TECHNOLOGY STRATEGY IN SUPPLIER INDUSTRIES: GLOBALIZATION IN THE AUTOMOBILE SUPPLIER INDUSTRY

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ABSTRACT

Many American and European automotive suppliers have expanded overseas before such expansion became widespread among Japanese suppliers. Whereas Western offshore expansion has been limited to big companies, many Japanese automotive suppliers who have expanded overseas are medium to small firms. This overseas' expansion increased rapidly after 1985.

For most of the suppliers, the crucial reason has been to respond to the needs of their customers in the local area. Also it is important to develop new local customers. But the mode of response to their customers differs between a company with a strong tie to car manufacturers, such as suppliers in the "Keiretsu" system or subsidiaries of the automobile makers, and an independent supplier. The former finds it easy to develop local business with offshore Japanese producers, but difficult to expand its business to other firms outside their Keiretsu.

Although almost all companies are willing to expand the autonomy in local companies toward full localization, they are having difficulties in hiring good local employees and maintaining of control over the local company. The research suggests that the direction of international strategy in automotive supplier industry is heading toward the full localization and globalization as their essential strategy. One of the biggest reasons for this strategy comes from the efforts to respond the needs of customers who have already taken the globalization strategy and are diversifying their market on a world scale. So to be a successful company in the international environment means not just having local facilities but also taking a global strategy by giving full autonomy to the local facility.

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CHAPTER 1 : INTRODUCTION

The automotive industry has become transfigured from a mature industry to a high-tech industry. In contrast to a decade ago, currently automobile manufacturers are using many electronic products. For example, one of the luxury cars produced by Toyota has had more than 30 computers included in the last several years. What is more, the trend in the automobile industry is toward introducing more highly electronic and sophisticated in-vehicle systems such as optic fiber systems, electronic display systems, head up display systems and navigation systems similar to those the most modern jet plains. This trend will continue in the coming years.

The steady growth of the introduction of a number of in-vehicle electronic systems indicates that the strategy of the auto manufacturers and their suppliers is moving towards globalization. In contrast to the operations of the manufacturers before 1980, wherein plants were established in developing countries to take the advantage of lower labor cost, the direction of overseas expansion is changing toward three fully industrialized regions: Japan, USA and Europe. This is mainly to accomplish localization policies such as "local-content regulation", to overcome the various tariff barriers and to prepare for the economic union of Europe in 1992. These factors influence the attitude and strategy of

auto suppliers. The supplier is forced to shift its strategy from domestic orientation to an international one, forward on the three main regions of the developed "Triad."

Against this backdrop, the focus of this paper is the automotive supplier industry in the world's three big automotive industry regions (Japan, Europe and USA) and on the international engineering development and R&D strategies of this industry. By focusing on their R&D strategy, which forms the most important part of the company, the objectives of this research are to analyze the movement of R&D strategy, including an engineering division, in order to make clear the process of internationalization and the meaning of the industry's globalization.

The paper will analyze the direction in which the automotive supplier industry will more to move and the stages in which the automotive suppliers in world's big three regions find themselves. Generally speaking, the following is the list of the five stages of their globalization strategy:

(1). Establishment of a foothold through mergers and acquisitions or joint ventures.

(2). Local production by an owned factory.

(3). Establishment of engineering or R&D centers and their partial localization.

(4). Establishment of independent engineering facilities at R&D centers.

(5). Globalization through international interaction of engineering or R&D section.

Now most of world automotive manufacturers in the three major regions in the world are at level 3 and are heading to the next step. The many companies in the automotive suppliers industries cover a very broad range of stage. You can see a variety of examples: many large European and U.S. suppliers have extensive overseas operations in stages 3 and 4; many Japanese suppliers have followed the auto assemblers overseas, especially since 1985, and are also moving into the fourth stage. However, many auto manufacturers are heading to their final target of globalization as their strategy.

This research is conducted by means of the following methodology:

- A survey questionnaire to the automotive suppliers.
- Interviews with high-level managers in selected automotive supplier companies.

The companies investigated are large, because small automotive suppliers, whose sales heavily depend upon the car industry, often do not have a R&D section in the company. Therefore big companies are included to analyze R&D strategy sufficiently. The questionnaire sent and a list of companies are attached in the appendix A and B.

CHAPTER 2: WORLD AUTOMOTIVE AND SUPPLIERS INDUSTRIES

2-1. EUROPE, USA AND JAPANESE AUTOMOTIVE MARKET

The production numbers of automobiles in 1986 and 1987 are shown in tables 2-1-A to 2-1-C below. Table 2-1-A shows both passenger car and commercial vehicles production in Europe in the late 1980s. West Germany is the dominant producer, but France, England, Italy and Spain also have significant production capacity.

Table 2-1-A. World Automobile Production Numbers: Ratio in each country (Europe)- Unit: %

	1987			1988			1989		
	PC	CV	Total	PC	CV	Total	PC	CV	Total
W.G.	32.6	16.0	30.8	31.1	14.4	29.1	31.2	13.9	29.1
France	22.7	27.0	23.2	23.1	24.4	23.2	23.3	24.6	23.5
England	8.5	18.5	9.2	8.8	16.4	9.7	8.9	15.7	9.7
Italy	12.7	12.2	12.6	13.5	11.7	13.3	13.5	12.0	13.3
Spain	10.5	18.5	11.3	10.7	19.0	11.7	11.2	19.6	12.3
Other W.E.	13.0	7.8	12.9	12.8	14.1	13.0	11.9	14.2	12.1
Total :Number	100 13.4M	100 1.6M	100 15.0M	100 14.0M	100 1.9M	100 15.9M	100 14.6M	100 2.1M	100 16.7M

-W.G.:West Germany, Other W.E.: Other Western Europe
-PC:Passenger Car, CV:Commercial Vehicle
-1989 Data don't include the data in Greece and Finland.
(Source: Modified data in *JIDOSYA HANDBOOK*-1990 *BAN*-, pp210-217, KINOKUNIYA)

Table 2-1-B shows the North American production for the same time period.One feature of the data is the declining share of the U.S. production era in this short time frame. However, the United States still produces over eighty percent of the total production.

Table 2-1-B. World Automobile Production numbers:
Ratio in each country (North America)-Unit: %

	1987			1988			1989		
	PC	CV	Total	PC	CV	Total	PC	CV	Total
USA	86.8	80.0	84.3	83.7	78.8	81.9	82.6	78.0	80.8
Canada	9.9	17.3	12.6	12.1	18.2	14.4	12.1	18.2	14.4
Mexico	3.3	2.7	3.1	4.2	3.0	3.7	5.3	3.8	4.7
Total (Number)	100 8.2M	100 4.8M	100 13.0M	100 8.5M	100 5.2M	100 13.7M	100 8.3M	100 5.2M	100 13.4M

-PC:Passenger Car, CV:Commercial Vehicle
(Source: Modified data in *JIDOSYA HANDBOOK*-1990 *BAN*-, pp210-217, KINOKUNIYA)

Finally, Table 2-1-C shows the distribution across the three major regions. Only 13.2% of vehicles are produced outside the Triad. Production is fairly evenly distributed across the three regions, although Western Europe produces more vehicle than either the United States and Japan.

Table 2-1-C. World Automobile Production Numbers:
Ratio in each region (Unit: %)

	1987			1988			1989		
	PC	CV	Total	PC	CV	Total	PC	CV	Total
North America	24.8	37.2	28.3	24.9	37.4	28.5	22.7	39.4	27.0
Western Europe	40.6	12.4	30.9	40.9	13.7	33.1	39.9	15.9	33.6
Japan	23.9	34.1	26.6	24.0	32.4	26.4	24.9	30.3	26.2
Others	10.7	16.3	14.2	10.2	16.5	12.0	12.5	14.4	13.2
Total :Number	100 33.0 M	100 12.9 M	100 45.9M	100 34.2M	100 13.9M	100 48.1M	100 36.6M	100 13.2M	100 49.7M

-PC:Passenger Car, CV:Commercial Vehicle
-1989 Data in Western Europe don't include the data in Greece and Finland.
-North America:USA, Canada and Mexico
(Source: Modified data in *JIDOSYA HANDBOOK*-1990 *BAN*-, pp2-3,pp210-217, KINOKUNIYA)

2-2. EUROPEAN MARKET

2-2-1. European Automotive Industry and Its Market

Europe, the birth place of the automobile, has a large number of automobile manufacturers in this region. Yet because of many regulations, the European market can be said to be a closed market in a different way than is the Japanese market. However, the size of the whole market itself including Western Europe is quite large. The automobile production in the Western European market are more than 140 million(140,641,000 in 1988) and in all of Europe, they produced 195,787,000 in 1988-that is about 37% in the world market share (about 536,221,000 in 1988).[2.1]

The production of automobiles in Europe has exceeded that of North America since 1986, and it has become the world's largest production number. The European automotive market, as can be seen in Table 2-1-A, has different features across each country, with their markets differing economically, socially and culturally, as in West Germany, France, England and Spain. At the same time, these countries, except for West Germany, are strongly regulating the import of the cars to keep their market. What is more, these countries, except for Spain, possess their own national automotive industry, which has a big market share in their country.

Table 2-2. Registered Automobile Number in Western Europe: The ratio in each country (Unit: %)

	1986			1987		
	PC	CV	Total	PC	CV	Total
W.Germany	24.5 %	10.1 %	23.0 %	24.2 %	10.0 %	22.6 %
France	16.6	27.6	17.8	17.4	27.3	18.6
England	16.3	20.6	16.8	16.7	20.4	17.1
Italy	15.8	7.4	14.9	16.4	8.1	15.4
Spain	5.6	10.4	6.2	5.4	11.1	6.0
Other W. Europe	21.2	23.9	21.3	19.9	23.1	20.3
Total (Number)	100 % (11.5M)	100 % (1.4M)	100 % (12.9M)	100% (12.1M)	100% (1.5M)	100% (13.6M)

-PA:Passenger Car, CV:Commercial Vehicle
(Source: Modified 1988 Ward's Automotive Yearbook)

Table 2-2 shows the registered automobiles in the Western European market. In this area, West Germany, France, Italy and England have high rate of car ownership and constitute the main market. In addition, Europe as a whole will become more attractive because of the impending unity of the EC market and the democratization and freer markets in Eastern Europe.

Table 2-3 shows the market share of each automobile manufacturing group or company in Western Europe. Table 2-4 shows the market share in each country based on the original nationality of car production. It is well known that these groups or companies have very strong and firm market shares in their home country, as shown in Table 2-4. It is not an easy

job for foreign countries like North Mwerica or Japan to penetrate into the European market which is dominated by the national automotive companies, even though European countries are going to integrate their trading regulations, which now very independently among the various countries. This integration will make entry into the European market easier than before.

Table 2-3. Sales Share of Major European Car Manufacturers in European Market

	The name of Automotive manufacturers	Market Share (%)	
		1986	1987
1	Volkswagen	14.65	15.88
2	Fiat	14.04	14.23
3	PSA	11.38	12.15
4	Europe Ford	11.70	11.94
5	Total of Japanese Car	11.73	11.33
6	Renault	10.62	10.61
7	Europe GM	10.91	10.54
8	Mercedes	3.76	3.52
9	Austin Rover	3.52	3.63
10	BMW	2.56	2.39
11	Volvo	2.30	2.16

(Source: Word's Automotive Report 1988)

The auto-manufacturers in North America prepared their base in Europe more than ten years ago. Yet the Japanese auto manufacturers have taken a more cautious approach to manufacturing in Europe. As a result, the Japanese car manufacturers have only a 10% share in the European market.

This market share looks stable and therefore it may be difficult to raise the market share rapidly in this dispersed market situation. Even if the car manufacturer can gain a large market share in some country, it may lead people in the country to feel a strong antipathy toward the car manufacturer that causes a significant decreases in its own companies' market shares. In addition, there is a possibility that the country will set up stronger regulations to combat the foreign car market share. Therefore car companies from outside Europe are proceeding with their plans carefully. This does not mean that they will stop implementing their plans, rather this issue becomes a large factor when proceeding with their localization plans.

Japanese car manufacturers are not so active in the European market in comparison with the American market, but now they are proceeding with localization strategies that include both manufacturing plants and design and development activities. Many Japanese companies are moving towards establishing a foothold with the objective of solid localization which will include all activities from design and development to manufacturing.[2.2] A similar movement can be

seen in the Japanese automotive parts suppliers. [2.3][2.4][2.5][2.6] This overseas expansion, including design and development, is effective not only because of an increase in market share in the European market but also because an integration into the local market. It will be an effective and necessary strategy for foreign companies in Europe, because the European market is relatively closed market for non-European companies.

European auto manufacturers, however, are forwarding the 1992 European economic unification and market integration. They are overhauling not only their own systems and organizations but also their relationships with their suppliers. As a result of this radical reform, many car makers are making the following efforts:

1. Select suppliers and reduce the number of them.
2. Have longer term contracts for parts supply than before.
3. Let the suppliers join development activities in the early stages to shorten the development time.

