CHAPTER 4

ENTREPRENEURIAL NETWORK ORGANISATIONS IN THE WORLD AUTO INDUSTRY AND JAPANESE SUB-CONTRACTING ARRANGEMENTS

The last Chapter has provided in great detail the role of ENOs in the economic development of the Asian region. This Chapter extends the discussion into a more specific industrial sector – the automobile industry – to demonstrate that an economic activity organised along the ENO structure is capable of competing internationally. Owing to its triumph, the Japanese model of automobile sub-contracting arrangements is discussed in a great detail to provide a clear picture of the nature and working mechanism of such an ENO in modern economy.

It is interesting to study the Japanese automobile industry and its sub-contracting arrangements for two reasons. First, its ability to compete internationally and hence turn out to be the world’s largest producer within a few decades, whilst simultaneously developing a production model for the world’s automobile industry. Second, it would be an appropriate model for developing countries to incorporate into their industrial policy, particularly for those countries who are involved in the auto industry such as Malaysia. As a late comer to industrialisation, the Japanese model of ENO in the automobile industry is essential for developing countries should they wish to survive present global competition since the model has proved its success and has been emulated even by established firms in the West.
4.1 Significant Contributions of the Automobile Industry

The continuous fascination with the automobile industry and its significant impact on socio-economic life of mankind are illustrated in many studies (see for examples, Ueno and Muto 1980, Mutoh 1988, Smitka 1991, Law 1991, Wells and Rawlinson 1994). Of significance is its impact on economic development, industrial organisations, technologies, managerial practices and the standard of living of producing countries. Lately, as a major contributor to environmental degradation worldwide, it has attracted more attention. Due to its prominence, the automobile industry is often viewed as the representative of modern industry (Law 1991).

Its contribution to economic development, whether measured in national or regional bases, is well recognised. The automobile industry is considered the single largest manufacturing sector in the world (Turnbull, Oliver and Wilkinson 1992). More than 10 per cent of the Japanese and American output and employment was derived from the industry (Smitka 1991). Its shares in the Japanese manufacturing value added, employment and exports in 1980 were 7.4 percent, 6.2 per cent and 17.9 per cent respectively (Mutoh 1988). In 1988, the output value and total number of employment of the industry of the 12 European Union’s member countries were about ECU80 billion and 1 million workers respectively; the top five producing countries, in order, were Germany, France, Italy, Spain and the United Kingdom (Sadler 1994). The automobile output of these 12 countries as a whole accounted for 10 percent of the total manufacturing output; in Germany alone, the sector contributed about 20 percent to its Gross Domestic Product (GDP). Its contribution to the region’s trade surplus amounted to ECU22 billion in 1991 (Wells and Rawlinson 1994).
This industry is income elastic in which the automobile stock is expected to increase faster than the increase in income level. In figures, the income elasticity of the automobile stock was 1.31 and 1.03 in eight advanced countries and less-advanced countries respectively (Ueno and Muto 1980). World demand elasticity for automobile exports is also high leading to the increase in the industrial productivity (Mutoh 1988). More importantly, it links directly or indirectly to a wide range of other sectors from primary to secondary and services sectors. It also links many types of producing firms, from material producers to intermediate and capital manufacturers and final assemblers.

Efforts to develop the automobile industry have significant impact on resource-based industries - iron and steel, chemical, nonferrous metal, rubber and plastic-related industries as well as petroleum-based industries; and on non-resource based industries, such as electrical and electronics-related parts. In the services sector, it provides service-related activities, such as stamping, repairing, designing and engineering, banking, shipping, storing, insurance and distributing and marketing channels. Of significance, the automobile industry requires a set of production systems linking a wide range of industrial organisations and technologies with great variations in size and sophistication.

The ability of a country to develop this industry means a great opportunity for the emergence and development of its small and medium firms (SMFs). Such huge backward and forward inter-linkages justify one's arguments that the industry is the backbone of the economy. This cross-sector link is thus crucial in the development policy of developing countries for further growth.
The automobile industry is the pioneer industry which brought about changes in the mode of industrial organisations, industrial technological approach and the managerial practices. Its innovation is later adopted as a standard mode of practices and followed by other industries. Until recently, the mode of industrial organisations is dubbed as Fordism and Post-Fordism or Neo-Fordism (Sayer in Law 1991) because these two concepts are derived from the automobile industry that refer to different modes of economic organisations. The first refers to the old mode of rigid organisation pioneered by Ford of America, while the latter is the new mode of flexible organisation pioneered by Toyota of Japan.

4.2 The World Automobile Industry in Transition

Several waves of transition in the world automobile industry have occurred since the emergence of the automobile in the history of human life at the turn of the 20th century (Gwynne 1991). Each wave is characterised by the advent of new innovations either in the product, production process, or production system. This innovation is normally undertaken by new producers from a new region of the world which become predominant in the production and tend to shape the world automobile industry.

New producers are predominant when they have significant shares in the world total output and export market of automobiles; and they appear with new technological methods and production systems. Recent transition has taken place in the 1980s when the Japanese automobile firms put a tough challenge to the traditional producers (the U.S and the European firms) through their innovative measures in almost every aspect of the automobile production.
There has been a number of countries around the world currently involved in the automobile manufacturing industry. In 1980, 26 countries produced automobiles; but its distribution was heavily concentrated in 10 dominant producing countries - Japan, the United States, West Germany, France, the Soviet Union, Italy, Canada, the United Kingdom, Spain and Brazil - which accounted for 90.5 percent of the world total output (Mutoh 1988). On a regional basis, the three dominant producers are Asia, North America and Western Europe (Bloomfield 1991). The main auto producers in the Asian region as ranked by the total number of annual production are Japan, South Korea, China, India, Taiwan and the ASEAN countries - Thailand, Indonesia, Malaysia and the Philippines (Abrenica 1998).

The participation of a large number of countries makes the world automobile industry much more competitive. Stiffer competition was really felt when Japan started to promote the industry earnestly in the 1950s. Immediately after the WW II, the Japanese presence in the automobile industry was unknown. Its output by the end of WW II was at a level of almost zero (Mutoh 1988). Nissan and Toyota together were still insignificant in their presence in which their production was merely 1,300 cars in 1950 (Smitka 1991). All auto assembly plants in Japan produced the automobiles about the same number. Consequently, the share of imported automobiles in the domestic consumption was high.

The smallness of the Japanese automobile industry against the U.S. and the U.K automobile industry was obvious. In 1955, it was only one-half of the U.S. and one-quarter of the U.K level, both in terms of value added and employment. By 1970, Japan ranked the world's second largest producer of automobiles; the first largest in the
production of buses and trucks and the third in passenger cars behind the U.S and West Germany (Ueno and Muto 1980). In 1979, Japan ranked first in the world automobile industry in terms of units produced (Mutoh 1988). With respect to the volume of exported cars, however, Japanese firms outpaced the United States and Italy since 1968 (Miyakawa 1991).

The 1973 oil shock felt by Western automobile producers was the first time indication of the Japanese advent in the industrial race. The Japanese put a tough challenge to old producers in terms of quality and price (Smitka 1991). Since the import liberalisation adopted in October 1965, top-level Japanese automakers were able to compete with U.S and European producers in the productivity and performance capability of passenger cars (Ueno and Muto 1980). In the following decades, the American and European firms lagged far behind the Japanese producers in their competition. The U.S. Big Three - General Motors (GM), Ford and Chrysler - were not able to compete with the Japanese cars in terms of quality, productivity, cost advantages, new models and the growing share in the world markets (Smitka 1991).

The recession that hit large automobile companies, especially in the U.S during 1980-83, accelerated the transitional process and became a turning point in the world automobile history. The Big Three took an earnest step in investigating the structure of relationships among the automobile core firms, parts producers and workers in other countries. They found that the extraordinary achievement of the Japanese automobile industry lay in the ability of the Japanese automakers to organise their technology, management, labour and buyer-supplier networks embedded along the production process.
Upon seeing the advantages of the Japanese model, the Big Three reorganised their own production system resembling closely the Japanese automobile firms (Sheard 1983). Not only them, the model has been emulated by other automobile manufacturers (Hill and Lee 1994) across national boundaries; it has indeed "exerted a great influence on the structural and locational pattern of the entire industry in the world" (Miyakawa 1991: 88).

Long-term contracts between the U.S. Big Three and a selected number of direct components suppliers towards a collaborative manufacturing (sub-contracting) are reportedly increased (Rubenstein 1991, Bloomfield 1991) and expected to be a common practice in the future (Glasmeier and McCluskey 1987). The increasing trend in outsourcing of automobile assemblers from components suppliers is also seen in the European automobile industry since the 1980s (Rawlinson 1991) and this transactional arrangement has transcended even national boundaries (Wells and Rawlinson 1994). The "Japanisation" of the Western production system (Friedman 1983) indicates that Japan has formally taken the lead in the new production mode of the world automobile industry, replacing the U.S.'s old, long-standing vertically integrated mass-production model.

The pervasiveness of the Japanese model in the world automobile industry becomes more apparent when Japanese automakers, albeit their prior reluctance (Hill and Lee 1994), have been forced by their competitors, particularly the U.S. to reorganise their production system internationally. Honda made an announcement of the construction of its first automobile assembling plant in the U.S. in 1980 and went into operation in 1982; it was then followed by other Japanese automobile firms.
(Miyakawa 1991, Rubenstein 1991). The relocation process of the Japanese firms in the
U.S., Europe and other developing countries facilitates others to imitate its model more
effectively, either through traditional technology transfer (such as licensing) or joint-
venture agreements.

4.3 The Japanese Auto Manufacturing Industry

The Japanese local firms entered into the automobile manufacturing industry
about the same period as the establishment of Ford in the U.S. in 1903. In 1904, Tokyo
Motor Vehicle Manufacturing was the first Japanese firm to manufacture automobiles.
The First World War (WW I) that broke out in 1914 led to the increase in the demand
for army trucks. The total number of new Japanese autofirms increased to cope with the
demand. Tokyo, Osaka and Kobe turned out to be the important areas for automobile
manufacture during the period (Miyakawa 1991).

The Japanese automobile industry was reshaped only after the Great Kanto
Earthquake in 1923. This disaster damaged a large part of Tokyo; the automobile firms
in the area suffered great damage. Public transport (buses) became the widely accepted
mode of transportation then. Buses were ordered by the Japanese government from
Ford in the U.S. Seeing the opportunity, Ford and later the GM and Chrysler decided to
set up plants in Japan because it was costly to ship the completed vehicles from their
home country - the United States: Ford built an assembly plant in Yokohama in 1925;
GM in Osaka in 1927; and Chrysler through a joint venture in 1929.

Those Big Three were involved in producing completely knocked-down (CKD)
motor vehicles for public transport. Much of the automobile parts required for local
assembly were imported. According to Smitka (1991), an attempt by several Japanese firms to produce four-wheel cars in the late 1920s failed because they were incapable of competing against the American companies, namely Ford and GM. The only Japanese auto producer during the time was the Japanese military, producing the trucks on a small scale basis in their arsenals. There were also a few local firms producing common replacement items, such as spark plugs, brake linings, belts, springs, piston rings and radiators.

The participation of Japanese firms in the industry was only apparent by the end of 1930s. However, their fast development since then was a record. From a key role as assemblers, they expanded to credible manufacturers in just a few decades, signifying their ability to mobilise both internal and external resources. With stiffer competition among domestic producers allowable by the government, the 11 producing firms had no choice, but to enhance their productivity and quality. They improved their internal resources by borrowing management techniques and buying licensing technology from the U.S., besides improving the skills of their workforce and managerial resources. Of the 11 Japanese automakers, Toyota Motor Corporation is the largest producer with 40 percent share in total sales of the Japanese market and also one of the world's largest auto producers. Its total production was 3.6 million cars during its fiftieth anniversary in 1987, representing about 9 per cent of the world production (Wada 1994).

