Therefore, what an assembler had to do were: to make suppliers feel safe in committing further into the relationship by securing own strong position in the market; to define clearly what was essential for efficiency improvement of the whole system, to show to suppliers the objective and the way for it, and to give support and guidance; to design an appropriate incentive system and give it to suppliers.

Incentive System at the Developing Stage

What was the incentive system that made a supplier maintain the effort at the developing stage? The ratio of assembler-specific skill became higher

and the supplier's loss from ending the relationship grew larger in this stage, however, the assembler's potential loss also grew. The higher was the supplier's skill-level, the higher was the ratio of assembler-specific skill,⁶¹ and the higher was the assembler's purchase ratio of some specific part from the supplier, the larger would be the cost for securing alternative supply sources and loss from the influence on the total production system in this period, and therefore, the assembler's loss.

Let us ask, "Why had a supplier continuously decided to maintain the relationship and made further commitment?" and "What incentive system made it such decisions?" The composite of four factors made it: (1) to reduce the supplier's risk by showing ex ante a risk-sharing rule, or by fixing a compensation rule as a custom⁶²; (2) that the assembler's loss from ending the relationship with the supplier is tremendous; (3) the externality of an assembler's action against a supplier. the assembler has close relationship with so many suppliers, and an action against one supplier may affect behavior of all other suppliers. because of this externality, loss from ending a relationship is much larger than the direct one⁶³; (4) that from the start an assembler had to make a supplier

⁶¹ Even when not so large as that of a vendor, know-how accumulated by a machining firm should not be undervalued. Mr. Masaoka, managing director of Mazda in charge of purchase department, answers in an interview: "Japanese machining firms have marvelous manufacturing know-how, such technology and know-how as in efficient arrangement of die and tools, and in maintaining product quality without expensive and handsome machine. For instance, even making a car-door needs lots of know-how, and nobody can do it only with a drawing" (1985 API Yearbook, p.76).

⁶² "Die compensation (Kata-hosho)" is an example. An assembler pays huge amount of money to suppliers for compensating the cost increase by the change and reproduction of dies incurred through unexpected change in assembler's drawings. The compensation often amounts to several hundreds million yen per year. For a case of Nissan, see p.98 of 1986 API Yearbook.

⁶³ When an assembler takes an opportunistic behavior and exploit one supplier, the other suppliers will change their expectation and devalue the profitability of their business. The assembler has to take such reaction of suppliers into consideration. In an extreme case, the whole production system is taken as the hostage in Williamson[1983]'s sense, and the assembler is risking to lose everything by an action against only one supplier. See also the discussion on the role of reputation and the reputation-bearer-view of a firm by Kreps[1989].

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realize the longstanding character of the trade relationship and make every effort to maintain the trust on it. it works as a guarantee for a supplier that an assembler will not take a short-sighted action. each concrete decision is strongly supported by a common understanding that the subcontracting relationship is established and maintained for the long-run interest. thus, a supplier recognizes that the assembler will not run a risk to lose all the system for a short-run profit.⁶⁴

Surrounded by such composite of four factors which functioned as safety devices, a supplier had made successively a decision on three points to each of assembler's request for commitment: whether to comply with the request? on what conditions? to what degree?⁶⁵ A supplier made commitments successively, some of whose period of duration usually overlapped. Therefore, both, a supplier and an assembler, did not regard each request and corresponding commitment as independent, and the maintained relationship for division of work which was friendly, productive, and mutually beneficial was the basic safety device.⁶⁶

4-6. Two Topics Related to Incentive System

Measures for Efficiency Improvement

⁶⁴ This factor applies more clearly to a vendor. Mr. Endo, executive managing director of Nissan, answers in an interview: "We purchase from a vendor not parts but technology, parts as a result of it. We sign a contract to purchase the parts now, on the assumption that the supplier will improve it with new idea and better technology even when we use the same parts for the next model. Thus, we sign not only for the parts now but also for research and development in the future" (1986 API Yearbook, p.87).