For example, PSA in France reduced their suppliers from 2000 companies in 1981 to 950 in 1988 and Renault reduced its number of suppliers from 1415 in 1981 to 900 in 1985. This became a general tendency among European car manufacturers.[2.7]

Table 2-4. 1989 Market Share in Newly Registered Passenger Car

(Unit: %)

Name of countries	W.Germany	France	Italy	England
W. Germany	44.3(1)	11.7(3)	15.0(2)	9.4(5)
France	6.8(5)	61.8(1)	14.8(3)	12.7(3)
Italy	4.8(6)	7.2(4)	57.2(1)	3.3(6)
England	14.2(4)	1.9(6)	0.9(6)	14.2(2)
Japan	14.7(3)	2.9(5)	1.4(5)	11.3(4)
USA	26.2(2)	12.3(2)	8.7(4)	41.6(1)

1. W.Germany: VW, Bentz, BMW. Porsche
2. France : Renault, PSA
3. Italy : Fiat
4. England : Rover Group, Jaguar
5. USA : GM, Ford, Chrysler
6. Japan : NISSAN, TOYOTA, MAZDA, Mitsubishi, HONDA, ISUZU, DAIHATSU, SUZUKI

(Source: Calculated data from *Jidosya Handbook*-1990 *Ban*-, pp278-279, KINOKUNIYA)

In next section, the situation in Western Europe will be addressed in more detail.

2-2-2. Suppliers in Western Europe

(1). Western Germany

The western part of Germany, previously West Germany, had outstanding economic growth after World War II, as did Japan. The competitiveness of the German car industry is relatively strong among European countries, with its competitive strength in the high-end segment of the world automotive market. Also, their supplier industry, including from the big to the small

companies, is technologically competitive. It can be said that there are many big companies in terms of technology.

On the other hand, West Germany (now the western part of Germany) has been the highest wage earning country in the world since 1987. As a result of this, there is a tendency for German companies, especially parts suppliers, to set up their base of operation outside of Europe and other overseas.[2.8] Table 2-5 shows the wage comparison among major European countries, the USA and Japan.

Under a strong German Mark, the German auto industry, including its supplier industry, has to deal with serious issues to solve the higher wage rate. Thus the German auto industry is fighting to reduce both costs and personnel expenses.

Table 2-5. Comparison of Hourly Labor Cost in the Auto Industry
(Hourly wages: Relative comparison of total wages)
(Unit % : 100 % = 33.95 DM:Wages in West Germany in 1985)

	1983	1984	1985	1986	1987
W. Germany	93.0	96.1	100	105.4	108.6
France	68.4	70.3	74.1	73.8	72.0
England	54.9	58.0	63.1	57.6	56.8
Italy	64.3	70.5	75.2	76.3	76.0
Spain	42.7	46.5	49.9	52.1	55.7
USA	128.7	148.7	164.6	121.0	101.6
Japan	66.3	76.3	80.7	88.2	87.4

(Source: Modified 1988 Data of Verband der Automobile Industrie E. V. in West Germany)

For foreign companies, a strong German Mark means that Germany is not an attractive country in which to establish a manufacturing base; rather it is more suitable to establish more highly value-added facilities dedicated design, development or research there. [2.2] [2.3]

Table 2-6. Automotive Supplier Industry in West Germany (1983)

Number od employees	Number of suppliers
20 --- 99	120
100 --- 499	90
500 --- 999	17
more than 1000	45
Total	272

(Source : The Automotive Industry in Germany, 1988)
(*)Except for automotive body manufacturers.

Table 2-6 shows the composition of West German automotive suppliers based on the number of employees. As the table shows, they are polarized into two groups; one is the small size companies of less than 100 employees and the other is large size companies of more than 1000 employees. The suppliers in West Germany have advanced technology, but as described before, the higher wage rate and strong German Mark are pushing the auto suppliers toward international expansion. Already the domestic automotive industry in West Germany has shifted its parts supply system from domestic to overseas production. This shift in itself has stimulated and is a

strong factor in international expansion. However it is generally true in this country that expansion means only within Europe. There are many suppliers who have expanded in this "international" manner. International globalization on a world scale has only been by big suppliers in Western Germany.

(2). France

In France, two big auto manufacturers, the PSA and Renault, dominate the French market, with 99.9 % of production and 70 % of total market share occupied by those two companies. This situation is very close to a monopoly. The size of the French market is second only to that of West Germany in Europe. But at the same time, France is noted for its many restrictions on car imports and foreign currency regulations.

As can be seen in Table 2-8, total automobile shipments have been increasing, yet the total number of employees in this industry decreased during the same time period (Table 2-7). This would indicate that the efficiency of production has improved in the French auto industry.

Table 2-7. Employees in the Auto Supplier Industry in France
(Unit: X 1000 people)

	1983	1984	1985	1986
Staff	32.1	31.4	29.8	29.9
Manufacturing	87.0	82.8	78.2	74.2
Total	119.1	114.2	108.0	104.1

(Source: Data issued by Federation des Industriews des Equipements pour Vehicules in France)

Table 2-8. The Balance of Trade (Unit: 100M FF)

	1983	1984	1985	1986
Total amount of shipment	58,120	60,676	65,000	70,000
Trade balance	14,992	18,536	18,243	19,059
The ratio of export/import	189.0	201.4	188.5	184.7

(Source: Data issued by Federation des Industriews des Equipements pour Vehicules in France)

The automotive manufacturers in France don't focus on the high-end segment of the market as their prime objective as do the West Germans. Rather they focus on the general car segment as their prime market and therefore compete with the Japanese and Korean car manufacturers in this market. As a result of this, it appears that France will not be willing to have a free and open market by relaxing many regulations even after 1992 unification of Europe.

The big suppliers like Michelin or Valeo are very

competitive in the world market and are therefore proceeding with their internationalization strategies. Almost all of other suppliers in France are medium and small sized companies and therefore their expansion overseas has not proceeded well yet. The supplier strategy by car manufacturers in France will result the reconstruction among automotive parts suppliers in near future.

In a country with such a protectionist policy breaking into the market is very difficult. Therefore only a few foreign companies have succeeded in the French market.

(3). England

In England the auto industry has been exposed to severe shocks of closure and mergers and acquisitions over a long time. In spite of this, there are British companies that focused on the high-end segment of the market and survived the mergers and acquisitions. As a result of this, most of the auto manufacturers have strong relationships with other manufacturers or have become multi-national companies and are active overseas. The auto suppliers have experienced nearly the same thing, yet there still exist almost 2000 parts suppliers. They are mainly small size companies.

Because of the weak British Pound in 1987 and strong German Mark, many suppliers are taking advantage of the

relatively low wage throughout supplier industry. The relative wage in England is second only to Spain as the lowest in Western Europe, as shown in Table 2-5. As a result of this (Table 2-9), almost 50% of British products are exported, mainly to Western Europe. Consequently, England and Spain has become a parts supply base to Western Europe.

This leads to the advance of Japanese car manufacturers such as Toyota, Nissan and Honda, following the expansion of Japanese suppliers, to England. This does not cause trade friction because the main market for auto suppliers to England is outside of the country. But until quite recently, most Japanese suppliers didn't have their manufacturing base in England. One reason for this is that demand for parts was not high. It seems that they soon will proceed the mergers and acquisitions or joint venture with British auto suppliers to reduce risk and to set up a manufacturing base. In this sense, it may be said that England is a suitable place in which to set up a strategic supply point in Europe.

Table 2-9. The Automotive Supplier Industry in England

Number of parts companies	More than 2000
Number of employees	About 424,000
Percentage of parts supplied to car manufacturers	Average 50 %
Amount of parts shipped	5.0 Billion Pound/year
Amount of parts exported	2.5 Billion Pound/year

(Source: Modified data of the Society of Motor Manufacturers and Traders Limited, 1987)

(4). Italy

The supplier industry in Italy, like auto industry, is clustered in the north of the country in Turin and Milan. As we can see in Table 2-1-A, Italy is the third largest car producer in Europe next to West Germany and France. Almost all car production emanates from single company, Fiat. Car production is clearly a monopoly in Italy. Additionally, the government takes a protectionist stance with the auto industry, thereby forestalling a car manufacturing "invasion" from non-European countries.

The market is not to attractive to foreign car manufacturers, because of;

(1). Protectionism by the government

(2). A relatively high wage rate compared with other Western European countries.

(3). The existence of only one mass-production car manufacturer

As a result of this, the possibility of the invasion from foreign car manufacturers is very small for the future.

Table 2-10. Italian Auto Supplier Industry

OEM makers	100
Parts manufacturers	600
Body related companies	2,000 to 3,000
Employees	About 100,000

(Source:Modified Data from Associazione Nazionale fra Industire Automobilistiche, 1987)

(5). Spain

Because the cost of labor in Spain is virtually the lowest among Western European countries, Spain has played an important role as the base both for low-end car production and labor intensive parts supply. But recently, because of the expansion of Spain's GNP and a resultant increase in wages due to economic growth, Spain is no longer attractive for companies only seeking the low labor costs. However, since (1) the labor cost in this country is still relatively lower than other Western European countries, and (2) it can be expected to have a higher market growth rate, Spain will remain as the base of parts supply in Europe. The West Germany automotive industry in particular is affected by the highest labor cost in Europe. German companies are therefore seeking a new supply base outside of their country and are looking to establish their manufacturing base in Spain. They join this market through technology licensing, capital investment and joint venture or plant construction and thus are building strong economic relations with Spain.

Approximately 200 companies have joined the Asociacion Espanola de Fabricantes de Equipos y Componentes para Automocion which is the automotive component industry association in Spain. These member companies make more than 80 % of total sales in the Spanish auto industry. A total of about 1200 companies are actually supplying their products to

car manufacturers, but about 800 of them are very small. Therefore only about 400 companies can truly be said to comprise the supplier industry. Table 2-11 shows automotive parts sales in Spain and the number of companies involved in doing so.

Table 2-11. Automotive Components Sales and the Number of Companies in Spain

	Sales (Billion Pte)	Number of companies
Tire and related parts	1.8	-----
Chassis parts	1.5	94
Electric and Electronic parts	1.3	35
Body parts	1.1	61
Engine parts	0.6	48

(Source: Data of the Asociacion Espanola de Fabricantes de Equipos y Componentes para Automocion)

Summary

The most active domestic industry is in Germany, but the most primary bar for FDI(Foreign Direct Investment) are the UK and Spain, because of their low wage rate and the flexibility of government policies. Let us then next to the pattern of foreign direct investment in the automobile supplier industry.

2-3. JAPAN

The Japanese automotive industries have expanded as a consequence of policies for the promotion of the auto industry and Japanese export-band economic growth. The Japanese automotive supplier industry has also expanded with the expansion of automotive industry. This successful expansion has heavily depended upon the acquisition of global competitiveness by the introduction of Total Quality Control method(TQC) and the efforts to cut costs and rationalize production. In addition, this is due to the fact that many auto manufacturers in Japan have developed the "Keiretsu" strategy in 1970s.

This "Keiretsu" strategy generated the following effects with their customers, which are auto manufacturers;

(1). Introduction of Just In Time(JIT) method.
(2). Decrease inventories resulted by the JIT introduction.
(3). Shorten the new car development time by the cooperative activity with their suppliers from the very early stage of the development.
(4). Maintain control of all "Keiretsu" suppliers.

The details about the "Keiretsu" system will be discussed in chapter three; most simply, the structure of the "Keiretsu" system is a pyramid at the top of which is the car

manufacturer.(ref. Fig.3-2)

There are about 5.5 million people in the automotive industry.[2.9] This is approximately equal to the 10% of all working force in Japan. Table 2-12 shows the distribution of the number of companies classified by the number of employees. Table 2-13 shows the production ratio of automotive parts according to the capital of the companies.

Table 2-12. The Size of Automotive Parts Industries in Japan (March 1987)

The size of employees	Companies	Production share
less than 100	46	0.4 %
101 ---- 300	74	3.3
301 ---- 500	51	4.3
501 ----1,000	44	11.8
1,001 --- 2,000	48	22.4
more than 2,000	44	57.8
Total	307	100.0

(Source: Modified data in *THE JAPAN AUTO-PARTS INDUSTRIES* 1989/90, FOURIN INC.)

The distribution of number of the companies across levels is almost equal, but the companies that have more than 500 employees occupy 90% of the production share in total. The companies that have more that 1 billion yen in capital occupy about 70% in total in terms of capital fund as shown in Table 2-13. The top 156 companies form the first layer of suppliers,

but it is difficult to classify clearly those which belong to the secondary level in automotive parts suppliers industry by using the accepted industry classification, because these secondary and third-level suppliers are supplying general parts such as screws and gears, which are components for other industries as well. Therefore, the number of companies in Figure 3-2 in chapter three and the number of companies in Table 2-12 is not necessary equal.