One strategic step adopted by the Japanese firms is the way they organise their scarce resources collectively with smaller supplier firms. Unlike the typical practice of the Western automakers, such as the U.S. Big Three, which own and directly operate
parts and components plants, the Japanese automakers rely much for their parts and components on external suppliers.

There seems to be specialised tasks between assemblers and suppliers. The assembler provides a stable market on a longer-term basis of orders to the supplier, while the supplier, given the market assurance, has the responsibility to lower the cost of production and to improve the quality of products should they wish to sustain their network relations. It is a common practice in Japan where the sub-contractors undertake R & D, design and product development and engineering improvement and implement statistical quality control and JIT production systems.

The assembler-supplier networks have developed over time and it has now become a complex system which is believed to be one of major factors underlying the competitiveness of the Japanese automobile industry (Asanuma 1992). Sheard (1983) argues that the rapid growth (several folds) in the Japanese automobile industry during the post-1945 period was much attributed to the massive innovation at the level of individual firms and their production systems, among others, through the rationalisation of sub-contracting networks. Owing to their comparable achievement to the American and European competitors in product performance and quality of the engineering and manufacturing features, the Japanese firms set a new standard internationally (Nishiguchi 1994).

In fact, the Japanese customer-supplier production networks involve two types of relationships distinguished by geographical location. One is the existing domestic networks which comprise the Japanese automobile assemblers and their local suppliers. The other is the off-shore production networks which involve the Japanese automobile
assemblers and their indigenous and foreign suppliers. This chapter deals only with the first category of network due to its easy generalisation in comparison to the complexity of the offshore production networks. Moreover, the Japanese automaker and auto-part firms and production are highly concentrated at home, rather than, in the host country.\(^8\) The domestic automobile firms or plants are also concentrated in the prime industrial regions of Keihin (Tokyo-Yokohama), Nagoya and Osaka.

According to Hill and Lee (1994), there was little tendency for Japanese automobile firms to set up their plants overseas because they need a considerable intimate collaboration with the suppliers to pursue their product design, quality control, flexible production and JIT delivery schedules. They preferred to organise clustered production networks taking all collaborative firms close to one another in space and time. The capital-intensive nature of the industry itself limits its development outside; cultural factors, such as loyalty and lifetime employment of the core-workers which are difficult to find elsewhere add to the limitation. Only a small number of the Japanese off-shore plants sells a substantial share of their production to the local markets of particular host countries.

4.4 The Need for Sub-contracting Arrangements

The automobile manufacturing industry involves a complex set of parts making, system-component assembly and the annexation of different bundles of technology (Rawlinson 1991). A production system becomes more complex when a product requires thousands of parts, components and subassemblies. In the case of a completed automobile,\(^9\) it comprises 1500 basic parts (Sheard 1983) or 10,000 to 20,000 individual
parts (Smitka 1991); but it goes to over 20,000 and 20-30,000 parts according to Wada (1994) and Yoshimatsu (1999) respectively, contingent upon the complexity and sophistication of the vehicle and the method of counting, each of which has to meet a standard precision and quality set for market demand, weather and durability (Ueno and Muto 1980).

The automobile (motor vehicle) itself is a commodity that involves a complex set of production processes taking place within a production system\[^{10}\] and a value added continuum of what Porter (1985) calls a value chain. This value chain involves a flow of production and service processes from product development (R & D and design), manufacturing process of individual parts and components, sub-assembly of the individual parts and components, and assembly of end units of automobiles; to distribution and marketing. Neither possible nor desirable for a single entrepreneurial organisation to perform all the tasks.

Every stage of the production and distribution tasks may be performed by different actors and may require different skills. With respect to skills in the parts manufacturing, Hill and Lee (1994) break down into two types of parts: lower value parts (examples are brake linings, clutchplates and wire harnesses) and high value parts (examples are transmissions, drive trains, electrical systems and engines). The first type is more standardised that requires less sophisticated technology, skills and capital. They can be produced in large volumes. The latter is more specialised and precise. It requires more advanced technology, skills and capital; hence it is less routine to produce.

How can a firm organise such a complex set of production processes? The downturn of Western automobile producers in the 1980s came largely from their
failure to foresee such a question in the first place, leave alone translate it into a more practical manner. They did not realise that the pattern of consumer demand had changed with the increase in the standard of living. Consumers with higher prosperity wished to have a more differentiated choice of similar products. Yet, the Western producers believed that consumer wants had never changed. They continued producing standard auto-model (for example, T model of Ford), whereas the Japanese had differentiated their auto products.

The adoption of product differentiation, however, requires a flexible production approach. But, a complex industry such as the automobile industry cannot be executed by a single actor due to the danger of inefficiency. Acknowledging such a critical issue, the Japanese turned to sub-contracting arrangements \(^\text{11}\) operated through a constellation of entrepreneurial organisations as an integral part of their automobile manufacturing.

4.5 The Japanese Automobile Sub-contractings

The outstanding development of the Japanese automobile industry could be seen in many dimensions, among others, in the perspectives of automobile assembly and production, parts manufacturing and system-component subassembly, flexible production, exports market, technology, production system (process) or production networks, division of labour and flexible specialisation.

Since one of the aims of the present study is to investigate the division of entrepreneurial organisations, this section confines itself to the development, configuration and characteristics of the Japanese automobile production system. By examining the Japanese auto-production system, one would find that sub-contracting
arrangements between the automakers and their suppliers are not developed with the genesis of the industry itself, but with an evolutionary process shaped by the interplay of a wide variety of economic and social capital variables.

The flexible production approach adopted by Japanese firms to permit product differentiation (Friedman 1983) required them to organise a new production system or process which is totally different from the Western old mass-production system. Instead of adopting the in-house production approach for a standardised product as normally found in the West, the Japanese automobile firms tend to buy, rather than to make in-house, auto parts and components: the average Japanese automaker makes 30 per cent parts in-house compared to about 50 per cent by the average U.S automaker (Best 1990). In line with their product diversification strategy, Japanese automakers have switched to a new production system, i.e. the sub-contracting arrangements (shitaukei) - which is later associated with the outstanding performance of the Japanese industry.

4.5.1 An Organisational Reconfiguration

Owing to the domination of the U.S Big Three in the Japanese and World automobile industry by the turn of the 20th century, there must be some imitating efforts on the part of the Japanese firms to survive in the industry. During the early period of the 1930s to 1950, for self-sufficiency reasons, the Japanese automakers integrated vertically their entrepreneurial organisations as widely practised in the West. In their effort to learn the mass-production system, Nissan (established in 1933) and Toyota sent their engineers to work with Ford (Miyakawa 1991). Important and critical
parts or components, such as brakes, castings and other subassemblies were produced by the automakers own plants. Independent firms were merely allowed to do some stampings and supply simple parts.

The development after 1950 saw a new pattern in the organisation of the Japanese automobile industry. The integrated M-form as practised earlier was swiftly replaced by a new form of ENO - the sub-contracting arrangements. This transformation indicates the increasing importance of outsourcing in the Japanese automobile industry. Under long-term contracting agreements, the automakers tend to source (to buy) automobile parts from their external suppliers (Inaba and Tabeta 1995, Tabeta 1996, Tabeta and Shahidur 1996). According to Smitka (1991), the value of outsourcing (purchases) in the Japanese automobile industry alone made up 70 per cent of total manufacturing costs; the U.S. automobile manufacturers, in contrast, tended to make in-house rather than to buy the parts from the external suppliers, particularly prior to the economic downturn in the early 1980s (Asanuma 1992).

The increasing trend in outsourcing and the inter-dependency of the automobile group firms are probably best illustrated by the manager (administration staff) of the Purchasing Administration Department in Toyota Motor Corporation Headquaters as follows:

"When we started making motor vehicles, there were few full-fledged components manufacturers in Japan from whom we could buy necessary components "off the shelf" to assemble. We had to make many components in-house. But over time the situation has changed. Especially after the 1960s, we began to rely on our suppliers' ability to design and produce automotive components for us. Today, we just give them basic ideas and specifications of the components we want for a specific car. Then they give us professional ideas and turn them into products. Our job is to maintain our ability to judge their technical capabilities and proposals and to demand corrections if necessary. We
can't actually make many of the components in-house. We make only engines, transmissions and some other important components, which is why our suppliers are so important to us. We'll do whatever we can to help them become competitive because it's good for us, too. By design, it is impossible to switch them around or fire them simply because of fluctuations in demand" (Nishiguchi 1994: 118).

4.5.2 Mixed Forces Inducing the Reconfiguration

The emerging distinctive feature of the Japanese organisation in the automobile industry has drawn a lengthy argument from a wide variety of interested parties, from inside and outside of Japan. For scholars, those are the times for them to observe, theorise and explain what they believe pertinent to their hypothetical questions of the Japanese special feature.


The flexible production approach was also applied by Friedman (1983) in his comparison of the Japanese automobile firms to the mass-production system of American automobile firms. More importantly, some scholars also realise the strong influence of non-economic factors on sub-contracting arrangements. They include the

Within the framework of transaction cost hypothesis, the reason for automakers to integrate vertically their parts suppliers under their big corporation is to minimise the transaction costs due to high asset specificity in the industry. High technological know-how required by the industry added with the non-transferable feature of the know-how and the non-patentable feature of the skills may provide some opportunities for the suppliers to increase the price of their parts in the next contract. With the special characteristics of the industry, barriers to new entrants are high, hence leading to high costs of switching-suppliers (costs of getting alternative suppliers).

The Japanese automakers, however, succeeded in mitigating the opportunism. Joint-shareholdings, better coordination and information sharing among their limited number of parts suppliers enable the automakers not only to avoid such opportunism, but also to reduce the overall cost of auto production. It makes them highly competitive in the international markets. Information sharing also functions in the same way. Though specific parts require a highly specific technology to be assigned to some suppliers, the information about the technology is disseminated and shared by all their group members. This strategy makes easier for the automakers to get new suppliers for the specialised parts in the case of default by the existing suppliers in the future (Tabeta 1996).

The dual economic structure of the dualism theory can be observed in several frameworks, namely risk-shifting hypothesis, joint-profit maximising, risk absorption
and their mixes. These frameworks are also known as the principal-agent frameworks (Tabeta and Shahidur 1996). The dual economic structure argues that the auto monopsony uses smaller suppliers as buffers against the business cycle which was highly applicable during the early period (1930s-1960s) of their establishment. The risk-shifting hypothesis argues that the strong bargaining power firm acting as monopsonists exploit its supplier firms by shifting the cost to the latter to avoid a higher business risk. At the same time, suppliers are used as buffers during periodic economic disturbance.

The joint-profit maximising framework is concerned with the expected profitability of the member firms maintaining such a collective group, but this framework according to Tabeta (1996) is less explanatory in many studies of the Japanese groups. The network grouping is more obvious in sharing risks among their member firms. Thus, the performance of the group stabilizes. It is based on risk-sharing hypothesis in which the automakers provide an insurance service against the uncertainty in the sales and profit rates of their suppliers. The suppliers, in turn, buy a risk premium from the automakers. Major automakers, such as Toyota, Nissan, Mazda and Mitsubishi, absorb around 90 per cent of unpredicted cost incurred by their supplier firms in the course of the parts production (Asanuma and Kukutani, as quoted in Tabeta 1996).

But, whatever approach is adopted, one thing is obvious, the internal (particularly economic) factors are not the only variables. The external environments that mutually shape the distinctive feature of the entrepreneurial organisation in the Japanese automobile industry are also responsible. Therefore, any effort to distinguish the internal variables from the external variables within a different framework as

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developed in Chapter 2 would entail a trivial end in such a complex society as Japan. This is in a clear evidence once the historical evolution of Japanese sub-contracting arrangements is studied deeply.