⁶⁵ It was often hard for an assembler both to observe and judge to what degree the supplier complied with the request and to have it fulfill the promise unless observed. I will discuss this point in the next section, as the countermeasure was a part of the set of measures for efficiency improvement of the whole system. Remember, however, that the longstanding relationship with the assembler was also profitable for the supplier, which assumed the assembler's trust on the supplier. Therefore, it was a part of the measure to show and persuade the supplier that sincere keeping of the promise was indispensable for the trust.

⁶⁶ Even if some of the safety devices was assigned to a specific commitment (for example, (1) among the above four factors), it was a part of this basic device.

In 4-5, I asked what had worked as safety devices for suppliers and an assembler, and concluded that the maintained relationship for division of work was the basic, for which the assembler had made every effort. This conclusion immediately awakes readers' question: "When an assembler decides to establish a long-run relationship by giving up spot market transaction, and makes every effort to maintain it stably, the supplier will be able to enjoy a monopoly. How can an assembler manage to achieve the objective, that is, the establishment of efficient production system?"⁶⁷ The revealed choice of long-run relationship implies its superior efficiency over two alternatives: to purchase through spot market and to make by itself. Therefore, the next question is how efficiency improvement could be achieved.⁶⁸ The apparatus for efficiency improvement of the whole subcontracting relationship, which is composed both of a collection of long-run relationship between an assembler and a supplier and of relationship among a group of an assembler and suppliers, was the composite of five measures.

First, the use of competitive pressure. The first type of measure is to introduce competitive pressure and provide incentives for better performance. Each supplier almost always has rival firms within the system. Toyota's "two-vendor policy" is a symbol,⁶⁹ and every machining firm usually has rivals within the system, including the assembler itself, with almost the same capability which would be able to take the place of it in a

⁶⁷ An episode which I experienced in 1988 symbolizes the situation. In commenting academics' discussion on SME subordination and exploitation in keiretsu relationship, a successful SME owner cynically asked, "Does some of you know that almost every SME owner wish to be put into keiretsu, and why?" Also recall note 44 supra.

⁶⁸ The answer is naturally the same as to the question for an "organization," "organizational transaction," or a "firm as an organization." See Part IV of this volume.

⁶⁹ For the details of Toyota's "two-vendor policy," see Matsui[1985]. As Asanuma[1989, p.4] states, this policy has been adopted in combination with the "practice of nonswitching." At the level of such broad groups of parts as head lamp, brake, and steering column, each assembler "seeks to secure more than one - typically two to three - suppliers for each kind and hold them in parallel. One of these is in some cases an in-house parts manufacturing plant" of the assembler itself.

short time.⁷⁰ Even in a case where it takes a long time to secure alternative supplier or to end the relationship with it has a risk to reduce drastically the efficiency of the whole system, with a careful long run plan, and every necessary procedure and explanation to others, the assembler would be able to use competitive pressure and replace the supplier if necessary and rational. Also the assembler can increase the members⁷¹ within the system, and the share of orders to firms with good performance in the long run. Thus, the use of competitive pressure can be an effective measure in the long run.

Second, direct intervention to prevent waste. An assembler can reduce the total production cost by asking suppliers a delivery at the price which it estimates as feasible⁷² and by preventing wastes through guidance which depends on a detailed information on the supplier's technology and management.⁷³ Though it may hurt smooth operation of the system by asking too much, appropriate guidance and intervention to suppliers with careful investigation can be an effective measure.

⁷⁰ For instance, Isobe[1964, p.22] reports the case of Mitsubishi (Mizushima plant): of 25 local subcontractors, 8 firms for plate work, 8 for machining, 3 for plate work and machining, 1 for accessory and plate work, 3 for casting and forging, 1 for rubber parts, 1 for wooden parts, and 1 for window frames.

⁷¹ It can reduce the cost to increase the members by pressing own employee to establish a new firm or by beginning trade with a firm the former employee of a subcontractor opened. However, increasing the members may raise the total production cost, and, as Wada[1991, p.40] points out, Toyota increased the parts purchase without increasing the number of suppliers in the expansion process in 1960s.

⁷² For instance, Isobe[1964, p.27] surveys the calculation method of man hour indication for unit cost in Mitsubishi (Mizuahima plant): "They calculate the man hour as the necessary time for a standard man in the factory at the standard load, including the time for transportation on the process. The man hour indication for each supplier is calculated by adding a room which suits for its capacity and equipment to this standard man hour. They use the standard time strictly in determining the machining fee, but admit margin in calculating the load."