Table 2-13. The Production Ratio being based on the Size of Capital(April 1986 to March 1987)

Capital(Million Yen)	Production share(%)
Less than 50	4.5
50 --- 100	5.1
100 --- 500	14.5
500 --- 1,000	6.9
1,000 --- 2,000	10.5
2,000 --- 5,000	21.2
More than 5,000	37.3

(Source: Modified data in *THE JAPAN AUTO-PARTS INDUSTRIES* 1989/90, FOURIN INC.)

Table 2-13 shows the number of the supplier companies in Japan. It includes the independent companies that don't belong to any "Keiretsu" system such as Yazaki Corporation or NSK Corporation. Also there are companies that are listed in more than one "Keiretsu" system, because many automotive manufacturers include companies which produce the products

that the "Keiretsu" company does not produce. For example, Nippondenso, which is the one of biggest "Keiretsu" company in Toyota Motor, is a member of the supplier companies of Mitsubishi Motors. Therefore it is possible to estimate the number of the "Keiretsu" or supplier companies in each automotive manufacturers in Japan, but adding the numbers od companies in each Keiretsu would produce a total greater than the total number of companies.

In this "Keiretsu" system, basically there is no company that supplies their parts to a direct automotive competitor: Nippondenso in Toyota Keiretsu, for example, has never belonged to the Nissan Keiretsu. But, as described above, it would be possible to supply their product or be selected as one of suppliers if any company in "Keiretsu" does not make that specific and necessary product.

The main advantage of joining the "Keiretsu" is that the suppliers in the "Keiretsu" can get a stable amount of orders from the automotive manufacturer at the top of the "Keiretsu". Therefore, it helps companies which are relatively small in size or are in the start-up stage. However, this system may act to prevent the growth of the company. Being a member of the "Keiretsu" system means that the supplier itself is in a very close relationship with the specific "Keiretsu" automotive manufacturer. This means that it might be difficult to supply products to other automotive manufacturers. Therefore, to stay in the specific "Keiretsu" system means

that the production volume of the specific "Keiretsu" automotive manufacturer constrains the growth of the supplier company. Thus some companies try to join or supply their products to another "Keiretsu" system to weaken the power or dependency of the "Keiretsu" system.[2.10]

Table 2-14. Suppliers in Japanese Automotive Manufacturers (Keiretsu Suppliers)

Car makers and the group name of supplier companies (Keiretsu)	The number of company
TOYOTA :Kyohou-kai, Eihou-kai	235
NISSAN :Syouhou-kai, Takara-kai	164
HONDA :Torihikigaisya(Suppliers)	311
MITSUBISHI:MITSUBISHI Kashiwa-kai	353
MAZDA :Youkou-kai	179
ISUZU :ISUZU Kyouwa-kai	285
FUJI HEAVY IND.:SUBARU Yuhi-kai	201
DAIHATSU:DAIHATSU Kyoryoku-kai	169
HINO :HINO Kyoryoku-kai	237
NISSAN Diesel: Yayoi-kai, Shinwa-kai	149
SUZUKI :Kyoryoku-kyoudou-kumiai	97

(Source: Modified data in *THE JAPAN AUTO-PARTS INDUSTRIES* 1989/90, FOURIN INC.)

The Japanese automotive industry has expanded according to the expansion of demand in domestic market and export to the foreign countries and has been serious about overseas expansion since 1980. In direct relationship with the expansion of automotive industry, the Japanese automotive parts industry has also expanded and reached a turning point in their overseas strategies.

There are two reactions to the overseas strategies in automotive parts suppliers to the strategies in automotive manufacturers. One is a "push" motivation: because of the decrease of the domestic job, so-called "Kuhdoka" in Japanese, they worry about "Kuhdoka" in Japan, and this becomes one of the biggest motivation for overseas expansion for them. The other is a "pull" motivation: a globalization is the biggest motivation accelerated by the strong Yen or fluctuation of exchange rate. But there is a contrary opinion to this fear of "Kuhdoka", namely:

(1). The shift in automotive production itself is small.

(2). Customers in the domestic market are shifting from the low to the high end.

(3). The domestic situation itself is very severe, involving strong competition among suppliers. Preparing for survival in the domestic market has no relationship to "Kuhdoka." Therefore the Kudoka" itself is not a big problem.[2.11]

Whatever the fact, the overseas expansion in the automotive supplier industry is now a major trend in the industries. It is certain that the reason behind the globalization and overseas expansion in this industry is the latitude in funds due to the fact that the domestic market expansion has increased the demand for the cars and shifted from the low end to the high end.

2-4. AMERICA

According to data from American International Trading Committee, the 1986 amounts shipped in the automotive industry and in the automotive parts industry were about $1.8 billion and $830 million respectively. The two industries accounted for approximately 12% of total shipping amount in all manufacturing industries, which was about $2.63 billion. The automotive parts industry occupied about 4% of that. The total employees that are engaged in automotive industries is about 600,000.

One of the outstanding features in the North American automotive industries, especially in the United States, is its higher internal manufacturing ratio of automotive parts by automotive manufacturers. The automotive parts produced by car manufacturers themselves classified into the Standard Industrial Classification 3714 were 21% in GM, 15% in Ford and 5% in Chrysler in 1985 respectively. This means that 41% of total production of automotive parts production in North America is produced by the Big Three car companies.[2.12] The internal manufacturing ratio is still very high even though the volume is tending to decrease. Also another feature in the automotive parts industries in North America is that the industry is dominated by very big companies. For example, 69% of total value of shipments of automotive parts in America is occupied by the top 8 parts suppliers, and 85% is occupied by

the top 50 companies.[2.12]

Since the Big Three car manufacturers dominated the American market, they have adopted out-sourcing strategies for car parts to get the advantages of cheaper price based on the short term contracts (usually one year). To do this, they have provided their suppliers with the information about the parts needed for their next car-- what is called "wants list" or "need list"-- and have had price competition among suppliers. This was a typical Big Three strategy for car parts for a long time. However, after the expansion of Japanese exports car to the American market, they had to recognize the change in the market. This was mainly caused by the high quality and low price of the Japanese car, and it decreased the market share of American car manufacturers in the U.S. market. Also, these results had a major impact on the Big Three car manufacturers.

In order to meet the demands of the changing market, they have started to introduce the good points represented by the relationship between car manufacturers and their suppliers in Japan. The following are this strategic changes in car parts supply;

(1). The expansion of out sourcing strategies of parts

(2). Introduction of single sourcing strategy

(3). The selection of strong suppliers which have enough capability in development activity

(4). The introduction of long term contract

(5). Joint development with suppliers at very early stage of new car development

The ratio of out-sourcing of car parts in the Big Three is 30% in GM, 50% in Ford and 70% in Chrysler.[2.12] Now more than 90% of parts[2.13] comes from single sourcing in Chrysler and almost 98% parts are also from single sourcing at Ford.[2.14] In comparison with the old ratio of single sourcing in Ford, for example, which was 70%[2.14], they have changed their supplier strategy dramatically and increased the ratio of it. Also, the contract term used to be one year, but now it becomes three to five years on average. GM has reduced its first suppliers by almost half, from 800 companies in 1986 to 425 in 1989.[2.15] Chrysler decreased the number of its suppliers and now more than 90% of parts comes from 340 suppliers although they once had about 3500 suppliers.[2.16]

It can be said that this change in supplier strategy is the shift from a "Mass production method" to one based on to "Lean production", which obviously many Japanese car manufacturers have implemented as their strategy. More important is that this is not a short term change but a long term strategic tendency.

As another factor which influences the North American market, the movement of Japanese companies into North America has to be mentioned. Figure 2-1 shows the cumulative total investment by the Japanese automotive parts suppliers in America.

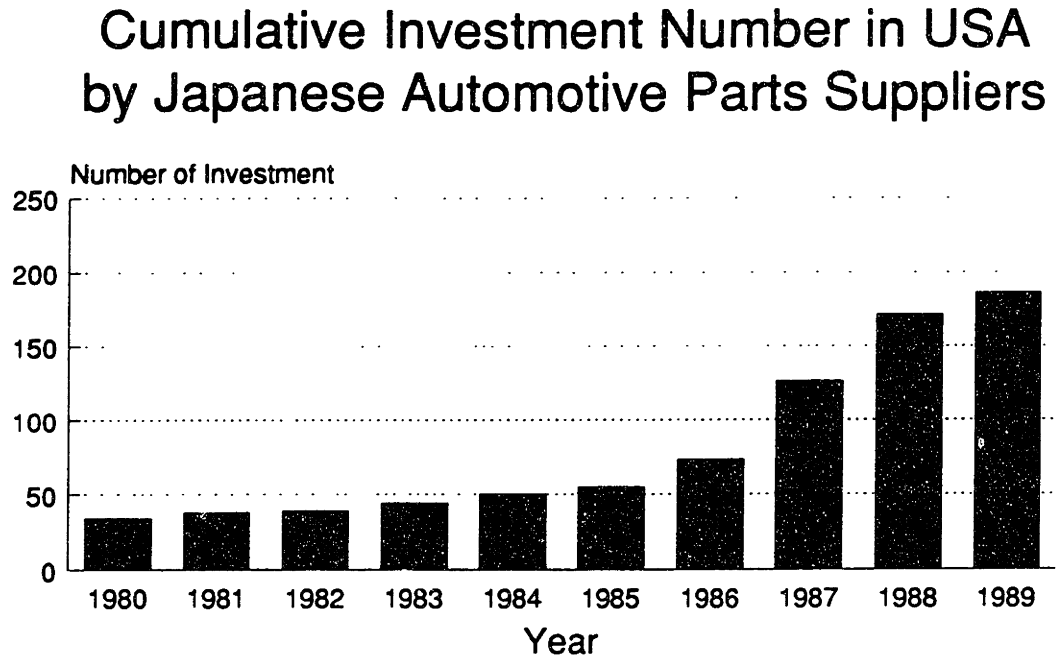

Figure 2-1. Cumulative Total Investment by Japanese Automotive Parts Suppliers in America(1980 - 1989)
(Source:1990 *Hokubei Jidosya Buhin Sangyo*, pp160, Fourin Inc.)

The cumulative investment suddenly increased in 1987 because automotive suppliers began to accompany the transplants of Japanese auto manufacturers into America. These overseas expansion in the Japanese automotive parts suppliers reached 104 companies in 1987, an increase of double the entry levels in 1984. [2.17] There are many cases where they have located their plant close to their customers' plants, which

are mainly in the states of Michigan, Ohio and Kentucky. This typical tendency can be observed in many Japanese Keiretsu suppliers, especially after 1985. But at the same time, they have the additional background motive of intention to supply their products not only to the Japanese transplant but also to the American Big Three car companies.[2.18]

Thus the friction between American suppliers and Japanese parts suppliers becomes another problem of trade friction in the American market.[2.17] Therefore JAPIA suggests that its member companies consider joint ventures with local companies when they expand overseas, to avoid trade friction.[2.19] Although many American companies are worrying about the strength of the Japanese expanding to America[2.20], many Japanese parts suppliers are not always successful in their business overseas.[2.21] It is becoming another aspect of the survival game among these companies.

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CHAPTER 3 OVERSEAS EXPANSION OF AUTOMOTIVE SUPPLIERS

3-1. OVERSEAS EXPANSION IN THREE MAJOR REGIONS- JAPAN, WESTERN EUROPE AND THE USA

The automotive supplier companies which are expanding overseas to the world's three major industrial regions, Japan, Western Europe and the USA, are investigated here to learn their overseas strategy by using the company directory[3.1][3.2][3.3] and annual report or other information brochures issued by these companies. Each company is a typical automotive supplier in the region, but it also a big company such as Siemens, Allied Signals and Mitsubishi Electric. These may indeed too big to be called merely automotive suppliers. However, the ratio of each companies' size to the region is almost the same for each, so the comparison can be taken as reasonable.

In Europe, 185 automotive suppliers were investigated, except for originally Japanese and American companies. As a result, the companies that have expanded overseas and have factories or other facilities outside of Europe are only 25 % (47 companies) of all investigated companies. In case of the USA, the 180 companies, except for original Japanese and European companies, were investigated as to whether or not they have factories or other facilities outside the USA. Forty-seven percent, or 84 companies do. In Japanese case, 66

% of automotive suppliers here factories located in the United States.[3.4] Table 3-1 summarizes these facts.
Note that the data pertaining to Japanese companies shows the numbers for factories located only in US.

Table 3-1. Automotive Parts Supplier Companies Expansion in Overseas Markets

Regions	The ratio of the companies expanding in overseas	The number of investigated company
Japan	66 %	160
Europe	47 %	180
N. America	25 %	185

-European Companies: Germany 46, England 42, France 24
Italy 22, The Benelux 16, Spain 14,
Scandinavian countries 12, Others 9

-North American Companies: The USA 176, Canada 4

By examining the above numbers in Table 3-1, it is clear that Japanese expansion overseas is greater than that of European and North American companies. This is because many Japanese companies tried to buffer themselves against the influences of fluctuation in exchange rates caused by the strong yen, especially after 1980. Furthermore, they strengthened their overseas strategies as a counter measure against the fact that many countries increased their use of domestically produced parts in their car because these

countries preferred to protect their auto and supplier industries from foreign auto companies. The results of this further corroborate these theories.