Owing to the longitudinal studies by Smitka (1991) and especially Nishiguchi (1994), the evolutionary process of the Japanese arrangement and factors influencing its organisational structure can be divided into three phases: the prewar period (prior to 1945), the immediate postwar period (1945-1960) and the contemporary period (the years after 1960).  

4.5.2.1 The Pre-War Period (Prior to 1945)

Prior to the 1930s wartime, sub-contracting according to Nishiguchi (1994) was not a feature of the Japanese economy. Labour or firm idiosyncrasy (dualism) was not the source of economic advantage in the economy at the turn of the 20th century. Machinery and components for domestic manufacturing were substantially imported. Although, the WW I in the 1910s forced Japanese firms to produce their own equipment and machine tools, most of the manufacturing work was conducted in-house. Therefore, the locally-based automobile industry was not really developed during the time.

The 1920s general recession and the reentry of Western competitors created a dual structure in the Japanese economy. Labour force was demarcated into two groups: the first group was the ones who worked with the large manufacturers; and the second group was the ones who were expelled or denied from entering the first group of labour and had to either work with or be owners of small firms. The pheripheralising process
of the workers into small firms created a dualistic economy in the Japanese history with a dual system of wages or incomes. The income differentials widened between the large core and the small peripheral firms. The environment provided a conducive opportunity for the large firms to use the small firms as their sub-contractors in the later period.

The wartime during the 1930s to 1945 was the opportunity for the advent of sub-contracting in Japan. Its rise during this period is characterised as "a distinctive product of the wartime economy" (Nishiguchi 1994: 28). He attributes it to four macro-structural factors, namely the economy (including the dualistic structure of the economy), technological development, infrastructure and political power. Following him, neither a specific cultural value, nor the advent of dualism was a sufficient condition for the emergence of sub-contracting arrangements in Japan.

There were two significant developments by the 1930s that provided the opportunity for the Japanese firms to get involved in the automobile industry. One was the sharp devaluation of the yen as a result of the abandonment of the gold standard by the government and the concurrent increase in tariffs leading to the increase in the cost of imported items (Smitka 1991). In 1936, the Ministry of Finance increased the import tariff for automobiles from 50 per cent to 70 per cent and for engines from 35 per cent to 60 per cent (Miyakawa 1991). The Big Three had no choice, but to outsource parts to local firms to mitigate the adverse effects of the cost increase. Among the local firms involved were Mitsubishi Electric, Hitachi, Tobata Casting, Teikoku Spring, Sumitomo and Toyo Kogyo (Mazda) and Diesel Kiki. They tied up with the foreign firms, either through joint ventures or licensing agreements. Another opportunity for local firms was
the increase in the demand for small three-wheel trucks which made production commercially possible.

The other development was the involvement of Japan in several wars in the 1930s and the first half of the 1940s: the Manchurian Incident in 1937, the Sino-Japanese War in 1937 and the WW II during 1940-45. The 1936 Auto Industry Law was enacted to provide subsidies to licensed domestic firms (Mutoh 1988) and to limit the involvement of U.S. firms (Smitka 1991). Hence, Japanese firms such as Isuzu (formerly Diesel Automotive), Toyota and Nissan made their significant presence in the automobile industry.

Toyota, for example, produced its first car by assembling its in-house manufactured components comprising a body, cylinder heads and blocks, housing and transmission case: and almost all the outsourced chassis and other components, gear and materials came from other local firms, including from Nagoya suppliers. Its purchase costs of parts to total manufacturing cost of each car was 51 per cent in 1936 and continuously increased since then in line with the increase in local content (Nishiguchi 1994). But this local content was contributed by the sub-contracting firms, rather than in-house units. In 1938, the U.S. automobile firms were squeezed out of the country as they were denied import licences by the army (Smitka 1991); only automobiles for military or government use were allowed to be manufactured (Miyakawa 1991).

These wars and the strict government intervention in the automobile industry benefited local firms. The spiralling increase in the demand for munitions, including war-related vehicles (especially trucks), from the military provided a good market for
auto components and replacement parts. The existing capacity of the large firms was quite small to meet the demand. Learning the lesson from the adverse effects of over-investment as experienced during the WW I, the large firms, instead of increasing their own firm’s capacity, sub-contracted part of the production activities to external firms - the small peripheral firms. The existing dualistic structure of the economy facilitated the sub-contracting process.

The 1930s also saw the changes in production technology in small firms. They changed the operational mode from merely dependent on labour-powered technology to electric-powered lathes and drilling machines. Simple machining and drilling could now be adopted at lower costs by the small sub-contracting firms. The change in basic infrastructural facilities, especially transportation, communication and electricity helped support the small firms to be better business partners to the large firms. With the expansion of the national transportation and communication systems, the geographical barrier was no longer applicable for such a cooperation. Electricity enabled the small firms adopting electric-power machines as in the large firms. It made them affordable to take larger orders.

Some flaws of the Japanese sub-contracting during the decade, according to Nishiguchi (1994), were the minimum attention to technical and institutional managements by the core assemblers. The assemblers had no direct control on their sub-contractors. The control over the sub-contracting exchanges was instead played by brokers who made profits by charging excessive commissions. The technology used by the sub-contractors was considerably primitive with little sophistication and only for general purposes. Parts produced were based on the drawings and designs provided by
the customers and there was no innovative effort by both parties in providing such a
design. Added by the lack of quality assurance, product quality was the main problem
facing the customers.

Institutional mechanism to govern a longer term basis of the sub-contracting
arrangement was not emphasised in the decade because the relation was merely a short
term in nature. The orders were made just to fulfill the current demand of the customers.
The relation was more inclined to short-term economic calculations rather than to
longer-term mutual obligations.

The exceptional case was Toyota. A strategic operational management in sub-
contracting had been adopted even in the early period of Toyota’s establishment. The
founder and the then vice-president of Toyota, Kiichiro Toyoda, made a significant
effort to structure the purchasing practices of the company in 1940. He differentiated
the component categories by origin and detailed out the purchased component
categories. He structured the components into three types as contained in the Internal
Rules for Automotive Components Control for easy decision-making of either to make
or to buy: 1) the in-house components that were produced internally by Toyota itself; 2)
the quasi-in-house components manufactured by Toyota’s affiliated firms; and 3) the
purchased components.

The last category (the purchased components) was detailed out further into three
other purchasing categories: a) general purchasing that involved components which
could be bought from any other firms, anytime and easier to switch to; b) special
purchasing comprising components that required special facility and training.
Components, prototypes and items as such were specially allocated to affiliated firms to
produce with which they in turn had special relations with Toyota in terms of capital and finance. These types of components should be ordered from the sub-contractors in the first category for unavoidable cases; and c) specialty manufacturing purchasing was related to special components that required special facilities to produce, thus also required a special tie between the core firm and sub-contractors in terms of capital and finance (Nishiguchi 1994).

During WW II (1940-45), the influence of the Japanese state power on the establishment of sub-contracting arrangements became stronger than the earlier decade, particularly in the munitions industry (army motor vehicles and airplanes). It was then extended to other industries and developed to be the universal structure of what Japan has today. The power-driven sub-contracting during this period was institutionalised by many ways: by placing orders to only large firms, material rationing (Smitka 1991), enacting various laws and regulations to stimulate domestic industries and discourage imports, providing various incentives and promotional schemes, monitoring and to a certain extent coercing buyer-supplier firms to form industrial and business networks, among others through industrial associations (Nishiguchi 1994).

The large firms which received huge orders from the military found themselves with a serious lack of productive capacity. They had in turn to outsource parts, components and even simple services from the small firms. The military government too, at the same time, introduced a material rationing in which only large firms producing munitions were allowed to buy materials through industry control associations. Small firms were desperate because they were deprived from being
members to the association. They had to affiliate themselves with the association members (large firms) to buy materials.

The Ministry of Commerce and Industry (MCI) played a significant role during the wartime. An important measure was the introduction of the Rationalisation Outline of the Machinery and Iron and Steel Industries in 1940 and its subsequent modifications. The measure was adopted due to the problem created by the use of low quality local components in the army vehicles. The 1940 rationalisation proposal for sub-contracting focused on two aspects: division of production and improvement of sub-contracting institutions.

The division of production was deemed necessary to improve quality and to minimise imports. Large contractors were required to utilise sub-contractors to maximum level for sourcing those items appropriate for external manufacture or processes. Thus, specialisation of production was carried out according to expertise to encourage, particularly component specialists performing their specialised jobs. These major contractors who produced overlapping components were also gradually phased out.

Pertaining to sub-contracting institutions, two important measures were introduced. One was the defining relationships between designated sub-contractors and prime contractors with respective functions at the presence of the MCI. Designated sub-contractors who had good technological expertise and facilities were exclusively dedicated to particular core contractors after the selection made by the core with the permission of the MCI for undertaking mere sub-contracting jobs.
The responsibilities of the core contractors were to provide technical, managerial and financial supports as well as marketing channel and materials to their respective designated sub-contractors. The MCI was also responsible for approving production categories and items produced at each factory and component firm by taking into consideration the proposals of the industrial associations concerned. Those small and medium firms which were unable to cope with the rationalisation plan were phased out from the market. Intermediaries (brokers and wholesalers) were no longer permitted.

The other sub-contracting-coercive measure was the provision for establishing sub-contractors’ organisations (kyoryokukai) under the control of the respective core contractors. With subsequent amendments to the outline in 1943 and 1944 which fostered the creation of business groups (kigyo shudan) and the rationalisation of vertical manufacturing networks between core contractors and their sub-contractor firms (kigyo Kaisha) respectively, sub-contractors’ associations dedicated to a specific major contractor were widely acceptable. Towards the end of the war, the sub-contracting ties in the automobile industry became stronger because all components of a vehicle were produced domestically as imported items were no longer available (Smitka 1991).

The occupation of the Allied Forces dissolved the sub-contracting institution that had been structured by the Japanese army. Pre-war Zaibatsu-type organisations (industrial grouping or kigyo shudan) were discouraged, as a strategy to welcome back the laissez-faire state in business dealings. Nonetheless, the strict government intervention during the war time at least provided a basic institutional mechanism for further modification and development in the postwar time.
In fact, the macro-structures are not the only factors. The micro-structures also provide favourable ground for the establishment of the structured sub-contracting mechanism in Japan. The micro-structures, such as contracting agreements, institutional consolidation, pricing and quality assurance and Just-in-Time delivery system are related to specific operational issues that are internal to governance mechanism of the existing sub-contracting firms. These internal factors are predominant only in the later, contemporary period. Therefore, it is suitable to deal with them in a separate subsection (Subsection 4.5.4).

4.5.2.2 The Immediate Post-War Period (1945-1960)

The end of the war did not persuade the U.S. Big Three to re-enter the market.\textsuperscript{14} It furnished a favourable condition for Japanese firms to shape the future of the automobile industry in its own mould. The demand for automobile spare parts was so high to repair existing vehicles. As the demand for new vehicles were unfavourable and the strict trade control imposed by the Allied Forces on imported parts from the U.S., many Japanese firms turned to auto parts production.

A heavy protection imposed by many labour laws enacted after the Japanese defeat and the unification of various levels of staff and workers (the white-collar and blue-collar workers) under one roof in the same firm with relatively equal treatment in many aspects of union benefits have brought about another development in the Japanese sub-contracting arrangements. Well-organised labour made the management restrictive to use labour as cost-savings. The introduction of the Dodge Plan\textsuperscript{15} in 1949 put another adverse effect on many industrial firms in Japan. There were over 1,100 bankruptcies
and 510,000 redundancies between February 1949 and March 1950 (Nishiguchi 1994). As a way out, labour force had to be reduced; but this strategy caused a long series of labour strikes in Nissan Diesel, Isuzu and Toyota in the 1950s (Miyakawa 1991).