⁷³ For instance, as mentioned in 4-3, the keiretsu diagnosis of SME Agency in 1952-53 was a wonderful opportunity for Toyota to learn how to make a factory diagnosis of suppliers. At this moment, suppliers began to attach control chart or materials for inspection at the delivery of the products. Also the large-scale touring study session since 1961 was epoch-making for Kyoho-kai.

Third, guidance and indication for improvement of the whole production process. An assembler can improve the performance of the whole production process by giving guidance and indication to each supplier both on the direction of the cooperative activities of all the members and on such individual decisions as choice of materials and its suppliers, choice of tools and machines and their better use, layout of equipments, work structure, job training method, and etc. It was the most effective diffusion route to suppliers, especially to machining firms, of the information and know-how on the efficient use of the machine of the newest type at each moment.⁷⁴

Fourth, urging suppliers to make efforts for improvement. The progress of production technology in the automobile industry is largely based on accumulated efforts for improvement within factories, where the role of suppliers and their workers can be great when they pursue the way for better efficiency and making fewer rejected articles.⁷⁵ Therefore, it is of critical importance to give suppliers the incentive for urging to

⁷⁴ Mr. Endo, executive managing director of Nissan, speaks at a Takara-kai meeting on the use of robots: "I visited your factories in these three months. Though a few making exceptionally active use, almost none of you were using robots in the way we were expecting, and I was deeply disappointed./ For instance, a robot with welding gun used for welding is still a welding machine... To use it effectively, you have to make a hand for it by yourself, and make the most of the play-back feature for your parts manufacturing. Effective use has to be made to replace workers in such ways as to transfer parts, and attach and remove components like engine, we believe. Looking from such standpoint, I could find almost nothing" (1986 API Yearbook, p.91). He also states that they manufacture by themselves 100 of the annual increase of 300 robots, and asks the members, when they cannot make better use of robots by themselves, to come to Nissan's Electronic Training Center where they are educating their maintenance personnel.

⁷⁵ Ohshima[1987, pp.81-82] states: "The strong international competitiveness of Japanese passenger cars depends not only on the good design performance on style, mileage, and fuel economy, but also on such high 'production technology' as to provide liable (trouble free) cars at low price with a wide variety. High production technology can be achieved not by the introduction of many robots but by the active attitude of workers to pursue the way for better efficiency and making fewer rejected articles. In the automobile industry, most firms make (at least design) by themselves machine for their own use, depending on the know-how for improvement accumulated within factories.... In this industry, the competitiveness of each firm is embodied in production technology, and depends on the capability for developing better production technology on production system, production line design, and machine tool development."

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reveal demands and propose ideas for the improvement of the whole production process.⁷⁶

Fifth, effort for improving the efficiency of the whole system of division of work. An assembler can improve the efficiency of the whole system, for example, by smoothing demands for supplier's parts delivery which contributes to the effective use of their capacity through reorganizing own manufacturing system, and by making larger the lot size through their standardization and promoting the use of common parts of parts orders which reduces the supplier's unit cost.

Thus, the composite of these five measures supplements the incentive system for efficiency improvement of the whole system for division of work. Note that those measures, especially from second to fifth, cannot be effective without active participation of and close cooperation with suppliers.

Long-Term Relationship with Flexibility, or Long-Run Flexibility

The second, third, and fourth safety devices mentioned in the last part of the previous section are effective on the assumption of a common understanding that the subcontracting relationship is established and maintained for the long-run interest, or at least on the assumption that a supplier so recognizes and trusts in the assembler's long-run behavior. The previous part, on the other hand, argues that the competitive pressure can be effective in the long-run for efficiency improvement. Then, what is the logical relation of these arguments and the meaning of the "long-run?"

⁷⁶ For instance, in 1966 Toyota newly set up Purchase Control Department and began to spread TQC know-how to principal suppliers, and introduced an incentive system: if a supplier's suggestion on how Toyota could reduce the parts cost actually led to cost savings, Toyota would return to the supplier half the amount saved. See Wada[1991, pp.42-43]. We also hear a complaint of insufficient efforts. Following the above mentioned talk of die compensation scheme, Mr. Endo of Nissan speaks with a concrete example: we ask you to express frankly your opinion when some of our proposal on design changes are not so important for users, and to tell us how much even a slight change will cost when you have already completed the die. we ask you to give to our design section the information and know-how as a manufacturer of specialized parts with expertise. 1986 API Yearbook, p.98.

