

# Japanese SMEs – Driving the Competitiveness of Japan's Automobile Industry

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## Competitive Strength of Japan's Automobile Industry

The Japanese automobile industry – featuring corporations like Toyota, Honda and Nissan – is without a doubt the driving force behind today's Japanese economy. However, if we look at the world history of automobile industries, we see that Japan was actually a latecomer. Ford Motor Co. of the United States built its first Model T in 1908, and had already reached its ten-millionth by 1921. In contrast, Toyota Motor Corp. was established in 1937, its first mass-produced passenger vehicle, the Toyopet Crown, was not produced until 1955, almost 50 years after the Model T was developed. By this stage, US automobile manufacturers such as Ford and General Motors were already leveraging their overwhelming capital

strength to create a system of start-to-finish production that enabled them to produce the vast majority of the 30,000 individual parts themselves. This approach later became the source of their competitive strength. However, as latecomers to the automobile industry, Japanese manufacturers lacked capital strength and were unable to copy the US production systems. They had no choice but to order most of the parts from many companies, including small and medium-sized enterprises (SMEs) located close to their assembly plants. Even now, unlike Ford's part production ratio of approximately 70%, Toyota produces only 30% of its parts in its own factories.

This historical background indicates that the supplier system of the Japanese automobile industry has developed with a quite different structure from that of

the United States. In Japan, as many as 200-300 Tier 1 suppliers provide parts directly to assembly manufacturers such as Toyota and Honda in a multi-tiered supplier system in which the processing is outsourced. Tier 1 suppliers source parts from many Tier 2 suppliers and Tier 2 suppliers do the same from Tier 3 suppliers. In contrast, the number of Tier 1 suppliers in the United States is 10 times that of Japan, and they work in a relatively flat structure with, in effect, no more than two levels of supply. In addition, in Japan Tier 1 suppliers, and in some cases Tier 2 suppliers, participate in parts development starting from the design stage of vehicles. Therefore, a large number of companies, including SMEs, are involved in the process from development to production. This makes it possible not only to reduce the time required for the development of new vehicles but also to develop and manufacture several different kinds of vehicle at one time. This is the secret behind the competitive strength of Japan's automobile industry today.

Most of the Tier 1 suppliers described above are large corporations, but almost all of the Tier 2 and Tier 3 suppliers are SMEs. In December 2004, I carried out a survey of 20 Tier 2 suppliers (companies A to T) underneath Futaba Industrial Co., Ltd. and Toyoda Iron Works Co., Ltd., which are Tier 1 suppliers to Toyoda affiliates. The survey focused on metal-stamped parts, which are produced predominantly by SMEs. Based upon the results of this survey, I will look at the formation process of the multi-tiered supplier system, focusing on the function analysis of Tier 2 suppliers. Futaba Industrial is a large corporation listed on the first section of the Tokyo Stock Exchange. It is capitalized at ¥11.7 billion, has a total of 2,556 employees and has its head office in Okazaki City, Aichi Prefecture. On the other hand, Toyoda Iron Works is an unlisted company. It is capitalized at

Table 1 Profile of 20 Tier 2 Supplier Companies

	Year Established	Capital Stock (Unit: million yen)	Numbers of Employees	Location of Head Office (Aichi Prefecture)
A	1970	40	465	Nishikasugai County
B	1952	10	210	Nagoya City
C	1948	30	153	Anjo City
D	1946	32	110	Toyohashi City
E	1934	20	110	Nishikasugai County
F	1968	30	123	Kanagawa Prefecture
G	1958	10	62	Nagoya City
H	1970	20	69	Okazaki City
I	1968	20	123	Chiryu City
J	1958	12	130	Kariya City
K	1960	10	33	Toyota City
L	1959	10	76	Nagoya City
M	1942	15	70	Kariya City
N	1962	40	88	Toyota City
O	1963	37	78	Toyota City
P	1960	10	65	Toyota City
Q	1976	10	48	Anjo City
R	1963	10	47	Ichinomiya City
S	1970	10	41	Toyota City
T	1964	10	19	Ama County

Source : The survey which the author conducted in December 2004

¥2.2 billion with a total of 2,060 employees, and its head office is located in Toyota City, Aichi Prefecture.