Less unionised labour in small firms than in large firms made wages lower in the former than the latter. As a result of this, the large core-firms turned to small firms for procurement. Wage differentials between regular and temporary workers were also apparent when the first received higher pay than the latter. These interscale wage differentials provided another channel for large firms to hire the cheaper source of labour. Thus dualistic structure in terms of wage, unionisation status and the job status of workers which characterised the Japanese industrial sector provided the conduit for the institutionalisation of sub-contracting arrangements.

The Japanese firms which were almost dying during the Dodge Plan received a new boost when the Korean War broke out in June 1950. Special procurements from the United Union forces saved the situation (Mutoh 1988). A spiralling increase in the demand for munitions by the forces furnished a new boom for industrial firms. Toyota, Nissan and Isuzu received large orders, including for military trucks. The spillover effects of the War were the accumulation of capital and the concurrent development of the iron and steel, electrical power, heavy machinery, chemical and automobile industries on one side and the industrial facilities, technologies and innovation on the other which provided a good ground for the sub-contracting expansion in the near future. Instead of hiring regular workers to expand their own capacity, the large firms turned to sub-contractors whose workers were often not unionised (Smitka 1991) and
whose capacity was ready to be utilised (Smitka 1991, Nishiguchi 1994) and which would otherwise remain idle.

The rapid expansion of Japanese sub-contracting arrangements immediately after the 1950s was also attributable to technological factors. The large manufacturers went for mass production to cope with the increase in demand during the war. Equipment and machines were replaced and these technological facilities were sold to sub-contractors to fix to their production plants. In the automobile industry, technology used by the small sub-contracting firms was relatively simple for producing simple parts or carrying out simple processes (Smitka 1991). This is in contrast to larger suppliers that used more advanced technology to produce specialised components.

The 1950s saw the return of the government to shape the sub-contracting arrangements and the adoption of strategic measures by the assemblers (producer-driven strategy) to reorganise their relationships with the sub-contractors. The government played greater and different roles this time by discouraging unfair practices in the existing sub-contracting arrangements, establishing cooperatives and forming small business financing mechanism.¹⁷

By the early 1950s, unfair trade practices - the withholding of payments to sub-contractors - was a major problem facing the arrangement. To solve this problem, the government with the assistance of the Fair Trade Commission (FTC) enacted a series of laws to deal with such unfair practices.¹⁸ The 1962 amendment to the Antimonopoly Law stipulated that contractors are not only required to pay their sub-contractors in six days, but also have to pay interests on a daily basis for not meeting the deadline. In ensuring the effectiveness of the regulations, a series of periodic and special
investigations as well as investigations of sub-contractors were made by the FTC and the Small and Medium Enterprise Agency (SMEA) to trace the unfair practices and those who did not comply with the law. A more thorough investigation would be made on those prime contractors who were questionable, or upon the appeal or request from the sub-contractors and the SMEA.

According to Nishiguchi (1994) the strict deadline and penalty on the payment delays added by the public announcement for the law violaters have maintained the sub-contracting institutions. On one side, the law ensured that small sub-contractors survive financially and thus could continuously play their supporting roles to the large firms. To the large firms, the law discouraged them from engaging in such unfair practices. The behaviour would tarnish their own reputation and social image because by doing so their malpractices would be announced publicly.

The government also enacted the law for promoting the establishment of cooperatives among small firms. The 1949 Law on Cooperatives of Small and Medium Enterprises and Other Parties was among the significant legislation to strengthen small firms which were organised into cooperatives. Through cooperatives, the strength of small firms would be developed in several ways. First, they gained a better position in negotiation (stronger bargaining power) with larger firms. Second, collective purchase and utilisation facilitated the introduction of new machinery, processes, facilities and technologies. Third, new sources of loans may be available with the cooperatives being the security risks. Finally, they could become an administrative agent for government policies and measures. The cooperatives which were mushrooming in the 1950s carried
out five major activities, namely joint purchases (of raw materials), joint loans, loan guarantees, education and information sharing and joint sales among their members.

Another government intervention during the 1950s was the setting up of a special organisation to support small firms and the introduction of small-business financing. The SMIPA was established in 1948 as an independent institution under the MCI, especially to implement government policy instruments that related to small firms. Its role in the 1950s was devoted to the legislation prohibiting unfair practices against small sub-contractors and the promotion of cooperatives and small-business financing organisations.

There were three groups of financial institutions responsible for financing small and large firms in Japan with different degrees depending on the original objectives of the establishment. First, the public small-firm financial organs that comprised the Central Bank for Commercial and Industrial Cooperatives, Small Business Finance Corporation (SBFC) and People’s Finance Corporation. Second, the private small-firm financial organs that included Credit Unions, Credit Depositories and Mutual Banks. Third, the private banks that consisted of Regional Banks and City Banks. Whereas the first and the second groups of financial institutions provided a higher proportion of total loans to small firms, the third group favoured larger firms than the smaller ones (based on the 1966 data in Nishiguchi 1994).

Following Mutoh (1988), financing the automobile parts industry was in practice by the enactment of the Law on Temporary Measures for Promoting the Machinery Industries (Machine Industry Law) in 1956. Under the Law, the automotive parts industry was among the 17 designated industries entitled to promotional incentives
and facilities. In the field of finance, loans for primary parts firms were provided by the Japan Development Bank; whilst to the secondary parts firms, the loans were provided by the SBFC. Apart from financial facilities, imports of foreign technology and machinery which were not available domestically and CKD vehicles were also permitted, but under strict controls.

Parallel to the strategic measures of assemblers, the producers encouraged their sub-contractors to modernise facilities with support in technical and financial resources, pursue the pricing system and quality assurance based on standardised cost calculations and process rationalisation from the product source (sub-contractors' point) and reorganise the sub-contractors' associations (kvoryokusai) to establish benevolent interactions among the member firms. These will be shown in greater detail in the next subsection.

From the economic perspective, one of the important factors induced by the sub-contracting configuration was capital savings. Smitka (1991) argues that the underdeveloped capital markets in the 1950s made impossible for the automobile firms to borrow money from the market, leave alone for smaller firms. At the same time, most small firms remained idle. This environment was favourable for the resource exchange. Both sides needed to reactivate the idle production capacity in the new form of organisation - a sub-contracting arrangement. By mid-1960s, it was found that each of the 11 auto assemblers had 200 to 300 direct suppliers (Smitka 1991) producing parts and, to a certain extent, doing subassemblies.
4.5.2.3 The Contemporary Period (The Years After 1960)

The years after 1960 have been known as the transformation period for Japanese sub-contracting. The development of the arrangement is no longer influenced by the government as well as dualism as in the earlier period, but by the producers themselves. Rapid changes in the economy during the 1960s which transformed Japan into an industrialised country furnished much opportunities for producers to take more active roles in their relations with sub-contractors, but still within the framework shaped by the government. With a new consumer-driven environment, producers resorted to a new strategy - the vertical buyer-supplier interdependency (as Subsection 4.5.3) and the intensification of internal innovation in the organisational operation (as in Subsection 4.5.4). This period indicates the greater role played by the resource dependence framework in the network relations, within the structure that has been already established.

Dualism plays insignificant role after 1960 because its four characteristics - interscale wage differentials between the core and peripheral sectors, its differential effect on working class, “the eventual decline of peripheral sector and the use of sub-contractors as a buffer against fluctuations” (Nishiguchi 1994: 90) have not really been applicable over time. The wage disparity between the industrial firms by size has increasingly narrowed since then due to tight labour market as a result of the surge of demand in product and labour markets. The interscale distribution of unionisation between the large and small firms has also relatively unchanged, instead of widened between 1948-1956, as the union membership remained stable over the 1960s and 1970s. The eventual decline of peripheral sector as predicted by the dualists is
unavoidable since the core firms would eventually win in the technological race for new industries and market. Hence, the small firms would be phased out from the economy.

The Japanese evidence, however, demonstrates the contrary. The share of the small firms in value added and employment of the Japanese manufacturing industry increased, instead of declined after 1960. The outsourcing rates among the Japanese auto assemblers also increased during the period. The two oil shocks in 1973-74 and 1979 seemed to have little impact on the outsourcing rates. This means that the argument of dualists about the use of the smaller firms by the large firms as a buffer is also argueable since the large firms did not reduce or eliminate the contract work during the recessionary period just to preserve a steady workload for the core firms themselves and their employees.

By the 1960s, Japan experienced a rapid growth of domestic demand concomitant with the increase in real disposable income. The demand for consumer durable goods, such as electrical products and vehicles increased rapidly. The Japanese registration for new automobiles leapt from 408,000 in 1960 to 6.7 million in 1988, whilst their production shot up from 482,000 to 12.7 million during the same period, or equivalent to annual growth rates of 10.5 per cent and 12.4 per cent respectively (Cusumano 1985).

One apparent characteristic of the Japanese manufacturing sector is the stiff competition among the local firms for the same or similar products and markets. Each of the eleven automakers attempted to carve a niche in a similar range of product segments. This overlapping market segment forced the firms to perform a more rapid
innovation in product development and appearance because the life cycle of a product became shorter under such a fierce competition.  

With bitter competition, the Japanese manufacturing process becomes more complex as product differentiation is a crucial strategy for success in the local marketplace. Also, this means that the U.S. model of entrepreneurial organisation (the M-form for a mass-production) is hardly applicable to the Japanese industrial system. Therefore, Japan has built its own distinctive entrepreneurial strategy by establishing ENO in the form of sub-contracting arrangements.

Many parts of the automobile production lines and processes, such as assembly and sub-assembly of components and systems as well as manufacturing of parts have been sub-contracted out to either contract assemblers, sub-assemblers, or sub-contractors. According to Nishiguchi (1994), the strategic move has enabled the core firms to divert their internal resources to more strategic activities, including product development, process innovation and state-of-the-art manufacturing because by doing so it would greatly relieve the operational and administrative burdens of the automobile makers in coping with the complexity of the market.

The development since the end of the 1950s, the rapid growth in demand, the complexity of the industry and the inclusion of Japan in the OECD countries (in 1964) put a greater challenge to the Japanese firms to compete in an open market. The existing small sub-contracting firms were lacking in financial and technological resources as well as in production capacity to take the challenge, especially to take bigger tasks during the economic boom. The automobile industry, in contrast, involves an asset specificity in Williamson's term because the contract assembly and systems-
components subassembly, as well as the contract for special parts manufacturing require a combination of technologies specific to the automakers and a set of investments to rationalise the manufacturing complexity.

The large firms (Kaiisha) started to play their roles, establishing the group affiliated firms by either creating 100 per cent-owned subsidiaries, partially-owned firms, or simply providing loans to their sub-contractors depending on the need and the availability of resources. The most important thing of the venture is that they would have at least some control over the affiliated firms, thus they would ensure the product quality is in line with the in-house production. This new core-sub-contractor tie shapes a new dimension in the sub-contracting arrangements of the Japanese manufacturing which is distinct from what had been available in the U.S. automobile industry, hitherto.