For an illustration of an assembler's problem, let me list up the types of case where it would reduce the trades or end the relationship with the supplier unless such safety devices worked: a supplier is not so efficient in production or does not achieve such good performance in research and development as expected; the function of a supplier has become useless, for instance, by the change of materials, like a shift from steel to plastics; under depression, for example, an assembler wants to reduce demand for parts from a supplier, because of the reduction of car production or the shifting the subcontract to own fabrication; an assembler wants to exit from the market, or close the factory. A supplier trusts in the long-run behavior of an assembler that it will not take an action for reducing the trade and ending the relationship with it because of the safety devices which will impose a huge cost for it.

Note that the relationships between an assembler and each supplier are not just the same, though they are all longstanding, and the previous discussion does not apply to all the relationships. The relationship with a member of Kyoryoku-kai, for example, has higher priority for the assembler than that with a non-member. An assembler classified even Kyoryoku-kai members into groups with different priority rank,⁷⁷ and follows this rank in the allocation of orders when it has to reduce the total parts demands.⁷⁸ In this sense, the whole of subcontracting system has flexibility. Note also that "long-term" in the "long-term trade relationship" is not clearly defined, and has not widely accepted common understanding, but only means that it is not a "short-term" or spot

⁷⁷ For instance, Professor Wada of the University of Tokyo told me, referring to an interview with a president of Toyota's supplier, that there are de facto three groups among Kyoho-kai members, usually called simply A, B, and C in the ranking order, and some of secret information of top importance is informed at an early stage of development only to firms in A.

⁷⁸ The sensitivity of safety device is not just the same, and more sensitive to a high priority firm than to a low. Note here that each member knows own ranking, and all the members understand the function of different priorities. The safety device works when an assembler takes an action against this common understanding.

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transaction.⁷⁹ What follows is not to present a clear definition but only to sketch my rough image of how the long-run flexibility of the system is maintained.

When an assembler intends to reduce the trade or end the relationship with a supplier, it has to judge, first of all, whether it has enough reason to persuade the others and justify the action. When it correctly judges in the affirmative, the action will not have big externality on the others' behavior. But when it takes the action with such a reason as to stimulate the distrust of suppliers or without showing a persuasive reason to suppliers, it will suffer from a long-run big loss. The same logic applies also to an allocation of orders among suppliers, especially when the total amount reduces. Though a supplier is sure at the beginning of the relationship that it will not end without showing the reason, it cannot forecast accurately the future flow of orders from the assembler. It understands like others that the amount of orders, the profitability of the relationship, and the position and ranking priority among firms in subcontracting relationship entirely depend on its own performance. Here the safety device works also when the assembler takes an action against the common understanding.

An assembler will suffer from a long-run big loss because of the distrust of suppliers and collapse of active cooperation of suppliers, when the reason of reduction of total subcontract volume is, for instance, a shift of outside subcontract to inside fabrication for employment maintenance. Even a factory shut down without persuasive reason or against the common understanding will cause serious reactions of suppliers to the other factories. The same is true for an exit decision from a market (for instance, passenger car market), and it will suffer from a damage in the other markets (bus and truck market). The same amount of order reduction will cause a big difference of suppliers' reaction, and therefore of the cost for the assembler, depending on the method and the reason for

⁷⁹ See the Robert Solow's comparison of the modern employment relation to a marriage than a one-night stand (Solow[1980, p.9]).

justification. In some cases, it will reduce the assembler's cost by informing of the order reduction as early as possible for supplier's convenience and by supporting the adjustment.