### Formation of the Multi-Tiered Supplier System

Table 1 indicates that, in terms of scale, the average capitalized value of the 20 Tier 2 suppliers surveyed was ¥19.3 million, and the average number of employees was 106. The capitalized value ranged from ¥10 million to ¥40 million and apart from 465 employees in Company A and 19 in Company T, the number of workers fits into the range of 40 to 210, placing them in the medium range among SMEs. In addition, if we look at a breakdown of the employees, we see that 75.3% are full-time employees, 13.2% dispatched foreign workers and 11.5% part-time employees.

Table 2 shows that their business operations mostly involve metal pressing and that 14 of the 20 companies have the facility for metal molding, meaning that they are capable – one way or another – of carrying out development within their own factories, and that through welding, they also carry out some assembly of pressed parts.

Table 3 allows us to understand the background to the establishment of Tier 2 suppliers. People who acquired technical skills by working in steel plate, metal pressing and metal molding factories in cities in the Mikawa region such as Kariya and Okazaki, went on to establish small-scale metal processing companies after the war during the period of high economic growth. As the Tier 1 suppliers expanded their production levels, those small companies were gradually integrated into the multi-tiered supplier system as Tier 2 suppliers grew into medium-sized corporations. In this respect, as technologically relevant industries gathered here before the birth of the region's automobile industry, this industrial agglomeration fulfilled a kind of incubation function, which was very significant in terms of the formation of the multi-tiered supplier system.

Table 4 shows what kind of Tier 3

Table 2 Business Description of 20 Tier 2 Supplier Companies

	Press	Welding	Cutting Work	Heat Treatment	Test Production	Metal Molding	Other
A							
B							
C							
D							
E							
F							
G							
H							
I							
J							
K							
L							
M							
N							
O							
P							
Q							
R							
S							
T							

Source : The survey which the author conducted in December 2004

Note : Other of Company T: resin treatment

Table 3 Commencement of Operations of the 20 Tier 2 Supplier Companies

	Year Established	Birth Year of the Founder	Founder's Age when Company was Established	Founder's Previous Occupation
A	1970	1938	32	—
B	1952	1929	23	Wholesale of Arimatsushibori
C	1948	1928	20	Steel Industry
D	1946	1925	21	Steel Plate Industry
E	1934	1907	27	Metal Pressing Industry
F	1968	1939	29	Camera Optics, Tripod Manufacture
G	1958	1930	28	Metal Processing Industry
H	1970	1936	34	Company Employee
I	1968	1929	39	Machinery Manufacture
J	1958	1935	23	Metal Pressing Industry
K	1960	1929	31	Automotive Industry
L	1959	1925	34	Automobile Parts Manufacture
M	1942	1905	37	Steel Plate Industry
N	1962	n.a.	n.a.	Driving School Teacher
O	1963	1936	27	Automobile Parts Manufacture
P	1960	n.a.	n.a.	Company Employee
Q	1976	1943	33	Company Employee
R	1963	1941	22	Metal Pressing Industry
S	1970	1937	33	Barber
T	1964	n.a.	n.a.	Metal Molding Manufacture

Source : The survey which the author conducted in December 2004

Note : n.a. – no answer

suppliers the Tier 2 suppliers deal with. According to the survey results – while there is a large range within the 20 companies – the average number of client companies receiving continuous orders from each was 13.7, with another 2.4 on a spot-basis, producing a combined total of 16.1 Tier 3 companies with whom they do business. Metal molding and pressing industries issue a particularly large number of orders on a spot-basis, but other industries make almost all of their orders on a continuous basis. This makes it clear that, while the relationship between Tier 2 and Tier 3 suppliers is based on continuous orders, those industries that need to make adjustments because of the fluctuations in the level of orders received will cope by mixing in deals on a spot-basis. Tier 2 suppliers meet the needs of their Tier 1 counter-

parts through division of labor with the Tier 3 suppliers in their vicinity.

While it is not shown in the figures, a survey of where the 20 companies deliver their products indicates that, when Tier 2 suppliers are in their growth phase, they expand their dealings not only with specific Tier 1 suppliers but also often with multiple Tier 1 suppliers. When they deal with a number of companies, it is the norm for them to be all Toyota affiliates, but some companies do have dealings with both Toyota and Honda affiliates. In this respect, the multi-tiered supplier system is not merely a hierarchical arrangement, but actually has some network-type elements.