Especially in Europe, the use of domestically produced parts, as an application national policy, was rapid because the rapid and massive export expansion of Japanese cars made it easy to predict that a similar trend could be expected on the part of Japanese supplier companies.

3-2. REASONS FOR OVERSEAS DEVELOPMENT AND RESEARCH

The world car production numbers are shown in both Table 3-2 in this chapter and Table 2-1 in Chapter two. The Table 3-2 shows more detailed data than that in Table 2-1. As the table shows, the production number of automobiles in the three major regions in the world are currently nearly the same. In Europe, starting with the unification of East and West Germany in 1990, a new united market is already being started, even before the planned 1992 unification. Under this circumstances, as described before, it is better for a company to construct a top to bottom system from development to manufacturing in major regions, and to build up a global system to circulate parts among these regions for the sake of construction of flexible system against the fluctuation of exchange rates and demand for products, and to maintain the competitive

Table 3-2. World Automobile Production Numbers (Passenger Car)

	Japan	North America	Western Europe
1985	12,271,095 (7,646,816)	14,041,938 (9,559,817)	15,470,473 (12,069,492)
1986	12,259,817 (7,809,809)	13,525,186 (9,098,990)	14,295,368 (12,722,482)
1987	12,249,174 (7,891,087)	12,950,729 (8,186,532)	15,184,921 (13,498,892)
1988	12,699,807 (8,198,400)	13,718,175 (8,491,991)	15,916,085 (13,973,613)
1989	13,025,735 (9,052,406)	13,428,660 (8,263,317)	*16,697,673 (14,619,454)

-North America: USA, Canada, Mexico.
-Western Europe: EC countries, Sweden, Finland, Switzerland Austria.
-*1: The data for 1989 exclude the numbers of Finland and Greece.
(Source: Modified data from *Jidosya Sangyo Handbook -1990 Ban*, KINOKUNIYA, 1990)

advantages in the world market. Therefore, the large company which has sufficient resources is in an advantageous position to construct such a global system. It is possible for a company with sufficient resources to undertake a wholly-owned expansion strategy overseas. On the contrary, it is quite a natural way of thinking for those companies which are not able to spend the money and are of less than medium size to take the cross-licensing or joint venture routes with foreign companies in order to proceed with their international strategies and to guard against the external pressure of internationalization by reducing risk. In terms of

localization, it is said that the cross-licensing or joint venture strategies are recommended and desirable in order to reduce friction and the chance of the conflict with the local companies while expanding overseas. [3.5]

Thus, when proceeding with international strategy, it is important to have not only a manufacturing facility but a development and research section in overseas. The main reasons for such an approach are the following;

(1). To respond quickly to local customer needs.

(2). To mold the international strategy to the local customer.

(3). To produce local products in overseas markets.

(4). To secure resources (financial, human etc.).

(5). To establish a global system from development and research to manufacturing and shipping.

Reasons 1 - 3 address a market-first priority in which first priority is given to the customer or local market, and which is therefore externally driven. In contrast, reason number 4 is of the type that prioritizes the company, and is internally driven.

In the real world of the company, these internal and external demand factors are complicated and therefore difficult to separate. However, it is common that customer satisfaction comes first as company policy. The mass production method invented by Mr. Ford that has been in full

force has been defeated in substance "Lean Production Method" invented by Mr. Toyoda and Mr. Ohno.[3.6] The mass production method has revealed its disadvantages in terms of product quality problems, and therefore the production methods are shifting to lean production on a world scale.[3.7] In light of this, it may be a world trend to proceed with overseas strategy by means of prioritizing customer market factors; factors which externally drive the companies.

(1). Quick Response to Local Customers

In case of overseas customers, it is obvious the speed of product development in the company which has a local development section in the customer's country is much quicker than that of the company which only has a domestic development section. This connects the technological differentiation strategy in the company directly; therefore, it is very important to keep up the development speed for the company, not only from point of marketing and finance, but also from the point of view management as well.

As J. Womack, D. Jones and D. Roos of MIT pointed out[3.8], the speed difference of new product development in the industry between Japan and USA stems from process difference in development. When the Japanese car manufacturers intend to develop new car, they ask their suppliers to join the

development work at very early stage. Through the participation of suppliers at early stage of the development the suppliers give continual feedback to the car manufacturer.

It is clear why the speed difference occurs by comparing the lean development process with mass production process. In lean development process, suppliers participate in the development process and join the car development project with their customer, thereby shortening the development process. The average development time per new car among auto manufacturers in 1980 was 60.4 months for Americans, 57.3 months for Europeans, and 46.2 months for the Japanese.[3.9]

The motivation to respond quickly to local customers has nothing to do with the production method itself, it is more basic than that. However, use of lean production and development methods instead of the mass production method more closely approximates this goal. If car manufacturers introduce the lean production method, their suppliers have to act with them in the early development stages of new product. Therefore if the car manufacturer is in as overseas market, it may also be necessary for their suppliers to have overseas development sections. But in the case of the mass production method, it can be said that the necessity of overseas development section for suppliers is less than that of the lean production. The mass production method did not require the suppliers to have development section in local area. They have taken a multiple sourcing strategy to gain cost advantage and therefore have

used the cheapest parts based on one year contracts with their suppliers. In this case, the supplier who offered the cheapest price could get the business. The development capability in their suppliers has nothing to do with their new car development. Usually the suppliers were not requested to participate in new car development. Companies simply asked their suppliers to supply their products at the best price.

(2). Respond of the International Strategy to the Home Country Customer

Adopting international strategy to the local customer is a strong motivator of overseas expansion for Japanese auto suppliers.[3.10] The Japanese auto suppliers have decided to act in concert with their customer(the auto manufacturer) when they expanded overseas. This was the linchpin of their expansion into Europe and North America, especially in the late 1980s. Prior to the 1980s the prime motivation for such expansion was to overcome domestic higher labor costs by looking to produce in foreign countries. This currently the motivation for overseas expansion the strong Japanese Yen and/or by the fluctuation of exchange rates affected by the change of world economic circumstances. Therefore, the

motivation is shifting from labor cost to stabilizing the impact of economic factors.

Furthermore, overseas expansion after the mid 1980s was characterized by that of the medium to small suppliers because many of these suppliers were combined into the "Keiretsu" system in Japanese auto industry and therefore many suppliers were threatened by their customers' international strategy. This is mainly because small suppliers were selling their products only to one specific auto manufacturer and therefore it meant that they could have lost their business if they did not adopt an international strategy along with their customers. When JAPIA (Japan Auto Parts Industries Association) made a investigation of the large members of the 209 member companies about overseas expansion in 1987, 156 companies responded showing that 103(fully 66%) were planning to expand overseas and 53 were not so planning.[3.4] This illustrates how Japanese companies rushed into expansion at this time.

In contrast with American and European suppliers, it was a common feature of Japanese suppliers to proceed with an international strategy in the mid-1980s. Not many American and European suppliers tended to have foreign operations at that time. The first reason for this was that many suppliers in America and Europe were mainly focused on domestic customers. Secondly, many big suppliers in America and Europe had already set up their overseas operations before this period, and

therefore had no specific reasons to undertake an additional international strategy. Thirdly, most of small and medium size suppliers in these regions could not have afforded to have a foreign operation and therefore could not expand overseas.

With regard to European expansion(different from that of the United States), it must be remembered that the suppliers have to consider the impact of European economic unification in 1992 on their operations and markets. In addition, the Europeans must consider possibility of blocking access to their market to combat the expansion strategies of Japanese and American suppliers.

(3). Local Production in Overseas Markets

It is obvious that there are geographical, social and cultural differences among the three major car production regions of the world. Because of the difference in local preferences, it is reasonable to design and target products accordingly. Each auto manufacturer has taken two strategies based on these differences. One is the localization product strategy in which distinct differences among regions clearly and makes the local products different. The other is the differentiation product strategy (represented by Honda) which locally (in Japan) produces unique products for export to the other regions. It seems that these two strategies will become

something of a world trend.

The activity of European auto suppliers is closely related to their size, characteristics and strategies. It appears that the strategies of the large companies are different from those of the medium and small companies. The large companies, like Bosch in Germany, Valeo in France and Magneit marelli in Italy, they tended to adopt the localization products strategy, while the medium and small companies tended to remain in their home countries. In terms of internationalization, however, European "international" policy tended not to extend beyond other European countries. Only several large companies had their manufacturing or development facilities outside of Europe.

As can be seen in Table 3-1, 47 companies out of 185, except for American and Japanese companies in Europe, have expanded overseas. But this number (approximately 25%) is small in comparison with 66% of Japanese companies' expansion into the American market of those Japanese suppliers that were surveyed.[3.4] This is the result of an investigation done mainly on relatively large companies in both Europe and Japan. Therefore the overseas expansion rate of European supplier companies is clearly lower than that of Japanese companies.

On the other hand, the activity of Japanese supplier companies that expanded their business overseas after 1980 had nothing to do with company size and was basically motivated by the radical change of the exchange rate. They were forced to

take a counter measure against the strong Japanese Yen and followed their customers' (the manufacturers) global strategy.[3.11][3.12] The other companies in the Japanese supplier industry that had already expanded overseas before 1980 undertook the different activities at that time. They tried to respond the needs of their local customers and to produce local matching products like some of their European and American competitors. Production of local matching products implies a globalization strategy, as described in a later chapter, and has a different meaning from a locally completed system".[3.13][3.14][3.15]

(4). Search for Resources (Financial and/or Human etc.)

Another common motivator for overseas expansion among auto suppliers, as well as for most other companies, is the search for resources. Before the problem of the strong Yen hit the Japanese auto supplier industry as a whole, most cases of overseas expansion were from companies with the following characteristics;

-1. The labor intensive company, which looked for cheaper labor cost in overseas work force.

-2. The company that produces fragile products, which produces the products that are easy to injure, destroy or deform during shipping.

-3. The company that produces products for automation in overseas markets.

The search for resources also motivated many American and European companies in the same manner as the Japanese companies.

But recently, in addition to the above motivations, it can be added the financial stability factor and the world-wide financing factor. The reason of financial stability addresses the need to reduce the financial risk and other financial variability caused by the fluctuation of the exchange rate. World-wide financing expresses the necessity of raising funds internationally; for example for the purpose of R&D. This is one reason why companies set up their development and/or research centers not only in their home countries but also outside in order to recruit good engineers and/or scientists in their overseas markets. As a result of the hiring of foreign engineers or scientists and their exchange between the home country and overseas production sites, a synergy effect can be expected. This also can be a good motivator.

Figure 3-1. International Relation

In many of the labor intensive companies in the automotive supplier industry, the aim of conventional overseas expansion was to exchange different value between the home country and the overseas production site(s), such that the company in the home country invested money and technology in developing countries instead of getting cheaper products by using low labor cost.[3.16] Currently, the meaning of the "resources" is changing and expanding. For example, human resources overseas used to mean the simple labor cost, but now it also includes a highly trained and educated labor force.

(5). Establishment of a Global Top-To-Bottom System from Development and Research to Manufacturing and Shipping

A global top-to-bottom system from development and research to manufacturing and shipping is a final goal for the automotive supplier companies. The overseas expansion of Japanese auto manufacturers began with a Mexican plant by Nissan Motor company in 1966 and with an European assembly plant by Ford Motor in 1911 in the American case.[3.17] But the completion of a top-to-bottom system of design and development occurred in the 1960s for American auto manufacturers and in the 1980s for Japanese auto manufacturers.[3.17] After the first expansion in overseas operations by auto manufacturers, the parts suppliers followed a similar strategy of foreign expansion.

The motivation of automotive suppliers will be described in a later chapter, but there seem to be two basic motivations. Under the conventional mass production method, overseas expansion would neither be attractive nor have significant meaning for many of the automotive suppliers if they could not expect sufficient demand in overseas markets and unless they could maintain cost competitiveness. The reason is that with the mass production method, car manufacturers used to buy cheaper products from suppliers. Quality and other features of the products were secondary and cost tended to be the main criterion for purchasing.

On the other hand, under the lean production method the same cannot be said. In the lean production system, the automotive manufacturers select their suppliers not on the basis of short term low cost but on total cost encompassing the development, manufacturing, and service stages. This is due to the auto manufacturers' aim at total cost reduction over the long term. Often they are not concerned with exceeding costs in the early stage, in favor of maintaining relations with their suppliers over the long term. This is one of the mechanisms by which suppliers are selected. One of the main reasons why many Japanese auto suppliers have followed their customers' (the manufacturers) global strategy is due to the lean production system which many Japanese automotive manufacturers have in place. That is, the top-to-bottom system itself necessitated the formation of a lean production system. This also explains the main motivation behind and reason why Japanese suppliers find it possible to sacrifice their primary cost competitiveness in the first stage of overseas expansion and why they want to expand their business overseas. What is more, it is important in terms of strategy for most of the suppliers to complete a global top-to-bottom system, because it has an important implications for the reduction of risk caused by fluctuation over long time periods and for smoothing those fluctuations.