Thus, a group of firms in subcontracting relationship with an assembler are mutually dependent and form an organic whole.⁸⁰ Even an assembler at the core of the group cannot replace one member with another without cost, and it has to persuade the other members with good reason. It can totally neglect it only when it will not care the total operation of the safety devices, that is, when the assembler entirely disappears.⁸¹

4-7. Concluding Remarks

"If we can agree that the economic problem of society is mainly one of rapid adaptation to changes in the particular circumstances of time and place, it would seem to follow that the ultimate decisions must be left to the people who are familiar with these circumstances, who know directly of the relevant changes and of the resources immediately available to meet them. ... We must solve it by some form of decentralization. But this answers only part of our problem. We need decentralization because only thus can we ensure that the knowledge of the particular circumstances of time and place will be promptly used. But the 'man on the spot' cannot decide solely on the basis of his limited but intimate knowledge of the facts of his immediate surroundings. There still remains the problem of communicating to him such further information as he needs to fit his decisions into the whole pattern of changes of the larger economic system" (Hayek[1945, pp.524-25]).

⁸⁰ Note, however, that, though I focused only on the trade relationship between an assembler and each supplier, there usually are dense network of trade relationship among suppliers, as is the case for Kyoho-kai members. I owe this point also to Professor Wada.

⁸¹ Even in such a case, the directors will suffer from "social responsibility" arguments. It may also applies to the government, financial institutions, and trade partners. Though a bankruptcy of big firm always accompanies a "social" ceremony, it is my view that it has almost nothing to do with the decision.

This statement, which Friedrich von Hayek wrote ten years before Toyota launched Crown, their de facto first passenger car, comes to my mind at the end of the study of the mechanism which supports the subcontracting relationship in Japanese automobile industry, which is one of the most important factors for its industrial success. The problem people have to challenge in manufacturing effectively passenger cars with more than 5,000 kinds and 20,000 items of parts is just the same as that illustrated here by Hayek.

Japanese automobile assemblers had to start with suppliers in low level technology and management, and achieved rapid productivity increase and dramatic quality improvement in a short time. Therefore, the problem had a dynamic nature. They have made a great success in challenging this dynamic problem by choosing to establish close long-term relationship with many suppliers, neither by fabricating most of parts by themselves nor by purchasing them in the spot market. What an assembler (and a group of firms in close relationship with it as a whole) intended and has actually realized are to stimulate the will to be a 'man on the spot' of an entrepreneur who had the potential, to have him make continuously his best effort and originality, and to create and provide information necessary for him to fit his decisions into the whole pattern of changes of the system. This process toward the success needed a long time and close cooperative relationship with suppliers, and the difference among assemblers of performance in challenging this problem has resulted in the tremendous difference in their firm performance.⁸²

Note that it was hard for rivals to imitate the process of an assembler for the success and much harder to achieve the same success by imitating it. The process was composed of a collection of steps each of which was the best response to the circumstances at each moment. Rivals

⁸² In recent years, new product development is quite often carried out through joint venture project with multiple firms because of the shortened product life cycle, and the skill of the firm in communicating with partners has critical importance to the long-run profitability. Though not an instance of automobile industry, a president of a medium-size firm in the Kawasaki District once suggested Canon as a representative of a firm with good skill, and Nikon as an opposite.

could not understand accurately why an observed action was the best response at the moment, and it was risky to imitate it without accurate understanding.⁸³ As mentioned above, even Japanese rivals praise Toyota, suggesting that a wide gap exists between them and Toyota, and even Kanto Kyoho-kai members did not clearly realize in 1970s what had occurred in Tokai Kyoho-kai.⁸⁴

As also mentioned in 4-4, latecomers in this industry such as Mazda, Mitsubishi, and Honda have recently strengthened the tie with suppliers. This observation can be explained with the composite of three reasons, which are essentially the solutions for the same problem: (1) The strong demand for frequent model change of a car and speed-up of the development process. It requires an assembler to strengthen the tie with suppliers in order to have them participate in the earlier stage of product development and provide their ideas, which is useful for a shorter development period; (2) Cost reduction. An assembler has realized more clearly that it can reduce the supplier's delivery price of parts by beginning the communication with suppliers at an earlier stage of development to show them the idea and design, ask their advice, and exchange opinion about it⁸⁵⁸⁶;

⁸³ Recall that, as shown in 4-3, Toyota did not clearly realize what it had to do at the beginning. They learned it step by step on the process.