In summary, we can make the following observations about the formation of the multi-tiered supplier system. The two Tier 1 supplier companies men-

tioned in this column expanded the percentage and volume of their dealings with Toyota since the mid-1960s in keeping with the rapid increase in the domestic production of Toyota Motors. However, there is a slight difference in the period when these corporations established ongoing relations with Tier 2 suppliers. In the period from the late 1950s to the mid-1970s, in addition to involving existing corporations in the Mikawa region that possessed metal pressing or related technological capabilities, Futaba Industrial also stimulated the establishment of new companies and increased its number of Tier 2 suppliers. In contrast, Toyoda Iron Works also increased its Tier 2 suppliers in the period from the late 1960's to the 1980's. This illustrates how the multi-tiered supplier system was not designed a pri-

Table 4 Services Ordered by the 20 Tier 2 Supplier Companies (Type of Business) CD: Number of continuous deals SD: Number of deals on a spot-basis

	Press			Welding			Painting			Coating			Metal Molding			Heat Treatment			Other*			Total		
	CD	SD	Total	CD	SD	Total	CD	SD	Total	CD	SD	Total	CD	SD	Total	CD	SD	Total	CD	SD	Total	CD	SD	Total
A	3	0	3	0	0	0	0	0	0	0	0	0	2	3	5	0	0	0	0	0	0	5	3	8
B	10	5	15	3	1	4	2	0	2	2	0	2	5	3	8	0	1	1	3	1	4	25	10	35
C	5	0	5	4	0	4	2	0	2	1	0	1	6	3	9	2	0	2	0	0	0	20	3	23
D	5	0	5	7	0	7	1	0	1	1	0	1	3	0	3	2	0	2	0	0	0	19	0	19
E	3	0	3	0	0	0	3	0	3	3	0	3	5	2	7	0	0	0	0	0	0	14	2	16
F	3	0	3	3	0	3	0	1	1	0	0	0	3	0	3	2	0	2	2	0	2	13	1	14
G	1	0	1	1	0	1	2	0	2	1	0	1	0	0	0	0	1	1	0	0	0	5	1	6
H	0	0	0	2	0	2	3	0	3	0	1	1	0	0	0	0	0	0	1	0	1	6	1	7
I	5	0	5	3	0	3	4	0	4	3	0	3	2	1	3	2	1	3	5	0	5	24	1	25
J	16	0	16	3	0	3	3	0	3	5	0	5	18	0	18	4	0	4	32	0	32	81	0	81
K	3	0	3	3	0	3	2	0	2	2	0	2	4	3	7	0	1	1	0	0	0	14	4	18
L	4	0	4	2	0	2	0	0	0	2	0	2	3	0	3	2	0	2	0	0	0	13	0	13
M	2	0	2	1	0	1	1	0	1	1	0	1	2	3	5	0	0	0	0	0	0	7	3	10
N	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3
O	1	0	1	1	0	1	0	0	0	0	0	0	2	0	2	0	0	0	1	0	1	5	0	5
P	4	0	4	2	0	2	2	0	2	0	0	0	4	0	4	0	0	0	0	0	0	12	0	12
Q	0	1	1	0	1	1	1	1	2	0	1	1	0	0	0	0	0	0	0	0	0	1	3	4
R	2	1	3	2	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	6
S	1	5	6	0	3	3	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0	1	11	12
T	1	0	1	0	1	1	0	0	0	0	0	0	0	1	1	1	0	1	0	0	0	2	2	4
Total	72	12	84	37	7	44	26	2	28	21	2	23	59	22	81	15	4	19	—	—	—	274	47	321
Average	4.2			2.2			1.4			1.2			4.1			1.0			—			16.1		

Source : The survey which the author conducted in December 2004

Note : Breakdown of "Other"

Company B: Spot Welding (CD: 3, SD: 1), Company F: Blazing (CD: 2, SD: 0), Company H: Assembly (CD: 1, SD: 0), Company I: Bending (CD: 5, SD: 0), Company J: Cutting Work (CD: 9, SD: 0), Test Production (CD: 10, SD: 0), and Steel Plate Work (CD: 13, SD: 0), Company O: Buffing (CD: 1, SD: 0)

ori, but rather, gradually evolved with the expansion of the varieties of finished vehicles produced domestically and the number of cars manufactured, as well as in keeping with the restructuring of the relationship between the Tier 1 and Tier 2 suppliers.