4.5.3 Contemporary Configuration of Sub-contracting

The auto Kaiisha tend to organise their production lines sub-contracting firms into a hierarchical network (Tabeta 1996), or a pyramidal structure (Yokokura 1988, Asanuma 1992). This tendency is obvious since the 1960s, largely due to resource dependency among the networked firms. Such a vertical coordination is seen only from outside and applicable at the early negotiation among the contracting parties as well as at the planning stage of production. Once the centralised monthly plan is formulated, the network relations among them in terms of production velocity, parts supply, quality control and delivery services are horizontal in which the customer end often ushers the production networks (Aoki 1990).
There are two types of sub-contracting firms in the Kaisha group. One is the affiliated firms partly owned by a particular core automaker and the other is the group of independent firms. Most sub-contracting firms are members to one of the Kaisha’s primary automakers (e.g., Toyota, Nissan, Honda and Mitsubishi) in which some of these automakers are in turn the member to one of the Keiretsu. Due to historical and institutional factors, only a few numbers of firms do not belong to any automobile Kaisha (Sheard 1983). According to Smitka (1991), only about 25 per cent (or 300 firms) of the 1,200 primary sub-contractors of 11 automakers combined are independent firms which make components; among these independent suppliers are Akebono Brake, Kayaba, Daikin Manufacturing, Shiraki Corp., Topre Corp., Toyo Radiator and Stanley Electric (Tabeta 1996).

Cross-shareholding as a common practice in the Japanese ENO (see Chapter 3) is also true for the automobile industry and it surpasses the group boundary. In many cases, automakers are the primary shareholders of their respective group sub-contracting firms when the suppliers produce critical or specific parts, such as engine, transmissions, steering and clutch components (Tabeta 1996). Independent sub-contracting firms come in when the industrial activities are less attracted for the automaker to keep the firms in a group. These activities include the supply of raw materials and the mass production of standard or generic parts.

Following Shinposha (as quoted in Nishiguchi 1994), the competing core firms had some percentages of shares in the same sub-contractors. For example, the percentage of shareholding of the following automakers in Akebono Brake were 15.1 per cent of the total shares for Bendix, 14.7 per cent (Nissan), 5.9 per cent (Isuzu), 2.7
per cent (Hino Motors) and 1.7 per cent for Mitsubishi; in Kayaba Kogyo were 14.5 per cent for Toyota and 9.2 per cent for Nissan; in Jidosha Kiki were 34.9 per cent for (Diesel Kiki, or Zexel), 16.2 per cent (Bendix), 5.6 per cent (Isuzu), 1.6 per cent (Toyota) and 1.5 per cent for Nissan; and in Ichiko Kogyo were 22.4 per cent for Nissan, 8.6 per cent (Toyota), 4.0 per cent (Isuzu) and 3.7 per cent for Daihatsu. This joint-shareholding is unsurprising because 54.5 per cent of the Japanese automakers belong to two giant groups - either the Toyota, or the Nissan Group (Sheard 1983, Miyakawa 1991).

Tabeta and Shahidur (1996) also found a common joint-shareholding in the Japanese automobile industry. Based on 54 samples of the Japanese first-tier part suppliers, they found that the average share of the group’s affiliated-independent firms and affiliated-dependent firms owned by a core automaker in 1994 was 11.4 percent and 32.8 percent respectively. The Kaisha, such as Toyota and Nissan, hold shares of every supplier firm in their respective group. The joint shareholding is important for the core company to monitor and coordinate the suppliers by sending either directors, managers, or engineers. The core suppliers in turn hold shares of the smaller, lower-tier suppliers. In a rare case, only a small number of the largest group supplier-firms were the shareholders of the core automakers’ common stocks.

The hierarchical structure of the Japanese auto sub-contracting arrangements is shown in Figure 4.1. The sub-contracting firms are organised pyramidally or vertically with any specific core automakers, supplying a wide variety of parts and components. Multi-layered production, operation and management systems are a common practice for the automakers to govern their networks with sub-contracting firms. The sub-
Figure 4.1
The Structure of the Japanese Automobile Sub-contracting Arrangements

Automobile Assemblers
(11 Core-Firms)

Primary Suppliers

Primary Suppliers

Primary Suppliers

Secondary Suppliers

Secondary Suppliers

Secondary Suppliers

Secondary Suppliers

Note:  
- Primary Suppliers: Direct Sub-contractors, 2-300 per core-firm, or 1200 in the industry  
- Secondary Suppliers: 50-200 per primary supplier, or 8,000 in the industry  
- Tertiary & Lower-Level Suppliers: 0-10 per second-tier supplier, or 40,000 in the industry  
Source: Smitka 1991, Figure 1.1, p. 15 (adapted).
contracting firms are normally organised into three tiers (layers) based on their functions and the type of products they produce (Smitka 1991, Tabeto and Shahidur 1996).

Referring to Figure 4.1, they are classified into the primary suppliers, the secondary suppliers and the tertiary and lower-level suppliers; or the first-tier, the second-tier and the third-tier sub-contractors respectively. The total number of suppliers for each tier of the 11 automobile assemblers differs from one to another; it ranges from 2 to 300 suppliers per core-firm for the first-tier, 50-200 suppliers for the second-tier and 0-10 suppliers for the third- and lower-tier. The total number of sub-contracting firms for the respective tier of the whole auto industry is 1,200, 8,000 and 40,000 firms respectively (see Figure 4.1).

Job specialisation among the networking firms is obvious. Each party manufactures a narrow range of products, or undertakes a limited number of production processes. Automakers tend to specialise in the final assembly of automobiles, whilst the sub-contractors specialise in the manufacturing of parts, or in the assembly of sub-components which is later assembled into the final assembly of automobiles at the automaker plants. Also, the Japanese automakers tend to source out any one specific parts or components from a small number of suppliers (Tabeto 1996) in comparison with the U.S automakers which tend to outsource from a large number of suppliers (Best 1990, Asanuma 1992).

Within the sub-contracting firms themselves, the first-tier (primary) suppliers typically do a more specialised job, for instance the sub-assembly of parts produced by themselves or by the lower-tier suppliers. This also means that the lower-tier suppliers
tend to do a more standardised job, hence supporting their upper-tier firms. The first-tier suppliers also deal directly with the automakers and their lower-tier suppliers (Tabeta and Shahidur 1996).\(^1\)

*Hypothesis 1:* First-tier sub-contractors are expectedly given more important production tasks than second-tier sub-contractors.

Inaba and Tabeta (1995), in their classification of the outsourcing from external firms, also identify the membership status of the supplying firms based on three basic types of product specificity. First, the most specialised parts and components (e.g. engine and transmissions, electrical components and steering sub-assemblies) are specifically produced for a particular automobile of a particular automaker. The ownership (shares) and control (management) of this type of sub-contracting firms normally belong to a particular primary auto group. Second, the more specialised parts, such as spark plugs, shock absorbers, radiators and brakes, are also produced by independent firms; but these parts mostly meet the design specification set by certain automakers. Finally, the less specialised (standardised) parts, such as tyres, bearing, or electrical wiring are mass-produced by large independent firms. The ownership and control of these firms are independent of any primary automaker groups.

The core automobile firms are normally larger than their sub-contractors. Following Tabeta and Shahidur (1996), Toyota and Nissan have about 63,000 and 58,000 work force respectively, whereas Nippon Denso as one of the largest sub-contracting firms in Toyota group is half the size of Toyota. Akebono Brake and NOK, the two largest independent firms have less than 3,000 workers each. They find that Toyota and Nissan groups’ member firms are smaller than the independent sub-
contracting firms, but the group sub-contracting firms tend to manufacture the more specialised products than the latter. According to Tabeta (1996), however, some large sub-contracting firms are comparable in size to the automakers and they also have their own technological and engineering capabilities which are even superior to the automakers; hence more able to diversify auto parts production and undertake more production tasks (italics is added).

Hypothesis 2: Large sub-contractors are expectedly more able to diversify auto parts production and to undertake more production tasks than small and medium sub-contractors.

The researcher observed that the Japanese automobile industry is different from the Malaysian context in the form of firm ownership and technological collaboration. Against Japanese auto sub-contractors in the home country which would be mostly owned by Japanese entrepreneurs, Malaysian sub-contractors are owned by locals and foreigners (see Chapter 6).

As also displayed in Chapter 6, Malaysia has to depend on foreign expertise and skills to produce automobiles and auto parts. Foreign firms are rather reluctant to transfer technology to local ones. For this reason, local sub-contractors would obtain limited technologies and confine themselves to less important production jobs, such as to make individual and general auto parts.

Hypothesis 3: Local sub-contractors tend to undertake less important production jobs than foreign-owned sub-contractors (briefly, foreign sub-contractors).
On the contrary, foreign firms would be more generous to cooperate with the firms that they have equity in them. Hence sub-contractors that have foreign equity participation would be able to perform more jobs, such as to involve in many levels and types of auto parts, than sub-contractors without this foreign resources.

*Hypothesis 4: Sub-contractors with foreign equity participation tend to perform more important jobs in auto parts production than sub-contractors without foreign equity participation.*

Compared with Japanese firms in the home country which have indigenous technology, Malaysian-based auto sub-contractors had to import technology to make auto parts. These sub-contractors had to collaborate with foreign firms. Because the Malaysian automobile industry is dominated by the Japanese, most of the sub-contractors have entered technological arrangements with Japanese-owned firms (see Chapter 6). These sub-contractors would be given greater opportunities and responsibilities in auto parts production by automakers operated in Malaysia.

*Hypothesis 5: Sub-contractors which entered technical collaboration with Japanese firms are able to take greater responsibilities in auto parts production.*

Going back to the Japanese case, despite the less formal relationship among firms within a group being established, their networks are well defined. One member firm of a group can either sell its products directly to the core automaker for final assembly or to any of its group members for sub-assembly. Group member firms are not prevented from selling their products to the other group firms, but it is not a common
practice to do so because their loyalty (paternalism as in Chapter 3) to the group firm is high (Tabeta and Shahidur 1996).

Each automaker prefers to keep its networks in goods transactions within its respective *Kigyo Keiretsu* (*Kaisha* group); Toyota and Nissan for example purchased about 90 per cent of total value of their purchased parts and components from the *Kyohokai* member firms in 1986 and from the *Takarakai* and *Shohikai* in 1983 respectively. Each part was purchased from a handful of sub-contracting firms: between 2-3 sub-contractors (Tabeta 1996).

Some authors, however, found that the transaction did not confine itself to a particular *Kaisha* group: Toyota was considered among the tightest groups, yet it permitted a large percentage (41.7 per cent) of its affiliated firms to sell 40-80 per cent of their products to the outside buyers (Sato, quoted in Nishiguchi 1994). Inaba and Tabeta (1995) unveil that once they (the affiliated group firms) do outside sales, they sell their products to independent parts suppliers to the secondary automaker groups, such as Honda, Mazda, Mitsubishi and Isuzu. Tabeta and Shahidur (1996) also stress the outselling of products of the independent suppliers to cross-group firms. In the same line of explanation, Smitka (1991) and Inaba and Tabeta (1995) found that large independent suppliers sold their products to all types of buyers of any groups.

*Hypothesis 6: Large sub-contractors expectedly have a broader market base (various market segments) than small and medium sub-contractors.*

Within the Japanese group member firms, Tabeta and Shahidur (1996) found some other relations, including the form of capital financing and directorship. The
automakers often exchange their managerial and technical skills, such as directors and engineers. This resource exchange has enabled the parent firms to monitor cost performance of each member (Tabeta 1996). For established independent firms, such as Nippon Denso and Mitsubishi Electric, there is little assistance that can be furnished by the automakers since they can take care of themselves (Asanuma 1992).

The core company typically provides financial assistance to its member firms. The information flow between the core and the group member firms is maintained from time to time, among others, through frequent exchanges in top executives and managers between them. Dissemination of technological know-how and innovation is a must in their networks as a means to keep on cutting production costs and improving efficiency.

One striking example was during the mid-1980s; the Plaza Accord (a Japanese-G5 agreement) signed in 1985 for floating exchange rate that forced the Japanese Yen to be appreciated. Smaller suppliers were in trouble due to the increase in the production costs. As an immediate response, Japanese automakers rendered technical assistance by sending their personnel to suppliers’ plants. As a result of the assistance, the sub-contracting firms restructured their production line by investing substantially in automation which then enabled an impressive reduction in costs (Asanuma 1992).