⁸⁴ Recall that by 1970 Toyota had systematized the fundamental ideas and diverse methods in the Toyota production system. See fn. 39 above.

⁸⁵ As Mr. Taniguchi, managing director of Mitsubishi Motors in charge of Purchase Department, suggests that the cost of fabricating parts for completed drawings with detailed specifications is determined by the current quotation among vendors (p.93 of 1985 API Yearbook).

⁸⁶ Mr. Masaoka, director of Mazda in charge of Purchase Department, talks about the Kyoryoku-kai: They recognized that vendors' participation from early stages of new model development was indispensable for high-quality and low-price car manufacturing, however, it took six month only to visit each vendor to ask it, which was the opportunity for the Kyoryoku-kai formation (p.81 of 1981 API Yearbook). But to make it work effectively was not easy. Even in the past, some vendors participated from the fairly early stage, and advised Mazda to reduce cost by realizing earlier participation which, they said, no assembler had ever tried. One of the reasons for no trial was to keep the secret of each assembler (p.83). Mr. Endo, executive managing director of Nissan, also suggests the difficulty in the speech at Takara-kai meeting: "We decided to ask you to come to our technical center an earlier stage of development than before, much earlier than the public announcement, and to talk more actively with you about the forms and necessary IE conditions./ It was for your ideas and advice for improvement in better quality, easy making, low cost, and good looking.... We expected

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(3) Technological advice and assistance of suppliers. Because both of the rapid change in technological environment such as progress in electronics and of such strong demands as for a lighter weight car with using light weight materials and for many-item small-lot production, an assembler has realized that close relationship with suppliers with specialized skill from an early stage of development is effective.

The change in the character of the problem may change the appearance of subcontracting relationship, however, the basic nature of the problem for which it was established and maintained will not change, and therefore the mechanism supporting it will not change, either. The difference of performance in challenging the problem continues to result in tremendous difference in their firm performance, too.

you to provide us your know-how, and our designers intended to reflect them in drawings. But some of you misunderstood and mistook our intention, I am afraid. They seem to recognize it just an opportunity for information collection, especially for that of coming design changes at earlier stages (p.99 of 1986 API Yearbook). De facto grouping of Kyoho-kai members, mentioned supra in note 75, functions as a measure for the problem.

Table 4-1 Specialization Structure in Automobile Industry - Number of Subcontractors:
The Case of Toyota (Figure is a total of establishments)

	core components	electric -electronic components	drive train and stairing components	suspension and brakes	accessories	chassis	body parts	others	Total
first-tier subcontractor	25	1	31	18	18	3	41	31	168
second-tier subcontractor	912	34	609	792	926	27	1213	924	5437
third-tier subcontractor	4,960	352	7,354	6,204	5,936	85	8,221	8,591	41,703
Total	5,897	387	7,994	7,014	6,880	115	9,475	9,546	47,308

*Each figure for second-tier, and third-tier subcontractors is a total of number. Estimate without duplication for second-tier is 4,700 and third-tier 31,600.

Source: SME Agency, Bungyo Kozo jittai chosa (jidoshha) (Survey of specialization structure (automobile industry)), 1977. Adopted from 1978 SME White Paper, p.168.

Table 4-2 Support of an Assembler (number of responses)

	Support	No Support	Total
Personal Interchange	8	49	57
Investments	17	42	59
Advance Payment	3	54	57
Materials	19	37	56
Technical Guidance	26	30	56
Lease and Disposal of Equipment and Tools	11	45	56
Bank Loan	9	46	55

Source: Adopted from Mitsubishi Economic Research Institute [1965, p. 38].

Table 4-3 Adoption of Scientific Management Method (number of responses)

	1955	56	57	58	59	60	61	62	63	Total
Schedule Management	28	4	3	3	1	3	0	1	1	44
Production Control	14	5	5	5	1	7	2	4	3	46
Quality Control	12	2	10	5	11	1	3	3	2	49
Materials Management	15	2	5	2	5	5	2	1	2	39
Personal Management	13	3	4	4	6	4	0	2	2	38
Suggestion System	12	7	2	9	6	6	3	3	0	48

Note: Number in 1955 includes firms adopted before 1954.
 Source: Adopted from Mitsubishi Economic Research Institute [1965, p. 49].