3-3. KEIRETSUKA

"Keiretsuka" is a unique feature of the Japanese auto industry and sometimes is taken to be the secret of that industry's strength. The "Keiretsu" is a pyramid structural system, in which car manufacturers inhabit the top, first suppliers comprise the second line, and are followed by next suppliers on the bottom as shown in Figure 3-2.

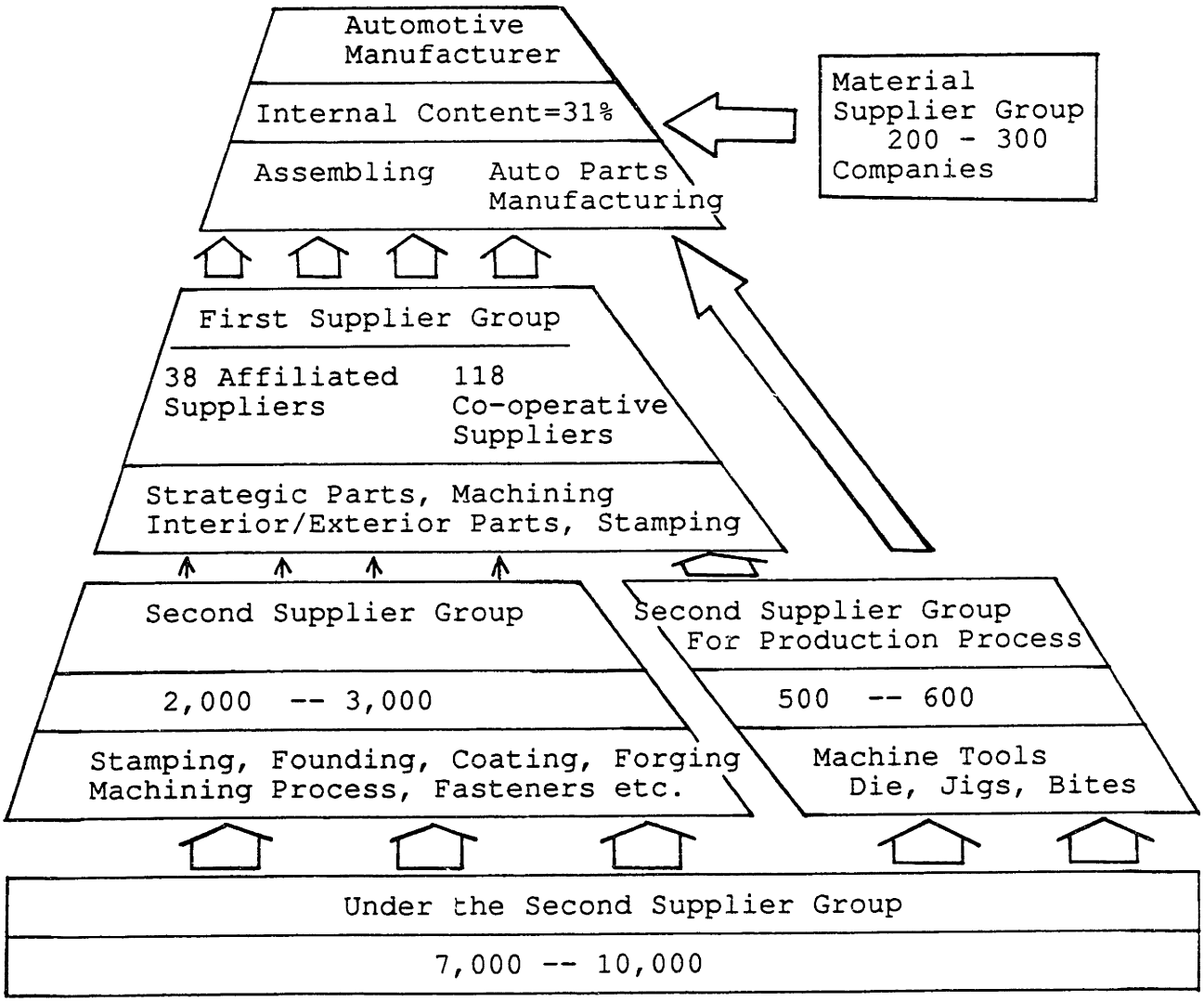

Figure 3-2. The Industrial Structure in Japanese Automotive Industries(The Structure of Keiretsu)
(Source: *The 1981 White Paper on Small and Medium Enterprises*, MITI in Japan)

However, it is difficult to differentiate first suppliers in the Keiretsu system like Nippondenso or Aisin Seiki in Toyota Keiretsu from the parts supplying division of a big company, such as the Delco products division at General Motors supplies GM's electric and electronic products, and the Packard Electric division which supplies electric components and wiring harnesses. In a sense, the difference is as clear as would be apparent by the names of the companies.

Toyota Motor has 20 % of stocks in both Nippondenso and Aisin Seiki, making it the largest stockholder in both companies. Seventy percent of total sales in Aisin Seiki and 50 % of total sales in Nippondenso come from Toyota. What is more, Nippondenso was a division of Toyota that was spun-off in 1957. [3.18] The companies described above(in case of GM, these are supplying divisions) are supply not only their parent companies but also other companies. Even though they may be a rival companies, suppliers or supplying divisions still sell them their products. For example, Packard division is selling its products to Mercedes, and Nippondenso is selling its products to Honda.[3.19] However, the auto manufacturer doesn't buy other Keiretsu products if there is a supplier in his Keiretsu or division. However, if there is no supplier in his Keiretsu or division, he may then buy the products from outside his Keiretsu company even though that supplier may belong to a rival Keiretsu. In this sense, a complementary supplying system is created.

It may be said that this complementary supplying system is regarded as a miniature system of alliance among car manufacturers through their international technology licensing or capital investments.[3.20] The complementary supply system as shown in Figure 3-3 is helping effective management of suppliers and is a big factor in globalization strategy at the same time. The reason for such globalization promotion is that if the automotive company with its Keiretsu system wants to have a relationship with an outsider parts supply company, it would be easy to do so with a foreign company because of geographical, strategic and emotional reasons. Long geographical distance means different markets for them. And different markets give rise to different strategies based on different market and culture, thus this makes them comfortable emotionally. Therefore the complementary supplying system can be a factor which promotes globalization and localization for suppliers.

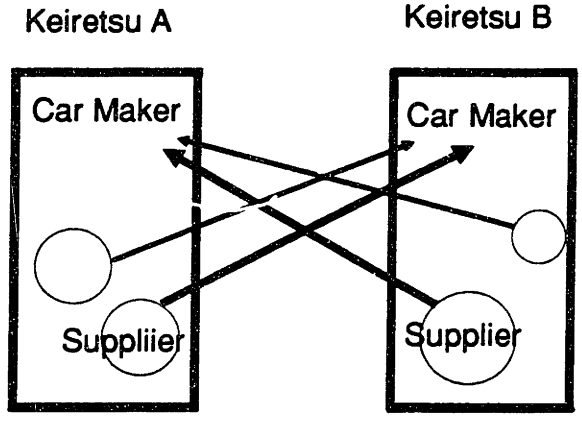

Figure 3-3. Complemental Relationship among Keiretsu Systems

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CHAPTER 4: SURVEY RESULTS AND ANALYSIS

In this chapter, the results of the survey and its analysis will be presented with regard to the automotive supplier industry and its development and research strategy.

4-1. METHODOLOGY

In this paper, two survey methods were used. One was by means of a questionnaire sent by mail to Japanese, European and American automotive suppliers. The other one was by interviewing some companies in the supplier industry. The questionnaire was sent to about 30 people in 20 American companies, 15 people in 13 European companies, 20 people in 13 Japanese companies and one person in one Korean company. The response rate was only 50 % from the American and European companies and 30 % from the Japanese companies. Interviews were done with three Japanese companies, three American companies and one European company, and all, except one, have more than 10,000 employees world-wide. The reason why these large companies were selected is that under this size the suppliers might not have R&D or technology development sections overseas as well as domestically.

The objective of this research is not to analyze data statistically but to get at the philosophy of the overseas strategy of companies. Therefore many companies exist that are

not included in this analysis.

A minority of automotive suppliers have overseas development or research sections. The structure of the automotive supplier industry consists of many medium to small size companies as is reflected in the pyramid where the automotive manufacturers appear at comes to the top and numerous suppliers comprise the bottom (Figure 3-2). The supplier companies that were included in the study are located close to the top of the pyramid, where automotive sales occupy the largest portion of the total sales, or even though their location of the pyramid closes to the top, their automotive sales occupies only small portion of their total sales, and therefore, these companies may not think that they belong to the automotive supplier industry. However even though these are a large companies, the division itself is supplying automotive parts and therefore these are regarded as automotive suppliers.

In some large companies, the strategy of R&D in the automotive area and other areas may not the same, therefore the other division is nothing to do with automotive industry and is omitted in this research. It is important to acknowledge that the corporate level strategy for R&D or technology development may affect strategy in the automotive division of the company. Fortunately, these large companies do not have corporate level R&D or technology development sections overseas in terms of the automotive supplier

industry, rather these exist on the divisional side. Any contradiction or conflict between these levels is therefore avoided.

4-2. RESEARCH RESULTS

Tables from 4-1 to 4-7, except for Table 4-3, summarize the research results. These tables show comparisons of function of R&D or technology development sections between domestic and overseas, the major obstacles and their counter measure in the overseas business environments, the direction of these sections, and the ratio of home country engineers/scientists to local engineers/scientists. Also company profiles are shown in Tables 4-8 and 4-9. In these tables, the letters A, J, E and O indicate the companies in North America, Japan, Western Europe and other countries respectively.

(1). The Function of R&D and/or Technology Development Sections in Overseas Expansion

Domestic

The common items being regarded as important functions of R&D or technology development sections are B (applied research) and F (reliability evaluation of the products) in

Table 4-1-A. Function of R&D and/or Technology Department:
(Japanese and European Automotive Suppliers)

X: Home Country, Y: Overseas
Factors rated 4 or 5 on 5-point scale: 5= very important

	Basic	Appl	InfoC	Acq/Ev	Design	RelEv	SP
JA	X	XY	XY	X	XY	XY	--
JB	X	X	XY	--	XY	X	-Y
JC	XY	XY	-Y	--	--	X	XY
JD	XY	XY	-Y	--	--	X	-Y
JE	X	X	-Y	--	-Y	-Y	--
JF	--	X	XY	XY	-Y	--	XY
EA	--	XY	XY	XY	-Y	X	X
EB	--	XY	XY	XY	XY	--	-Y
EC	--	XY	--	--	XY	XY	--
ED	--	XY	XY	XY	XY	XY	XY
EE	X	X	X	X	--	X	--
EF	XY	XY	XY	XY	X	--	--
EG	--	X	X	--	--	X	X
EH	XY	XY	--	--	-Y	X	--
EI	--	X	X	--	--	X	X

-Basic :Basic Research
-Appl :Applied Research
-InfoC :Information Collection
-Acq/Ev:Acquisition and Evaluation of External Technology
-Design:Design or Human Factor
-RelEv :Reliability Evaluation of the Products
-SP :Special Project

Table 4-1-B. Function of R&D and/or Technology Department:
(American Automotive Suppliers)

X: Home Country, Y: Overseas
Factors rated 4 or 5 on 5-point scale: 5= very important

	Basic	Appl	InfoC	Acq/Ev	Design	RelEv	SP	Other
AA	--	XY	--	--	--	XY	--	--
AB	--	XY	XY	XY	XY	XY	--	--
AC	--	XY	--	--	--	X	--	XY*
AD	--	XY	--	--	XY	XY	-Y	--
AE	-Y	XY	XY	-Y	--	-Y	X	--
AF	--		--	--	--	-Y	-Y	--
AG	--	XY	-Y	--	--	-Y	-Y	--
AH	--	-Y	-Y	--	XY	XY	-Y	--
AI	--	--	X	XY	--	XY	--	--
AJ	--	X	--	--	XY	XY	X	--
AK	--	XY	--	--	--	XY	XY	--

-Basic :Basic Research
-Appl :Applied Research
-InfoC :Information Collection
-Acq/Ev:Acquisition and Evaluation of External Technology
-Design:Design or Human Factor
-RelEv :Reliability Evaluation of the Products
-SP :Special Project
-Other :Others (X=Coordination of Tech. Group, Y=Better Service)

Table 4-1-C. Summary of Function of R&D and/or Technology Department

DOMESTIC	Japan (n=6)	USA (n=11)	W. Europe (n=9)
Basic Research	5	0	3
Applied Research	6	8	9
Information Collection	3	3	7
Acquisition and Evaluation of External Technology	3	2	5
Design or Human Factor	2	4	4
Reliability Evaluation of the Products	4	8	7
Special Project	2	3	4
Coordination of Tech. Group or Supply Better Service to Customers	0	1	0

OVERSEAS	Japan (n=6)	USA (n=11)	W. Europe (n=9)
Basic Research	2	1	2
Applied Research	2	8	6
Information Collection	6	4	4
Acquisition and Evaluation of External Technology	1	3	4
Design or Human Factor	4	4	5
Reliability Evaluation of the Products	2	10	2
Special Project	4	5	2
Coordination of Tech. Group or Supply Better Service to Customers	0	1	0

Tables 4-1-A and 4-1-B. On the other hand, basic research(A) was regarded differently between Japanese companies and others. In Japanese companies, item A(basic research) is regarded as an important function while it is not considered so in European and American companies. In Japanese companies, the basic and applied research and the reliability evaluation are regarded as important functions of domestic R&D or technology development sections, while in European and American companies applied research and reliability evaluation are important functions for their domestic R&D or technology development sections, at least with regard to automotive parts supply. Also, European companies tend to think that item D (acquisition and evaluation of external technology) is important.