There is a directorate interlocking among the group major firms with which a director of a group company sits in several boards of directors of the same group member firms. It is a common practice in which the former director of the core company becomes a director of the group member firms. The president’s club firms also have regular meetings with their members and maintain a close relation with the automaker.
4.5.4 A Governing Mechanism of Sub-contractings

It should be stressed again that the Japanese sub-contracting is not governed or coordinated by market or hierarchy (Smitka 1991), but by a combination of both plus some other social capital. This characteristic differs from what exists in the West; the large entrepreneurial organisations of the region prefer to integrate vertically (M-form) their production arms in order to avoid opportunism (Tabeta 1996).24 Large firms in Japan, despite their significant outsourcing to external firms, were able to mitigate such opportunism by practising a distinctive form of governing mechanism of sub-contracting.

Contracting agreements are one of the features of market mechanism adopted by the sub-contracting arrangement, but with less formal than the market itself. There are formal contracts to buy parts and components from the suppliers, but there is no detailed contract to govern their overall relationships. Likewise, a command or authority is also applicable to the sub-contracting arrangement, but once again with much less formal because goodwill and benevolence (Dore in Nishiguchi 1994) as well as trust (Smitka 1991) are the other elements that play a significant role in the network ties.

Therefore, both economic calculation and social capital are important and going hand-in-hand in creating and maintaining network relations among the contracting parties - the core (the contractor) and the sub-contractoring firms. The governing mechanism of the arrangement during the contemporary period is more on institutional and infrastructural solidification.
4.5.4.1 Contracting Agreements

A sense of high flexibility in contracting agreements is obvious in the case of the Japanese automobile industry. The contract sets different time frames for different items: the position and obligation of each party in the relation; the standard duration of contracted parts; and the allowable interval for price adjustments. The basic contract stating the general obligation of each side of contracting parties takes force for one year only. Nonetheless, the contract is automatically renewed, unless there is any objection from either side (Asanuma 1992).

No specific bulk of parts is set during the contract, but the only thing set is its target quantities based on forecast and the delivery dates (Tabeta 1996). The subsequent dealing in quantity orders is, albeit outside the contract (not stated in the contract), comprehensive. By the end of each month, the sub-contracting firms are provided with an order schedule for the next month production with daily quantities required by the core automakers.

The parts delivery for specific suppliers is expected to proceed for the life of the existing automobile model. Although the subsequent round of selecting the suppliers takes place when a particular automaker announces its development of a new vehicle model (Asanuma),

25 it is a normal practice in which the existing suppliers are repeatedly selected to secure the new contract; but they must first submit their cost estimates for producing the parts (Tabeta and Shahidur 1996) with the design specification (Inaba and Tabeta 1995). These cost estimates are then compared with the previous records and to a certain extent with the competitor’s costs. This arrangement is thus not based on formal bidding (tendering) process as in the U.S automobile industry in which the focus of comparison is on the price of final unit.
The selected suppliers will be awarded a contract for a specified time which normally lasts for years depending on the characteristics of the parts and components. During the contracting period, the core firm will assure that no parts will be purchased from other sources and no in-house production will perform. For mass-produced parts, the contract normally lasts for a four-year period, the practical period of the cycle of full model change in an automobile. It may last for 10 years for specialised components, such as engine and transmission. Owing to the standard duration, a complete change in the Japanese vehicle model is four years, and with similar duration for the standard interval for parts delivery for the suppliers. This duration is longer than that of the U.S. standard (Asanuma 1992).

Following Tabeta (1996), Japanese automakers prefer to keep existing suppliers on a long-term and stable basis because it is not easy to get the new suppliers who can meet their specification of design and quality. Yokokura (1988) argues that continuous long-term contracting agreements benefits both sides. By outsourcing, parent firms would avoid from too much resource concentration in their own plants for in-house manufacturing. Using sub-contractors' specialised technology, know-how and production facilities enabled them to obtain a stable supply of purchased parts at necessary quality, timing and quantity.

The sub-contractors are being assured of a stable market and, to some extent, obtain technical and managerial supports from their parent firms and are ready to respond promptly to expected quality and precision, timeliness and price. Stiffer competition among automobile Kaisha puts great pressure to each group firms to strengthen the network relations among them. This also demands a much more stable relation among each group member.
The case is even more complex when there is a frequent change in the automodel and designs. A special technological know-how is needed to meet with such a change. With the change, another round of designing and developing of parts and components has to be repeated. This process necessitates a close cooperation between the automaker and the suppliers during the trial period before the parts can be mass produced. It is more comfortable the longer the relation occurs since the past experience of the suppliers technological know-how transferred by the automakers may be useful and applicable to the development of the new design.

There is a provision in the basic contract in which the suppliers bear responsibility for any losses incurred due to late delivery of parts. The core firms can also claim financial compensation for any defective parts found in the core firm or in the final product marketed to consumers during a specific time after the delivery. The suppliers are liable for the costs of recalling the product and for the substitute of parts.

No specific price is determined over the contracting year. A rule based on the initial unit price\(^36\) is however determined to provide some flexibilities for price changes in every six months (twice a year - Asanuma 1992) during the contract in the case of changes in the production costs (Tabeta and Shahidur 1996), quality, design and efficiency (Inaba and Tabeta 1995). Costs of molds and castings are to be borne by the automakers. Even a compensation scheme is provided by the automaker at least to cover the fixed development and setup costs to its suppliers in the case of sluggish demand that results to the unfulfilling of target demand as agreed in the contract, but the suppliers in return must assure the continuous reduction in production costs of parts.
4.5.4.2 Institutional Consolidation

Efforts to consolidate institutional-related governance of sub-contracting were seen since the 1930s wartime period. Internal innovation of the sub-contracting governance since then was materialised with the establishment of trade associations (sub-contractor associations or supplier cooperative associations) and purchasing organisations.

Sub-contractor associations are essential for cementing interaction between the supplier-member firms and their buyer firms as well as for fostering cooperation among their own supplier-member firms. In other words, they bridge the connection between the supplier-member firms and the automobile firms on one side and among their own members at the other. A mutual friendship, rather than a hierarchical control relationship, is promoted between the core company (e.g. Toyota) and its primary sub-contractors (Nishiguchi 1994) in any activities that they have common interests. This type of relation also applies to supplier members of an association.

In line of explanation, Tabeta (1996) finds a large portion of the Japanese auto suppliers normally organise corporate associations (*buhin-kyoryokukai*) to link their member firms with the main automakers. Some suppliers are members to more than one regional associations (Asanuma 1996).

Toyota Motors has three associations - *Tokai Kyohokai*, *Kanto Kyohokai* and *Kansai Kyohokai* that are based on regional basis; whilst Nissan only has a single association, *Nisshokai*. In 1986, *Kyohokai* had 172 member firms, supplying more than 90 per cent of parts and components purchased by Toyota; Nissan purchases from *Nisshokai* also accounted for about 90 per cent of its total outsourcing of parts and
components. A separate association, the *eihokai* is another trade association under the purview of Toyota; but the members of this association are the suppliers of tools, equipment and construction services which totalled to 61 in 1986 (Asanuma 1992). Suppliers of basic raw materials such as steel are not members to neither *Kyohokai*, nor *eihokai*.

Suppliers of Mazda are members to different trade associations. Most suppliers of processing services (66 per cent in 1982) were members of the *Toyukai* (a cooperative association of small local suppliers to Mazda); whilst 75 per cent of parts suppliers were members of the *Yokokai* (a nationwide association), the less dependent parts suppliers’ association (Asanuma 1992). The remaining hundreds of suppliers of Mazda do not belong to any association.

In their early establishment, most Japanese sub-contractor associations played a passive role, confining to the effort of obtaining loans for members as well as to provide insurance, raw materials and other services. Their role has been more active, particularly since the 1950s to share information as well as to assist members upgrading their technical, engineering and managerial skills, resembling the one that existed in their core firms (Smitka 1991, Nishiguchi 1994).

The product differentiation approach adopted by Japanese automakers requires an integrated planning between the assembly line in the core plants and the supplier’s production line; hence any innovations in the assembly plants such as JIT, quality control and processing technology are transferred through the related associations. The associations would then diffuse the technology and information to their member firms. Plant visits among their member firms are also conducted (Smitka 1991).
The expansion of a mere purchasing sub-section to the purchasing sections or departments and/or the establishment of new ones in many Japanese firms in the 1930s signified the increasing significance of outsourcing in the Japanese manufacturing sector. The large firms, such as Toyota, Hitachi and Nissan all took similar steps during the decade, either to purchase the materials, parts, or components. Nowadays, purchasing department is set up in every core firms to control any purchasing-related activities. Only parts or components which are not produced in-house are purchased from external suppliers. The priority for purchasing is given according to the type of parts and components. Specialised components are normally purchased from their affiliated supplier firms; whilst the standardised parts and components are purchased from independent suppliers.

4.5.4.3 Pricing and Quality Assurance

Although the source of new competition of Japanese entrepreneurial organisations stemmed from economies of scope (product differentiation), rather than from economies of scale (capacity enhancement), yet they are highly committed to price reductions by means of fully utilising their production line at the upstream (the supplier firms). Following Asanuma (1992), the commitment had been initiated before the Plaza Accord in 1985, the year in which the Yen began to depreciate heavily. Prior to 1985, certain Japanese automobile manufacturers pushed their suppliers to meet an average of 2 per cent reductions in price in every six month through cutback in production costs.

Concurrent with high commitment to quality assurance, delivery as well as specification and engineering aspects, a systematic mechanism which would persuade
all parties to fulfill their obligations is also required. Attention of Japanese automobile manufacturers on such a strategic mechanism was developed since the mid 1950s as the sub-contracting rate increased consistently: the share of purchased components in total manufacturing cost of Toyota increased from 57 to 71 per cent for 1955 and 1961 respectively. In Nissan, the share increased from 50 to 64 per cent for 1957 and 1961 respectively (Nishiguchi 1994). The change in quantitative sub-contracting induced the change in qualitative networks in the supply base of the assemblers and their sub-contractors.

The 1950s period saw some strategic moves undertaken by the Japanese assemblers; they encouraged their suppliers to rationalise and modernise manufacturing facilities by providing technical and, to a certain extent, financial supports. They also adopted a standardised cost calculation in which pricing and quality assurance is based on the source of parts production, namely the upstream suppliers, rather than downstream assemblers. Toyota was the first user of the cost calculation methods in 1953. Pricing was no longer based on the bargaining and ongoing market prices, but based on co-determination between assembler and sub-contracting firms.

Indeed, fascinating development and the competitiveness of the Japanese automobile industry until lately have been much dedicated to its achievement in pricing and quality assurance as well as delivery system. Following Smitka (1991), a half reduction in the assemblers’ cost of making a car was emanated from the substantial decrease in the price of purchased parts (54 per cent as comparable with 16 per cent from the decrease in steel and material prices and 32 per cent from their own internal cost savings). Pertinent to pricing and quality assurance, four important measures have
been introduced, namely the adjustable price bidding mechanism, the value analysis (VA), value engineering (VE) and resident engineers.

Price bidding mechanism in Japan is rather different from that of the United States. Instead of comparing on final unit price as in the latter, the focus of comparison of the Japanese automobile assemblers is based on detailed cost decomposition of a certain part among the parts suppliers (Smitka 1991). Because there is a small number of suppliers supplying similar types of parts, the cost comparison between the previous and present bids among the competing suppliers are easy to make. Given some adjustments for parts improvement via manufacturing efficiency, the suppliers are expected to bid lower price than the previous one. Improvement in manufacturing processes is important in achieving an efficient level in parts making.