## ■ Function of Tier 2 Suppliers

To establish what function middle-range SME Tier 2 suppliers play within the multi-tiered supplier system, I analyzed the results of interviews with representatives of five of the 20 companies (Companies B, C, G, M and N). I came to the following conclusions.

First, the function of Tier 2 suppliers in the multi-tiered supplier system is to take orders from Tier 1 suppliers for the production of complex-shaped and small pressed parts that are difficult to handle on automated production lines. Such parts are many and varied and involve a diverse range of production lots, requiring a labor-intensive approach to production, which is reflected in the production cost. For this reason, Tier 2 suppliers employ larger percentages of cheaper, temporary non-Japanese workers in order to keep production costs down. However, because such non-Japanese workers need to develop skills, the companies do their best to retain the workers and to heighten their sense of involvement in the manufacturing process.

Secondly, in order to help themselves respond more quickly to orders for many types of parts in varied production lots, Tier 2 suppliers use nearby Tier 3 suppliers to supplement their quantity requirements. Among the Tier 2 suppliers, companies such as Company B and G take part in the development process of parts for Tier 1 suppliers. Both companies are involved in the development of uniquely-shaped pressed parts in the lead-up to decisions on the design of such parts, making suggestions for designs that facilitate lower production costs.

In sum, the formation of the multi-tiered supplier system signifies that, in

response to an expansion of orders for parts from finished-car manufacturers, Tier 1 suppliers respond by expanding their own production capabilities and their dealings with Tier 2 suppliers. They have used Tier 2 suppliers for two main reasons: Tier 2 suppliers use of non-permanent workers such as temporary staff and part-timers reduces costs, and also allows them to cope flexibly with changes in production volume. For this reason, Tier 2 suppliers maintain business relations not only with several Tier 1 suppliers, but also with Tier 3 suppliers, thereby creating a system in which they can smoothly cope with fluctuations in the quantity requirements.

However, the function of Tier 2 suppliers goes beyond that of supplementing the production quantity requirements of Tier 1 suppliers as described above. In the case of Company B and G, based upon their accumulated experience in manufacturing technology, by taking part in the planning and development of parts, there are occasions when they supplement the Tier 1 suppliers not only in terms of quantity but also in terms of quality.

The creative power that drives the competitive strength of Japan's automotive industry is based on the fact that these SMEs – as Tier 2 suppliers – possess both these functions.

## ■ Future Issues

The multi-tiered supplier system described above was established before finished-car manufacturers started to move their production bases overseas. However, from around 1995, when finished-car manufacturers began to move their operations overseas in earnest, Tier 1 suppliers started to do the same, and this trend has clearly gained momentum since 2000. How will the multi-tiered supplier system evolve in this new environment?

When Tier 1 suppliers commence overseas operations, the following three methods are possible with regard to the procurement of the small pressed parts that they had previously been subcon-

tracting to Tier 2 suppliers within Japan: (1) self-manufacture overseas, or having the Japanese domestic Tier 2 suppliers send parts; (2) transferring the required technology to local corporations and developing them as Tier 2 suppliers; (3) encouraging Japanese Tier 2 suppliers to develop overseas operations. The choice of option depends to some extent on the Tier 1 supplier, but there would seem to be a trend toward starting with (1) establishment of an overseas manufacturing base, then gradually moving to (2) or (3).

It is difficult to make a definitive statement on the response of the Tier 2 suppliers, but some Tier 2 suppliers are already following their Tier 1 counterparts in relocating overseas. However, Tier 2 suppliers are of a smaller scale than Tier 1 companies and survive by absorbing the impact of fluctuations in orders by working within a network of multiple clients and sub-contractors. So they will need a new approach if they are to develop their business in the new, overseas environment. Examples include developing a larger range of items for which they can accept orders, or developing new clients in the country where they set up operations.

In addition, a support system in Japan is necessary to facilitate smooth operations overseas. This is only possible when the Tier 2 suppliers are maintaining and continuing efficient operations in Japan in the same manner as the finished-car manufacturers and the Tier 1 suppliers. This is premised upon the continued existence of the function of the Tier 3 suppliers within the industrial agglomeration. At present, the Tier 2 suppliers can be said to be struggling to define their response, and only when they are able to find response strategies for their new circumstances will the innovative adaptation of the multi-tiered supplier system to the relocation overseas of finished-car manufacturers be complete. **J.S**

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