Overseas

Again, those companies which have R&D sections or centers overseas are in the minority, and therefore the overseas' technology development section was included in this question. It is, therefore not suitable to compare the overseas functions directly.

With this in mind, generally European and Japanese companies tend to think that C (information collection) is an important function of overseas R&D or technology development sections. On the other hand, item C tends not to be regarded

as an important function for them domestically. The high priority of overseas R&D or technology development sections for American companies is to perform the reliability evaluation function. Applied research and development, which is directly connected to the products, are the number one priority for European and American companies.

(2). Motivation for Overseas Expansion

Japanese, European and American companies in general think it important to keep good relations with their local customers (Question 2-2: C and D). Also Japanese and American suppliers think it important to maintain relations with their home country customers as well. This becomes the motivation behind the overseas expansion of suppliers when their home country customer (the manufacturer) expands its business overseas. Clearly, their customer's overseas expansion strategy indicate to the suppliers to follow suit in order to meet the expanding needs of their customer. There is no specific request to do so from their customers. "Customer needs" will be discussed in section 4-3 more in detail. It cannot be said that a motivator for overseas expansion in the case of European suppliers is to maintain relations with their home country customer. But this does not mean, however, that the importance of the home country customer in overseas is low for European suppliers.

Table 4-2. Objectives/Motivations of Overseas R&d and/or Technology Departments

[Qestion]
If you have one or more R&D and/or technology departments outside your home country, how important were the following factors in establishing this technology development organization ?

Factors rated 4 or 5 on a 5-point scale: 5=very important

	JAPAN (n=6)	USA (n=11)	W. EUROPE (n=9)*1
Access to human resource	2	7	2
Access to leading edge technology	5	1	7
Close relationships with key local customers	5	8	7
waintaining relationships with key home country customers' overseas operations	5	9	3
To support offshore manufacturing strategy	5	7	6
To support overall localization strategy	4	6*2	4

*1: Three European companies do not have R&D or technology departments outside their home country.
*2: Includes following functions:
-To be close to customers
-Maintaining the presence of global company

In fact, there were examples of the overseas expansion resulting from following customers, such as the expansion to Brazil by Volkswargen in West Germany, followed by their parts suppliers, and European expansion by American car manufacturers, followed by their parts suppliers. This type of

overseas expansion is one of the popular motivations for automotive parts suppliers. However, the overseas expansion by American and European parts suppliers were limited to big companies. In addition, because it has been a relatively long time since these companies have expanded to foreign countries, the objective itself has been changed as time passed or as many people have forgotten the original motivation. Therefore, it seems that this motivation may be far from the original one. These points are different from the motivation for overseas expansion in Japanese companies, especially after 1980.

Overseas expansion to accompany a home country customer's international strategy became a particularly notable feature for globalization strategy in Japanese automotive parts supplier companies after 1985.[4.1] Table 4-3 shows this phenomenon. Table 4-3 shows the expansion to America of parts suppliers in Nissan Keiretsu companies.

Table 4-3. Expansion to America of Parts Suppliers in Nissan Keiretsu Companies

Company Location and Name	Style of expansion
Tennessee	
Nippon Radiator	Sub
Kanto Seiki	Sub
Kinugawa Rubber Industrial Co.	JV with US Company
Kasai Kogyo	Sub
Yamakawa Industrial Co.	Sub
Tsuchiya Manufacturing Co.	Sub
Yorozu Motor Industrial Co.	Sub
	JV with Japanese company
Other States	
Nippon Radiator	Sub
Nihon Plast Co.	Sub
Jidosha Denki Kogyo Co.	Sub
Clarion	Sub
Tachi-S Co.	Sub
Ikeda Bussan	Sub
Ichikoh Industries	JV with German and Japanese, and Sub
Kokusan Kinzoku Kogyo Co.	Acquisition
None Expanded Companies	
Atsugi Motor Parts Co.	
Hashimoto Forming Industry Co.	
Niles Parts Co.	

- Sub: Subsidiary Company
- JV: Joint Venture

(Source: Nikkan Kogyo Shinbun, June 17, 1987)

(3). Obstacles to Overseas and Counter Measures

It seems that many Japanese companies are struggling with employment problems overseas. In contrast, many Americans appear to not have serious problems with their overseas expansion. This is because the cultural differences between America and Europe are not nearly as large as they are between both and Japan and therefore they can proceed with their localization strategies relatively smoothly. The problems for many American and European supplier companies is how to maintain control in their overseas subsidiary companies, including corporate level strategy, rather than localization problems. Many Japanese companies have proceeded with their internationalization strategy by establishing offices or plants many years ago, but this is not so for the Japanese automotive suppliers who do not have overseas development or R&D centers on which to base their globalization strategy. As a result of this, these companies have different employment problems from those comes from the expansion of factories and other facilities.

One main reason that cannot be ignored is that some of these problems stem from basic cultural differences. Japanese norms that govern labor and rules are completely different from those of European and American culture. In this sense, when they expand their business in Europe or America, many American and European companies may not have serious problems

which can come from different cultural issues.[4.2] It seems that when American suppliers refer to the obstacles to overseas expansion, they mean that problems come more from differences in language than culture. Only one company responded that they have no problem overseas.

However it is obvious from the literature as well as from this research that the problems of expanding internationally are numerous.

Table 4-4. The biggest Obstacles in Overseas

[Questions]
What is the biggest obstacles to do R&D activity in overseas?

	Japan (n=6)	USA (n=11)	W. Europe (n=9)
Language	2	1	1
Cultural and/or custom differences	2	3	2
Lack of suitable managers	1	1	0
Lack of financial resources/cost	0	1	2
Salaries	0	0	0
Difficulties of hiring good local people	5	1	0
Maintaining effective control	0	3	3
Coordination	0	1	0
Competition between Labs	0	1	0
Having critical mass	0	1	0

Table 4-5. Changes of Initial Human Resource Management Strategies Overseas

[Question]
Did your company make any of the following changing in your initial human resource management strategy ?(select all)

	Japan (n=6)	USA (n=11)	W. Europe (n=9)
Increase:Home Country Engineers	1	1	2
Decrease:Home Country Engineers	3	2	1
Increase:Home Country Managers	0	0	2
Decrease:Home Country Managers	0	2	1
Recruited Experienced Local Managers	3	5	4
Recruited Experienced Home Country Managers	1	2	2
Recruited Mid-Career Employees	2	2	1
Changed:Salary/Incentive	1	0	0
Gave Intensive Training to Managers (only)	0	2	2
Gave Intensive Training to Engineers	4	4	4
Gave Intensive Training to Other Employees	0	0	3
Usage of Consulting Co.	0	1	1
Modified Other Primary Overseas Strategy	0	0	0

(4). Labor Condition and Incentive System

The survey results show that many American and Japanese companies have localized their labor conditions such as salary, employee relations and management of human resources, while European companies in this industry have a tendency to only apply modified versions of their home country system to overseas subsidiary companies. The incentive system in Japanese companies is different overseas from that at home, while in American and European company, the same system as in home country is used. Therefore, only one of the Japanese companies reported using the same incentive system overseas as at home, where 4 of the 6 European companies who reported to this questions and 7 of the 11 U.S. companies dis so.

In many Japanese companies, different incentive systems are applied to their overseas local employees from that of Japanese system, and Japanese employees are offered a Japanese incentive system when overseas.[4.3] This is mainly because the incentive system itself has completely different characteristics in Japan from other countries.

Generally speaking, the incentive system from the point of view of the Japanese employee is obscure. Many Japanese companies do not let their employees know the result of performance evaluations. There exist performance reviews in Japanese companies but they are done by people who are in managerial or higher positions in the company. There is no

person to person or face to face performance review. What is more, the portion evaluated is probably less than 10% of basic salary including seasonal bonus review. Because employees do not formally learn the result of this review, they try instead to feel the result through daily activity. The "incentive" of a positive performance review is not an actual incentive at all. In addition, it appears that the monetary incentive plays a far less important role for most Japanese employees than it does in America and Europe.

An effective incentive in a Japanese company, however, is the expansion of responsibility for a job; while this too is not that clear an incentive for Japanese employees, it is clear enough to act an incentive for the dedicated person. However, this kind of incentive may not work well at all in other countries. One reason is that, for example in America, the job responsibility is clearly defined in a job description. Job responsibility and authorized right for a job therefore tend to change very little and a position is less flexible than it would be in Japan. Increasing job responsibility as an incentive would therefore send the opposite message in America as greater responsibility implies higher salary or reward.

In Japanese companies, they match the incentive system with local labor circumstances; that is they take a localized approach to local labor conditions and incentive/reward expectations.[4.4] This local approach does not apply to

Japanese company employees working abroad, who in turn expect Japanese-style retirement and seniority systems.

In many American and European companies, labor conditions and incentive systems are either completely localized or are based on the local labor environment. This means that their incentive systems basically resemble those of the home country.

Table 4-6. Human Resource Management
(Salary, Incentive System etc.)

[Question]
QA: In overseas R&D facility, have you adopted the same incentive system as in the home country ?
QB: How about the salary and human resource management of those engineers/scientists in that facility ? Compared to the home country, they are

		Japan (n=6)	USA (n=11)	W. Europe (n=9)
QA	Adopt Same Incentive	1	7	4
	Different Incentive	5	3	2
	N/A about Incentive	0	1	3
QB	Similar Human Mgmt*1	0	4	0
	Adjusted Somewhat*2	2	1	4
	Totally Localized*3	4	6	2
	No Answer	0	0	3

*1: Very similar.
*2: Adjusted somewhat according to the local environment.
*3: Totally localized.(Different from above A and B)

Table 4-7. Overseas Activity and Autonomy Expansion

[Questions]
In future in your company, the R&D activity in overseas will be

Future R&D Activity in Overseas	Japan (n=6)	USA (n=11)	W. Europe (n=9)*1
Expand	6	4	3
No Change	0	2	10
Dependent on Future	0	4	2

*1: Three companies did not answer.

[Questions]
In future, do you expect change in the level of autonomy and local strategic initiatives in this facility ?

	Japan (n=6)	USA (n=11)	W. Europe (n=9)*1
Autonomy will Expand	6	7	1
Stay the Same	0	4	5
Decrease	0	0	0

*1: Three companies did not answer.

[Question]
Do you think that the localization of R&D in overseas is valuable for your company ?

	Japan (n=6)	USA (n=11)	W. Europe (n=9)*1
Valuable	6	10	6
Not Valuable	0	0	0
I don not know	0	1	0

*1: Three companies did not answer.