Price adjustments are allowable only for certain specialised parts which may change regularly as a result of technological changes in design, quality and specification. This adjustment is agreed upon a sequence of short-term agreements (one to six months) as an addition to the basic contract in which the agreement is normally forced after the actual production commenced (Inaba and Tabeta 1995). Material costs, purchases of parts and process from secondary sub-contractors, direct manufacturing costs, tooling costs and gross margin (overhead plus a profit margin) are among cost components allowable to adjust during the subsequent bids (Smitka 1991). Nonetheless, increases in labour and energy costs are not permitted to be passed on the assemblers by means of higher contract prices (Inaba and Tabeta 1995).

Considerable cost reductions in parts manufacture may also be achieved through a series of proposals on possible modifications in design and material composition of a
certain part. This involves two development stages with different names: one is known as VA in which any possible modifications by suppliers are made during the commercial production stage; and the other is VE of which any modifications may be made prior to the commercial production (during the development stage of a new model). Any cost reductions made by suppliers in the two stages would benefit themselves in two ways. Any surplus created would be fully awarded by their core firms as an incentive for further reduction in production costs; it would also increase the ratings given by the core firms and this means that the suppliers' future chances of winning new contracts would be promising.

The sub-contracting rating system makes Japanese production chain achieved its full potential. Grade A, B, C, D and I: conferred by auto assemblers which are evaluated based on product quality, price, delivery, engineering and other indicators (Nishiguchi 1994) compel the suppliers to work hard to improve their manufacturing process and quality management. Those who are conferred with higher grades would be promising in the coming selection process of sub-contractors. Those who achieve poor grades have to work harder; otherwise they would be squeezed out after an allowable rationalised period is given, or they would be pushed down as lower-tier sub-contractors supplying parts to higher-tier sub-contractors. To a lesser extent, the highest grade sub-contractors (Grade A) have their own “self-certified” programme for achieving a zero-defect rate for the parts and components they supply. This means that their buyers need not inspect their quality of products.

Besides pioneering the cost calculation method, Toyota was also the first organisation realising the potentiality of resident engineers in enhancing
competitiveness. Engineers of Toyoda Machine Tools were regularly stationed at Toyota to maintain its machine tools sold to the customer as well as to convey detailed feedback from the customer firm (Toyota). The inter-firm feedback was crucial for the supplier firms to improve their manufacturing processes and products. This manpower institution has been widely adopted by the Japanese automobile industry in the later period.

Resident engineers are positioned at customer’s plants in two phases. In the product development phase, a project team of engineers comprising customer’s planning, design, product and process engineers are sent by supplier firms to their customer’s firms, normally for two to three years prior to commercial production, aimed at solving together various design problems and attaining target costs (Nishiguchi 1994). Any design-change proposals made by production engineers in later stage are reevaluated just before the real commercial production takes place. Collaborative problem solving at this new product development is crucial to minimise defect rates at the following commercial production stage.

In the commercial production phase, only resident production engineers remain in the customer’s firm for other tasks. They are required to observe the assembly process of their components into the final stage of automobile production. Any complaints made by the customer are documented and taken into account for further design and process modifications as well as for cost reductions. Their additional task is to gather information on a long-term product strategy of the customers. This is important for their employers (suppliers) to incorporate in the next proposals for a new auto model.
4.5.4.4 Just-in-Time Delivery System

As discussed in Chapter 1, the Just-in-Time (JIT) System is the product of Japan. Its operational mechanism, albeit extended to spatial platform, is similar to the Ford conveyor belt system. The first industry that introduced the system was the Japanese automobile industry (by Toyota) in 1956 (Wada 1994). Owing to its dynamism, the great success of the Japanese automobile industry is more specifically associated with this system.

All automobile manufacturers as well as manufacturers of some other industries in Japan adopted the JIT, enabling them to consolidate their sub-contracting networks, particularly with the first-layer sub-contractors. Of significance, the JIT has much reduced the need for inventories and hence costs of storing them on the part of the prime automakers. The sub-contractors would have made frequent deliveries of the contracted parts, or components in small batches whenever these items are required at the core assembly plants. This could be made because sub-contractors are located within a two-mile radius of the core assembly plants (Young 1992). Frequent delivery enables the automobile manufacturers to reduce their inventories to almost zero level, thus minimises their storage space and costs.

A strict delivery requirement under the system has compelled sub-contractors to locate their firms or plants nearer to their specific automobile manufacturer as well as to integrate their production line, particularly the first-tier sub-contractors with that of their parent firms, leading to their spatially concentrated feature (Sheard 1983). It is common for sub-contractors who supply a large proportion of their output to a specific
automobile firm and for those who supply bulky components, such as doors, seats and dashboards to cluster around the assembly plants they affiliate to.

Such a proximity attribute brings about advantages not only to both parties, but also to the entire automobile organisation and the industry vis-a-vis international competitors. Deliveries could be made at any time and any changes in the delivery could also be responded immediately. Other measures incorporated into the system are the delivery schedule, instructing in detail about the amounts and frequency of delivery and the use of information technology. This is used to notify sub-contractors at certain time intervals about the accurate orders of parts or components commensurate with the production schedule at the assembly plants. Close proximity between core automobile firms and the sub-contractors also saves time because the delivery of certain parts can be made hourly as in the case of Fuji Heavy Industries (Sheard 1983).

To make the JIT system more effective, a bonus-penalty system is also adopted. A bonus is awarded to sub-contractors succeeded in meeting the JIT schedule, whilst penalty is imposed on those who failed to meet the schedule. This bonus-penalty system proves to reduce radically the time unit of delivery scheduling of the whole auto network organisation from months to weeks, days and to hours in the recent period (Nishiguchi 1994).

4.5.4.5 Trust

As legal aspects of contractual agreements are difficult to enforce, the Japanese purchasers and suppliers govern their interdependency through trustworthiness. Trust is developed and institutionalised, among others through trade associations, the longer they form networks among their members.
Because of its high dependency on trust, a core automaker tends to network with a small number of old suppliers, rather than with the new ones, for outsourcing of specific items. According to Smitka (1991), purchases from new suppliers, if necessary, are made in stages. At the initial stage, the suppliers are placed orders for unimportant items. After proving their commitment, they would place new orders for more important items. But, it is not an easy task because significant time and money are normally invested to build up trust (Smitka 1991) before the new suppliers would be acceptable to the networking system. Such a tight requirement is probably the main difficulty for external and foreign suppliers to participate in the supply chain of the Japanese automobile industry.

It is understandable that trust is crucial in the Japanese automobile industry. The buyer-supplier network relations are based on longer-term commitment. Because of the high sophistication of the automobile product, new technology must be highly transferable from the core to supplier firms. In order to avoid the leakage of technological secrets, the automakers are only prepared to deal with the trusted suppliers. Strict adoption of the JIT system and quality control also requires the suppliers who are proved to be committed with the time scheduling and quality specification. The system and quality requirements will break if there are failures on the part of suppliers to deliver the contracted items at the right time and quality. Mutual trust too, would promote the suppliers to continuously improve their manufacturing processes and product design (Asanuma 1992).
4.6 Conclusion

An extraordinary achievement of the Japanese in the automobile industry has drawn much attention from other automakers throughout the world. The success has been much associated with the Japanese ability to organise intimate customer-sub-contractor networks. The success, however, did not come into existence in a short-time period, but through several decades. Also, it did not emerge by accident, but by earnest efforts of the Japanese society - the government, producers and suppliers. Economic and social factors were mutually responsible for shaping the auto sub-contracting arrangements which were distinct from other production systems in the world.

Although the structure of the Japanese automobile firms seems to resemble the Williamson hierarchies, but they are actually different in practice. Thus, the ability of transaction costs to explain the Japanese ENO has its own limit. Deep investigation into the Japanese sub-contracting history furnishes an obvious picture that no single factor dominates the other. No one can claim that his study approach is best to explain the Japanese ENO. The interplay among all observed factors - economic, political and socio-cultural of whether looking from the perspective of micro-structure (the firm and the industry itself as an organisational unit), or the macro-structure (the society as a whole) - is undisputed in the presence of such a complex society of Japan.

From resource dependence to social capital perspectives all are jointly in support and, to a certain extent, coerce the configuration of the Japanese sub-contracting arrangements in the automobile industry. The process of shaping the Japanese structure to what it is today took too much money, time, social commitment and sacrifice as well
as the full support of the government before the Japanese model proved its success and
competitiveness in the world automobile industry.

Perhaps, the sub-contracting organisation as Japan has today would have existed
differently if the government did not come into play in the 1950s. If the attempt by the
Allied forces to revert the Japanese economic system to laissez-faire has succeeded it
would have totally changed the Japanese pre-war sub-contracting structure into M-form
as in the U.S. The quick government intervention by legislative measures, including the
rectification of discriminatory practices by the large firms against their small sub-
contractors, that mostly favoured small firms, has continued the life of the sub-
contracting with new feature - the more obligatory relationship among the contracting
parties.

The government, considering the pressure from small-business organisations
and its own political survival, took an earnest measure to reorganise the preceding sub-
contracting into the presently longer-term, mutually benefiting sub-contracting
networks. This power coercion was a dominant factor in shaping the sub-contracting
configuration at early decades of its emergence. Economic factors only came into play
more effectively when the structure has been established. The impact of the economic
factors is, however, still within the domain of the Japanese benevolent society.
While the fourth wave is still debatable, the past three waves were occurred in three separate periods for each displayed a distinctive feature: 1) the change from the custom-built car with the involvement of many producers using short production runs to a standardised product, by adopting a moving assembly line for a mass-production process. The predominant producer was first Ford (with Model T between 1902-1920s), followed together by General Motors and Chrysler about the same period; 2) the shift to a diversified product (product differentiation) with the introduction of various models and new product technology led by European firms during the post-1945 to 1960s; and 3) the significant emergence of Japanese firms in international arena since the 1970s and particularly in 1980s with new organisations of labour and production system. This change has made Japan more competitive internationally that compelled other producers, either to imitate the Japanese model or to have joint-ventures with the Japanese firms.

The only difference in the sub-contracting organisation of Japan and the U.S and Europe lies in the level of outsourcing and the organisational structure of buyer-supplier networks: 1) outsourcing of the core assemblers from the suppliers in the U.S and Europe is lower than the Japanese firms (Friedman 1983; 2) whereas the Japanese core firms tends to organise vertically with their affiliated suppliers through a tight coordination, the U.S and Europe core firms, in contrast tend to organise horizontally with their suppliers as the component suppliers in the latter are independent, hence their interaction is limited only to the contractual basis (Friedman 1983, see Rawlinson 1991 for the case of Europe- a case study in Coventry, U.K.). But, according to Rubenstein (1991), there is a tendency for the U.S automobile firms to adopt a hierarchical organisation, exemplifying the Japanese multi-tier system. Instead of sourcing parts from a large number of suppliers, the U.S automobile firms source directly from a handful of the first-tier suppliers; the first-tier suppliers then form their own networks with the second-tier and the process goes on until the lowest-tier of which a whole process and interaction would form a pyramidal structure as in the Japanese case.

By the end of the 1970s, the U.S automobile industry began to stagnate: the third ranking company in the U.S (the Chrysler) was in a huge loss, amounting to $1.1 billion in 1979; in contrast, the export shares of the Japanese firms in the U.S market were increasing (Mutoh 1988). This crisis led to the U.S-Japan trade disputes. Some rounds of negotiations were made between the two administrations. In the first round of negotiations which was concluded in May 1980, the U.S. government (during the President of Jimmy Carter), among others encouraged the Japanese automobile firms (particularly Toyota and Nissan) to set up plants in their country; the same request also came from the President of the U.S. Union of Automobile Workers (Miyakawa 1991). Another round of negotiations was held during the President of Ronald Reagan; this time (also in the 1980s), the policy measure adopted was stricter by imposing a voluntary export restraint on Japanese automobile exports to the U.S. From April 1981-March 1982 alone, 1.68 million units of the Japanese automobiles were subjected to the regulation (Mutoh 1988).