Table 4-8. Company Profiles
(American Automotive Suppliers)

Name	X1	Net Sales (B$)			X2 (%)	X3
		T	D	O		
AA	1:10	21.4	13.9	7.5	12	18.7
AB	0:100	8.2	5.9	2.3	50	7.4
AC	4:1	9.6	8.1	4.9	10	10.4
AD	10:250	10.9	6.4	4.5	90	11.1
AE	2:98	12.3	9.4	2.9	33	11.0
AF	30:1	2.0	---	---	50	8.0
AG	0:100	2.9	---	---	10	2.8
AH	0:100	----	n/a	n/a	100	5.4
AI	0:50	----	n/a	n/a	100	1.5
AJ	9:1	3.7	---	--	61	3.9
AK	15:85	4.5	---	--	30	1-3

-X1: The Ratio of Engineers: Home country vs. Local
-T : Total Net Sales (Billion $)
-D : Domestic part of Net Sales(Billion $)
-O : Overseas part of Net Sales(Billion $)
-X2: Automotive Field Sales (Billion $)
-X3: Total employees (Unit: x10,000)

Table 4-9. Company Profile
(Japanese and European Automotive Suppliers)

Name	X1	Net Sales (B$)			X2 (%)	X3
		T	D	O		
JA	1:5	2.4	2.2	0.2	57	1.6
JB	1:3	4.5	3.2	1.3	75	4.5
JC	1:5	5.1	3.0	2.1	2	<1.0
JD	13:1	20.0	15.5	4.5	7	8.9
JE	1:3	44.8	34.3	10.5	<8	29.0
JF	1:5	37.7	21.2	16.5	25	19.8
EA	1:2	34.0	25.0	9.0	4	36.0
EB	10:1	20.4	11.1	9.3	52	16.0
EC	90:10	1.2	0.5	0.7	60	6.3
ED	5:100	3.7	1.8	1.9	100	3.4
EE	-----	1.0	0.7	0.3	91	0.8
EF	10:90	30.6	4.4	26.2	10	16.9
EG	----	0.3	----	---	<5	0.4
EH	-n/a-	----	----	---	20	----
EI	----	----	----	---	---	----
OA	9:1	5.9	2.2	3.7	<0.1	5.9

-X1: The Ratio of Engineers: Home country vs. Local
-T : Total Net Sales (Billion $)
-D : Domestic part of Net Sales(Billion $)
-O : Overseas part of Net Sales(Billion $)
-X2: Automotive Field Sales (Billion $)
-X3: Total employees (Unit: x10,000)

4-3. MOTIVATION FOR OVERSEAS EXPANSION: TECHNOLOGY DEVELOPMENT CENTERS

Why is it a necessity to have not only manufacturing but also the technology development centers overseas ? This is the central question of this research. To analyze overseas strategy, mode of expansion must therefore be discussed and consists of the following:

-1. Establishment of 100 % subsidiary
-2. Acquisition of and merger with local company
-3. Joint ventures
-4. Technology licensing
-5. OEM (Original Equipment Manufacturing)
-6. Passive investment

A detailed explanation of these modes style is not the main purpose of this thesis. Rather the background of motivation or reasons why the supplier takes these steps will be considered here.

In the progression from step one to six a decrease in technological control for the company is evident. Number six shows an emphasis on financial interest. Not reflected is the possibility of shifting from step 6 to 1 or 2 in order to control the company in the future by increasing the ratio of the capital investment.

Generally speaking, the expansion of Japanese suppliers in overseas markets after 1985 is due to the popularity of

joint ventures as the preferred style of expansion. This is mainly because of requests from local governments to participate in joint ventures and also JAPIA (Japan Automotive Parts Industries Association) request that its members participate in joint ventures with local company when expanding overseas.[4.5][4.6] This suggests that it is growing more difficult for suppliers to set a global strategy without taking local factors such as the economic and labor situation of the local region or government into account. It is a main feature of today's overseas strategy to reduce risk by having joint ventures, but within these the company may lose control of strategy and experience constraints on engineering development and R&D. Also, the existence of a hidden reason must be noted that being "to seek the solution of avoidance of maturity in industry by leveraging technology and taking globalization as strategy."[4.7]

(1). Cost Effectiveness

A clear and persuasive explanation for overseas expansion of technology is that "the total cost is cheap."[4.8] This is frequently heard in the literature and in interviews.

After setting up manufacturing plants and producing products, it would then be necessary to respond the technical

and product quality-related questions and requests from customers. Therefore, the supplier has to respond to these questions and requests by sending engineers from the home country on business trips on a short term basis. Then the frequency of these requests and questions will increase, and the complexity of the questions and requests will become more technical. As a result of this, the supplier company will decide to set up a technical section overseas to respond to customer needs, because the company determines that the establishment of a technology department or section might be cheaper. This cost conversion method explains that technology strategy and decision making is driven by the quantity of technology demanded or requested. If both cost and technology requests exceed a certain level, the company determines that it would be advantageous to set up a technology section in overseas. The flow of this logic is shown in Figure 4-1.

However it doesn't seem that the final decision to have a technology section overseas is based on cost. The reason why is that the conversion of technology to cost is very difficult. It is a different conversion from the cost to air transportation and the expenses of visiting engineers. It is almost impossible to minimize the importance of having the technology section close to the customer overseas, because the calculation would have to include the all factors such as the number of customers and their requests, reliability, the business's chances of success and the possibility of expansion

in future. Therefore cost effectiveness is easy to understand but it must be a secondary decision factor because of the ambiguities surrounding the factors that have the greatest impact on the decision.

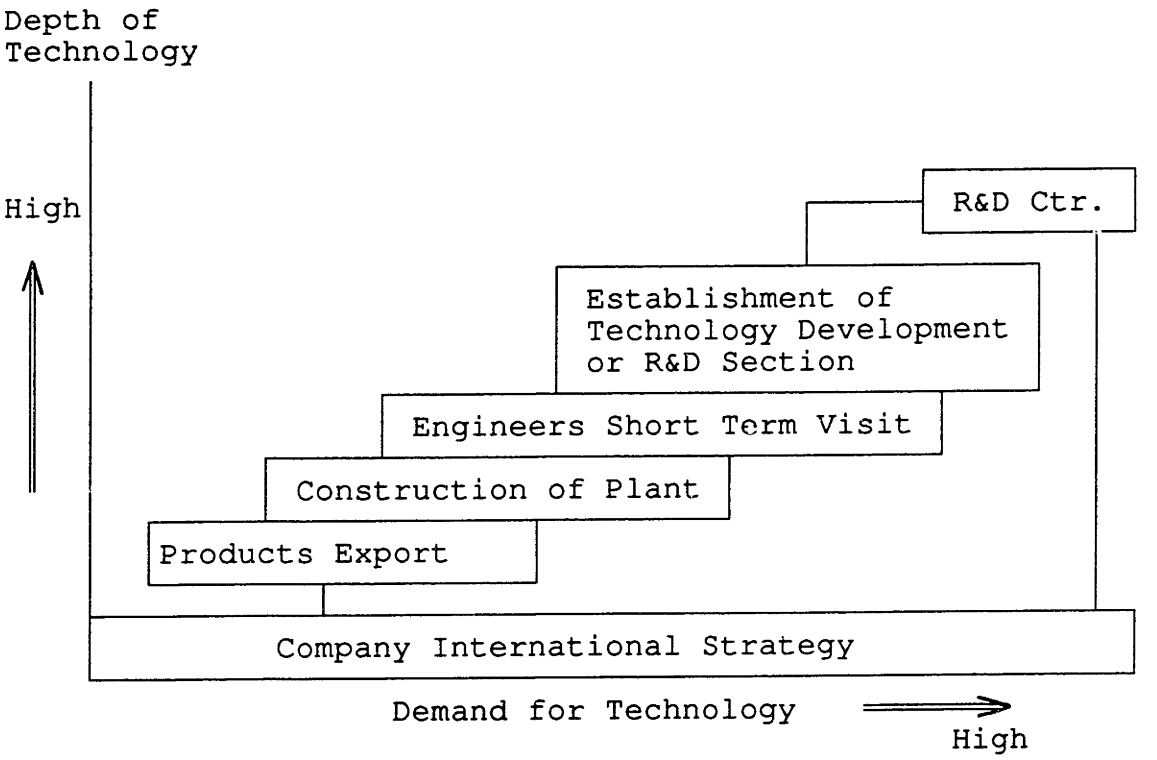

Figure 4-1. The Steps of Overseas Expansion and its Flow

Most European and American automotive manufacturers have been encouraging their suppliers to have technology development sections close to their companies as a supplier strategy. This can be seen from the shift from so-called

"close car line sourcing" to "single sourcing" for example. To become a "single sourcing" supplier is to be a "full service supplier", which means that the supplier has to provide the customer with service from development to manufacturing and beyond.[4.9] Before shifting the supplier strategy, the suppliers competed mainly in terms of one-shot pricing under the "close car line sourcing". But after introduction of the "single sourcing" strategy car parts suppliers have had to attend to aspect of their product, from development to after-sale service.

Under this strategic structure, or in a "keiretsu" system, it is important to set up a development section close to the customer. That is, if the car manufacturer adopts this system, it can use the technological potential of their suppliers in an very early stage of a new car's development. Suppliers in turn have to help and support their customer technologically in order to do business because of the system. In this system, the supplier joins the new car's development in its early stage and therefore the supplier can not do business if it does not have a technology development section or R&D available in the company. In this sense, the technology development section or R&D section is necessary to do business.

In Figure 4-1, R&D has a different meaning from a technology development section or engineering. But these two sections have similar meanings in that they are the applied

research or development sections--the best position to connect to the product directly, even though the product may be in the R&D center. Generally speaking, virtually all car suppliers lack basic research centers overseas. Those suppliers who do have R&D centers overseas only have the objective of applied research or technology development to connect to their products. None of them are basic research oriented, and therefore the reasons for their existence are along the same line of technology development.

(2). Satisfaction of Customer Needs

Of the companies investigated, the most frequently mentioned motivation for overseas expansion is "to respond to customer needs". Not only is response to customer needs important, but so is the anticipation of those needs.

In the former case the supplier passively waits to learn the customer's needs, and therefore the supplier cannot respond to customer needs until they are made known. In addition, the supplier cannot prepare for future technology by predicting future movements of the car industry or future customer requests and needs. There is no difference, therefore, between this response to customer needs and the short business trip from home base of old.(Figure 4-1) If the supplier stays at this stage, it would not learn of any

advantages to the establishment of a technology development section or R&D overseas except for the increased frequency of contact with customers. As a result of this, the technology development section overseas would actually increase real costs for the suppliers.

On the other hand, in the active case "to look for customer needs", the supplier actively anticipates the needs of their customer(s). This leads their customer to create new needs and to expand their business. For the automotive manufacturer as their customer, the supplies anticipation of its needs would be a great. For the manufacturer it would means that the supplier would work together with them on new car development in the very early stages, and this would result in a reduction of development time and cost by reducing the design and development work needed. For the suppliers, it means the gain of enough time for development and the possibility of modifying the development process by the proposals based on their knowledge and capability. Thus the supplier can have quite accurately match the development with their technological capability.

Prior to this interaction between manufacturer and supplier, the manufacturer would merely give the supplier the new product specifications and designs that have already been decided, and specific targets. The suppliers would then work based on these specifications. But now throughout the world, car manufacturers proceed with new car development with their

suppliers by using the suppliers' technological skill in the very early stage of development. In this situation, it is very rare to obtain clear specifications. Therefore, the car manufacturers need the suppliers that have very high technological skill and potential and high communication ability in technology.

To direct this ambiguous "customer needs" determination itself is the reason why the suppliers have to have their technology development sections overseas, and thus this technology globalization strategy has synergy with the localization strategy. To determine customer needs, it is necessary to understand what customer is looking for. To do this accurately, the suppliers from foreign countries have to understand the language, cultural and other characteristics of their market, which implies localization. It is necessary to hire local engineers for the supplier company to bridge the gap between the home country engineer and the local customer. And this local engineer has to understand the differences between them to be a good bridge for technology. The reason why this bridging engineer has to be local is that it results in higher satisfaction for the local customer.[4.10]

Ideally it is most desirable to not even need the bridging engineer. That would mean that perfect or full localization had been achieved. This kind of localization can be seen in such large companies as IBM and Hewlett Packard, but it is rare indeed.

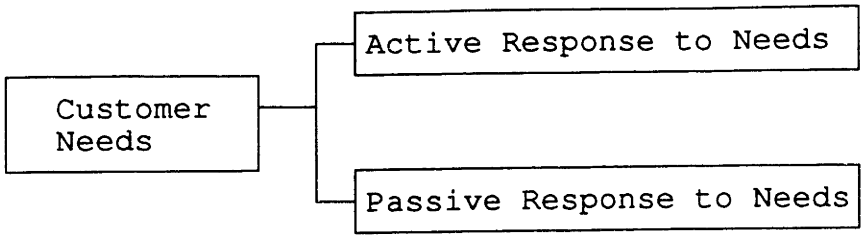

Figure 4-2. Customer Satisfaction

4-4. OVERSEAS STRATEGY

As a general tendency of corporate level overseas strategy, many companies are heading toward the expansion of overseas localization, as seen in section 4-2. Two approaches to this expansion of overseas localization strategy are observed. The first (observed in many Japanese companies) is the strategy that proceeds with localization using the company culture of the home company as its guide. Throughout these efforts, the company tries to gain local advantage and create synergy by mixing these advantages. Their final goal is a global network. To accomplish this goal, they give training not only to managers but also to other employees, on the way towards total localization. This transplantation process is flexible and active. It seems that they try to gain as much advantage through localization as possible. In this case, the final target is globalization by means of obtaining synergy. The second approach is a localization strategy that accepts

almost everything as it is. In contrast to the first approach, the company does not try to transplant the entire corporate culture of home country to the overseas subsidiary. Rather, this localization strategy is similar to a capital investment in or a merger and acquisition of an entire local company. In this way, complete localization is suddenly achieved. As long as the company has embarked upon this localization strategy, there is no internal strategic contradiction. They merely implement those strategies already in place. This strategy tends to be common among European and American companies as an overseas strategy. It has several advantages such as relatively rapid start up of the business and almost perfect localization, but at the same time it has a disadvantage in that it is difficult to obtain the synergy effect based on the original corporate culture. This strategy is like an artificial satellite, so that the employees simply send the information or profits to home country. It does not necessary produce synergy effects. Figure 4-3 shows the schematics of two types of international strategies, which are Globalization and Satellite-ization