Some built and operated their own assembly plants, while the other entered into joint ventures with the U.S company. Based on production start-up, the following companies which established their assembly plants in the U.S were Nissan in 1983, NUMMI (Toyota and GM joint venture) in 1984, Mazda in 1987, Toyota in 1988, Diamond-Star Motors (Mitsubishi and Chrysler joint venture) in 1988, Subaru in 1989 and Isuzu in 1989 (Rubenstein 1991).

Formerly, there were 12 automakers in Japan; but the number reduced to 11 firms when Nissan and Prince merged in August 1966 (Mutoh 1988). The 11 firms are Toyota, Nissan, Isuzu, Hino Motors, Mitsubishi, Nissan Diesel, Fuji Heavy Industries (Subaru), Honda, Toyo Kogyo (Mazda), Daihatsu and Suzuki (Smoka 1991, Nishiguchi 1994, Tabeta 1996). Some of these Kaisha belong to certain Keiretsu, but some are kept independent. Those affiliated to Toyota Group are Toyota, Daihatsu and Hino; whilst to Nissan Group are Nissan, Fuji Heavy Industries and Nissan Diesel. Toyo Kogyo, Mitsubishi and Isuzu are those firms partly owned by foreign firms (joint-venture firms); while Honda and Suzuki Motors are independent firms (Sheard 1983; Miyakawa 1991).

Toyota was initially the Automobile Department of Toyota Automatic Loom Works Ltd that was established in 1926; it became an independent entity in 1937. The founder and the president of the company was Kiichiro Toyoda. He resigned from the post in 1950 as a result of the labour and
financial crisis. These crises also impelled the Toyota Motor Company and Toyota Motor Sales Company separated; but they merged again in 1982 to be the Toyota Motor Corporation.

Measured in terms of productivity for assembly, the ability to develop new models as well as the ability of the part suppliers to switch one product from another and to minimize the product defects.

In Europe, Japanese suppliers, albeit showing an increasing trend, are still in small number in which they are either the subsidiaries of Japanese assemblers or the joint-venture firms (Wells and Rawlinson 1994). In the United States, there is a distinct relationship between the Japanese assemblers and their suppliers of different origins. They tend to buy bulky, low value-added products which require less skill to make, such as carpets, glass, tires from the American suppliers; but for the high value-added products which require higher skills and technology such as engines, transaxles, suspension systems and brake, they tend to buy from the Japanese suppliers which were promoted to build their plants in the U.S. (Rubenstein 1991).

An automobile, according to the Japanese Road Transport Law, is "a vehicle utilizing a motor, other than a bicycle equipped with a motor, which can be operated without depending on rails or electric lines" (quoted in Mutoh 1988: 310). Sharma (1998) defines an automobile as "a type of vehicle which is self-propelled and used for transportation purposes upon the ground" (p.1). Including in the automobile list is car, bus, truck, jeep, tractor, scooter, motorcycle and other special purpose vehicles.

A production system is "a collection of business operations linked by technology and organisation into the manufacture of final products" (Hill and Lee 1994: 290); or as "the collection of operating units which becomes linked as firms develop, manufacture and market specific products." (Sheard 1983: 51). Applying to automobile industry, an auto production system, in a wider sense, consists of not only the automobile manufacturer and its subsidiaries but also multi-size sub-contracting firms which supply, directly or indirectly, parts and engineering services to the core auto firm. Japanese automobile industry is seen as a set of production system centralised around each core firm, rather than as separate auto-assemblers industry and auto-parts industry (Sheard 1983; also Glasmeier and McCluskey 1987 with little picture on this demarcation).

Sub-contracting arrangements are a common feature of the Japanese manufacturing industries. Most sub-contractors are small and medium enterprises (SMEs) that are involved in a wide range of manufacturing activities; in 1981, more than 80 per cent of Japanese SMEs was the sub-contractors to textiles and clothing, general machinery, electrical machinery, transport machinery and precision machinery industries (Yokokura 1988) The smaller the firm size, the higher their dependency on sub-contracting transactions.

Product differentiation for a type of product such an automobile can be measured in terms of its variation in a combination of product design, model, size, technology, optional parts, colours, transmission systems and engine capacities.

Smitka (1991) divides the periods into three: the first thirty years (1923-1953), the period of rapid growth (1953-1973) and the contemporary era (1973-1985); while Nishiguchi (1994) separates them into the rising period of the sub-contracting (1980-1945), the emergence period during the postwar (1945-1960) and the transformation period (1960-1990). I tend to follow the time classification made by the latter because his time demarcation and arguments are clearer and easy to remember. Although much information is drawn from the two sources, for the sake of a more informative and up-to-date version, I also incorporated information from other literature as well as extended the time horizon to the most current development subjected to the availability of related information and data.

It did not do so, at least, until the 1970s. They came back in the decade, but in different approach due to the Japanese liberalisation on capital transactions in 1971. This measure permitted the U.S Big Three to enter into joint ventures with Japanese firms; Chrysler with Mitsubishi in 1971, GM with Isuzu in 1971 and Ford with Toyokogyo in 1979 (Miyakawa 1991).

This plan was introduced by the Occupation Forces in 1949; a deflationary plan that focused on a balanced budget, anti-inflation measures, establishment single exchange rate, the suspension of loans from the Reconstruction Bank and reduction and/or abolition of subsidies to Japan.

Sub-contracting arrangements in other industries will not be discussed in the present chapter since they are out of the question. Literature on Japanese sub-contracting as a whole can be obtained in Watanabe (1974), Yokokura (1988), Smitka (1991), Nishiguchi (1994).
The government actually played dual roles in developing the automobile industry during the 1950s: First, by introducing protectionist and promotional policies to develop the local automobile industry itself vis-à-vis foreign automobile industry (see Mutoh 1988); and second, by preserving and developing the actors and the governance within the industry which become the focus of this subsection. The first intervention enabled the local firms to move away from an infant status to the competitive one in the international market, particularly with the liberalisation pressures as Japan joined OECD in 1964. The second intervention, on the other hand, provided the local firms to strengthen their production and managerial organisations and hence enabled them to compete internationally when such a liberalisation takes place.

The series of laws were the 1953 Antimonopoly Law, the 1954 Standards for the Recognition of Unfair Delay in the Payment of Sub-contracting Charges, the 1956 Law on the Prevention of Delay in the Payment of Sub-contracting Charges and Related Matters. Another series of amendments to the existing laws were executed in 1962, 1963, 1965, 1970 and 1973. These laws were enacted and amended one after another to rectify the loopholes in the preceding laws that still put the subcontractors at disadvantage points whenever the contractors had rooms for delaying payments. For excellent elaboration of these laws see Nishiguchi 1994.

Japan was accepted to join the OECD in 1964, indicating the World recognition on its status as a developed nation.

Model changes are a normal feature in the Japanese industry: model changes for electrical appliances were one year, whilst a full model change for an auto make was about 4-5 years.

In the U.S., a production method combining special-purpose, product-specific machines and semi-skilled labour was applicable during the time due to the fact that there were only a few automakers competing for a bigger market share.

Contract assembly is adopted by an automaker when the automaker is unable to do in-house assembly due to its various models (e.g. various car models; sedan, hardtop, van, station wagon- these models too may in turn come in different designs, e.g. Toyota Crown, Corona, Corolla, etc.) and utilities of automobile production (e.g. trucks, lorry, buses, minivans and multipurpose utility vehicles- forklifts etc.); thus restricting its own production capacity. As a way out, it contracts out some parts of an assembly activity, say a car model or a vehicle utility to other contract assemblers. Toyota for example adopted the system since the 1940s and accelerated it in the 1960s with more strategic feature; by the end of 1980s, this firm (Toyota Motor Corporation, TMC) assembled completely 12 of its 20 car models (including vans), whilst contracted out the remaining to its eight other contract assemblers (see Nishiguchi 1994, Table 4-8 for the detail of the arrangement). The TMC only does final assembly for almost all of its trucks production; it means that the sub-assembly of parts components is preceding done by its sub-assemblers. The transfer of sub-assembly lines to its subcontractors was executed by Toyota since the 1960s; e.g. the sub-assembly of torque converters, wheels and engine valves to Aichi Kogyo, Chuo Seiki and Aisan Kogyo in 1964 respectively; driving parts to Ashin Seiki in 1965; and brakes to Hosei Brake in 1968. Nissan took the same strategy by focusing on certain assembly activity, while contracted out some its assembly lines to its affiliated firms, e.g. to Nissan Shatai in producing Nissan sport car, the “Z” series.

Such a link exists because each primary sub-contractor is responsible for organising their own second-tier supplier networks; the second-tier suppliers extend it into the third-tier network. Core automobile firms, such as Toyota are very reluctant to extend their control to second-tier suppliers because by doing so they have to increase their personnel in their purchasing department (Wada 1994). Instead of direct control, they transfer their knowledge of buyer-supplier management to their first-tier suppliers, thus this level of suppliers can organise its lower-tier suppliers as efficient as what they have with the core automobile firms. As a result of this process, the lower-tier suppliers have direct link (e.g. in management and transaction) to their next upper layer, but they have indirect link with the layer upper than that. Firm size measured in total number of employment is normally declined with the decrease in the supplier layer.

Opportunism may exist due the complexity of product development for new automobile. High technology is required to meet the precision and specification in design and quality which always involves a huge amount of set-up and operating costs. Moreover, such a skill would be developed only after frequent consultations between auto-assembler and the suppliers in a very long period of
time. In other words, know-how is not easily transferable and likewise, skills are not patentable. In this situation, it is not easy for the automaker to switch their suppliers more often. Thus, the tendency for the suppliers to increase the price of their products in the next contract is high.

His series of work were published in 1984 (2 articles), 1989 and 1992. Except for his 1992 article, I do not get access to his work because it was published in the journals that were out of my reach. His work was frequently quoted in many later studies of the Japanese production system, particularly the Japanese auto production industry (e.g. Tabeta 1996, Tabeta and Shahidur 1996, Smitka 1991, Inaba and Tabeta 1995, Wada 1994).

This estimated unit price covers the estimated production costs and a mark-up for the supplier's profit (Inaba and Tabeta 1995).

This single association was the reorganisation of the two associations, the Takarakai and Shohokai in 1991.

The basic price agreed upon at the development through negotiation stages for a part is formulated by Asanuma (1992) as follows: \( p = (m^* \cdot v^*) (1 + r^*) \), where \( m^* \) denotes the assessed level of per unit material costs, \( v^* \) and \( r^* \) stand for the assessed levels of per unit processing costs and allowed gross margin respectively. In other words \( m^* \), \( v^* \) and \( r^* \) are the mean averages of \( m \), \( v \) and \( r \) respectively. Though \( r^* \) is fixed, the margin \( r(t) \) which is actually earned by suppliers at each point in time, \( t \), may vary. At the early stage of the life cycle of the part, \( r(t) \cdot r^* \) because the actual levels of material costs \( m(t) \) and processing costs \( v(t) \cdot m^* \) and \( v^* \) respectively. Such a situation may cause the suppliers to run with loss for some time. They need to improve their manufacturing process to enable \( m(t) \) and \( v(t) \) decreased over time up to the point where \( m(t) < m^* \) and \( v(t) < v^* \). This level of comparison is attempted to achieve as immediately as possible by the suppliers before the end of the life cycle of the part in the hope that they would gain profit to cover the previous loss. As the profit increases, they return part of the profit to their core firms in the form of price reductions. This means that the source of price reductions in such a price mechanism is the manufacturing process.