Many successful companies engaged in overseas activities are called global companies and are implementing a total localization strategy world-wide. They are taking globalization as their international strategy and are aiming at the synergy effect based on their original corporate culture.[4.11]

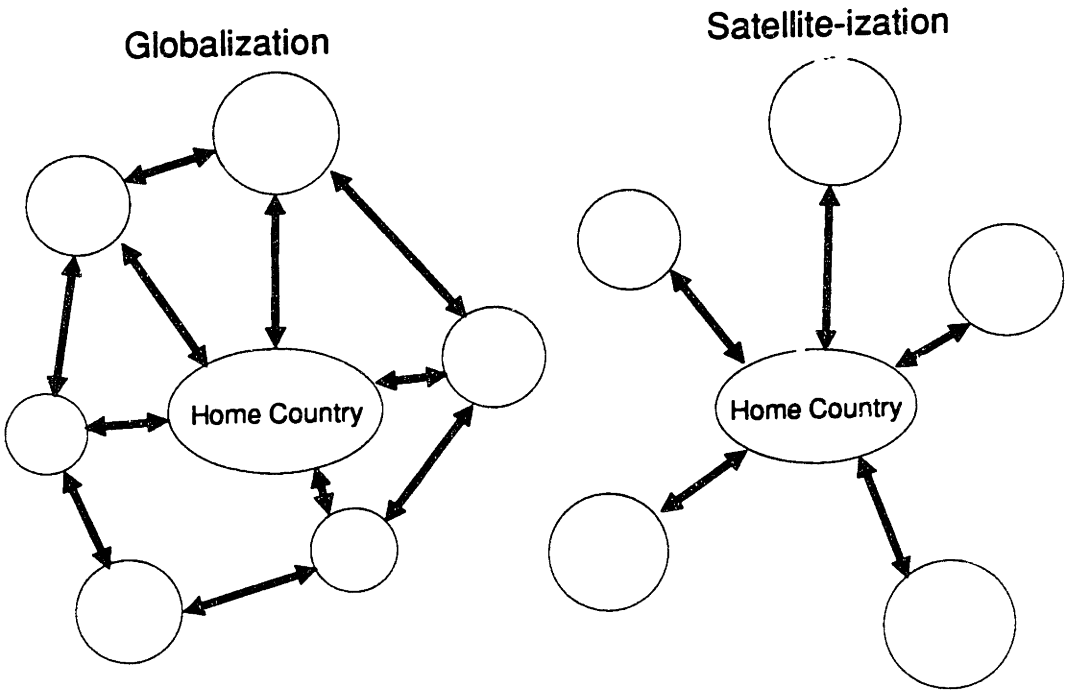

Figure 4-3. International Strategy

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4.9 Interview

4.10 Interview

4.11 Meeting in MIT Management of Technology Program

CHAPTER 5: SUMMARY AND CONCLUSION

As a result of the research and survey of the strategies in automotive supplier industries in three major world regions, it seems that their first priority and rationale for having development or R&D center overseas is to have or to maintain close relations with their local (home-country) customers. On the one hand, there are two types of overseas strategies in Japanese automotive suppliers. One is observed mainly in the companies that expanded overseas before 1980, and the other is in those expanding after the mid-80s. The motivation for overseas expansion between the two differs. The latter is a follower strategy: to accompany the automotive manufacturers from home country when they sat up production overseas, which was also observed in the American and European automotive suppliers in an earlier time. But the difference between the Japanese and American and European strategies is that the Japanese case is dominated by medium to small size suppliers, while the American and European companies were mainly by big suppliers. In addition, the number of companies taking the overseas expansion strategy in Japan is larger than in the United States or European.

Another difference is that many of Japanese suppliers are the companies belonging to the "Keiretsu" system of automotive manufacturers. The advantages of the overseas expansion using the "Keiretsu" system are;

1. The strong tie with their customer. This results in the joint development activity in an early stage of new car development.
2. The rapid start up overseas. The car manufacture at the top of the Keiretsu pyramid supports the establishment of their suppliers through the business overseas that the car maker has already initiated.

Many Japanese suppliers that belong to the Keiretsu system expected the above advantages when they decided on the overseas expansion in mid 80s. At the same time, many of these suppliers were strongly dependent on the export car business before taking overseas strategy.

However, there is a disadvantage in the Keiretsu system. One of the biggest disadvantages is the difficulty of supplying their products to other car manufacturers that already have their own Keiretsu system. This is not primarily because the car company with which the supplier is affiliated restricts the sale of products outside the group, but because other car companies with their own Keiretsu system do not want to use these products. That is, although the Keiretsu system itself does not necessarily restrict the outward supply of products to another Keiretsu, the other Keiretsu regulates the purchase from other Keiretsu suppliers. Therefore, the independent suppliers have the freedom to supply their products to any Keiretsu car manufacturers. The independent

suppliers, which have already expanded overseas in an earlier time, before 1980, have been suppliers to local car companies overseas or have had other customers in other fields of the automotive industry.

There are many obstacles in expanding overseas based on the different language or culture. But in addition, there are many companies that have difficulties maintaining control of a local company and hiring good local employees. These local labor or employment problems are based on the cultural differences, and therefore it is difficult to solve this problem. This is one of typical barriers to full localization overseas. In this aspect of employment issues, such as salary system and incentives or labor contracts, many companies differentiated the treatment of the employees between home country and the locally hired employees. This is mainly because many of employees from home country consider that they will return to their home country, so that they have to be treated by the system of the home country. In this sense, therefore, this employment problems may gradually disappear according to the progress of localization.

The problem of maintaining control is also an important issue because it relates to the overseas strategy of the company in its home country. It also relates to the cost-center versus the profit-center strategy. If the suppliers take a profit-center strategy, it would mean less control of

overseas operations. This control issue is a problem for many American and European suppliers. In contrast to many American and European and some Japanese suppliers that have a long history of the overseas operations, "a maintenance of control" still does not become a problem for most medium to small Japanese suppliers that expanded overseas after mid-80s, because they are in ramp-up stage.

In automotive supplier industry, it is relatively new to have a technology development or R&D section overseas; therefore they may have other new employment problems relating to the hiring of good engineers or scientists.

Almost all the automotive supplier companies surveyed answered that they will expand the localization strategy and autonomy of local company overseas. From now on, therefore, the overseas strategies in automotive supplier industry are heading toward the full localization. This will be true for most American and European automotive suppliers. However, it will be a little different for most Japanese suppliers. The overseas localization strategies in many Japanese automotive suppliers are up to their customers (car manufacturers), because of the strong and close ties. Even though suppliers want to proceed with their localization strategy, it is difficult to ignore the strategies of the car manufacturers'. This is mainly because that a long-term relationship between suppliers and car manufacturers and a language barrier in

foreign countries. Many people prefer to talk in their mother language. Therefore, during the time that car manufacturers have not completed full localization, their suppliers cannot take full localization as their globalization strategy.

However, automotive manufacturers are proceeding with their localization strategy; therefore full localization strategy is advancing in automotive supplier industries as well.

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APPENDIX A

[QUESTIONNAIRE]

[SECTION 1]

1-1. Company Name :

1-2. Address(If different from Headquarter, please write both)

1-3. Your Section and Title:
-The name of your section: _____
-Your Title : _____

1-4. What is your company's "Home country"-- that is the country in which your headquarter is located ?
A. USA
B. Japan
C. Germany
D. Other European country (Name: _____)
E. Other (Please specify : Name: _____)

1-5. Total sales in dollars: $ _____
Automotive field % in total sales: _____ %

1-6. Worldwide employees:
A. Less than 1,000
B. 1,000 --- 5,000
C. 5,000 --- 10,000
D. 10,000 --- 30,000
E. More than 30,000

Number of home country employees:
A. Less than 1,000
B. 1,000 --- 5,000
C. 5,000 --- 10,000
D. 10,000 --- 30,000
E. More than 30,000

1-7. Automotive Vehicle related products
(please select all that apply)
A. Engine Parts
B. Instrument Cluster & Electronic systems
C. Electric/Electronic Components
D. Audio and accessaries
E. Wheel and Tire
F. Mechanical Parts (Suspension/Transmission etc.)
G. Body Parts
I. Harness/Optic fiber
Z. Others (Please specify:)

1-8. The automotive industry is the primary industry of your company ?
A. Yes B. No

1-9. In which other industry does your company operate ?

A. Computer
B. Electric/Electronics Components
C. Mechanical Components
D. Audio System
E. Steel/Metal
F. Materials
G. Chemical
H. Home appliances
I. Heavy Industry
J. Aviation/Space
K. Other

1-10. The number of facilities

(1). Home country :

A. Factories _____ B. R&D Center _____ C. Others ____

(2). Overseas :

A. Factories _____ B. R&D Center _____ C. Others ____

1-11. Do you have home country R&D center or facility ?

A. Yes B. No

If YES, how many ? _____

1-12. If YES in Question #1-11, what is(are) the function of your home country R&D center ? Rate on a scale from 5 to 1 the importance of the following activities in your home country R&D organization.

	Very important 5	4	3	2	Unimportant 1
A. Basic Research					
B. Applied Research					
C. Information Collection (eg. External technology, Patent info. etc)					
D. Acquisition and evaluation of External Technology					
E. Design or Human Factor					
F. Reliability evaluation of the products					
G. Special Project					
H. Others (please specify:)					

1-13. In those facilities, you are doing R&D (Circle one)

A. related to Automotive products.

B. not related to Automotive products.

1-14. If you answered "A" in Q1-13, please answer the following question. If not please go to Q2-1. What is R&D ? Rate on a scale from 5 to 1 the importance of the following activities in your home country R&D organization, in the R&D activities related to Automotive products.

	Very important 5	4	3	2	Unimportant 1
A. Basic Research					
B. Applied Research					
C. Information Collection (eg. External technology, Patent info. etc)					
D. Acquisition and evaluation of External Technology					
E. Design or Human Factor					
F. Reliability evaluation of the products					
G. Special Project					
H. Others (please specify:)					

1-15. When did you establish the first R&D center in your home country ?

A. Before 1949
B. 1950 - 1959
C. 1960 - 1969
D. 1970 - 1978
E. 1980 - 1985
F. After 1986

Did it include R&D relevant to the automotive business at that time ?

A. Yes B. No

[SECTION 2]

2-1. Do you have technology development capabilities outside your home country ? Please indicate which of the following applies to your company. (Check all)

A. One (or more) R&D centers. _____
B. One (or more) technology departments linked to manufacturing facilities. _____
C. One (or more) technology departments not linked to manufacturing facilities. _____
D. One (or more) technology assessment groups included into marketing organization. _____
E. We have NO technology department outside our home country. _____

2-2. If A, B, or C above, how important were the following factors in establishing this technology development organization ? Please rate on scale.

	Very important 5	4	3	2	Unimportant 1
A. Access to human resource					
B. Access to leading edge technology					
C. Close relationships with key local customers					
D. Maintaining relationships with key home country customers' overseas operations					
E. To support offshore manufacturing strategy					
F. To support overall localization strategy (public image etc.)					

G. If an important reason is missing from the above list, we would appreciate your adding it for us here.

_____

_____

_____

_____

_____

2-3. If you have NO technology department outside your home country,

(1). Do you plan to have it ? A. Yes B. No

(2). If you have NO plan, why not ? Please rate on scale.

	Seriously Affect 5	4	3	2	Not so much Affect 1
A. We don't have enough resources.					
B. No necessity.					
C. Lack of suitable manager.					
D. Other (please specify:)					

(3). If YES in Q2-3 (1), (i.e. you have plans to establish R&D outside your home country in the future)why ? Please rate on scale.

	Very important 5	4	3	2	Unimportant 1
A. We expect to have enough resources.					
B. Access to human resources.					
C. Access to leading edge technology.					
D. Close relationships with key local customers.					
E. Maintaining relationships with key home country customers' overseas operations.					
F. To support offshore manufacturing strategy.					
G. To support overall localization strategy.(public image etc.)					

H. If an important reason is missing from the above list, we would appreciate your adding it for us here.

_____

_____

_____

_____

_____

If you have either an R&D center or a technology department outside your home country, please go on to the following question.
If you do not, we thank you for your time and effort.

[SECTION 3]

<<<<<< >>>>>>>

If you do have one or more R&D center or technology department outside your home country,

3-1. In which region do you have R&D facility ? (circle all)

A. North America (# of places:)

-USA (_____) -Canada (_____) -Mexico (_____)

B. Europe (# of places:)

-Germany(_____) -Switzerland(_____) -Italy (_____)

-UK (_____) -France (_____) -Holland(_____)

-Sweden (_____) -Other W. Europe(____) -Other E. Europe(__)

C. Japan (# of places:_____)

D. Other region (# of places:)

-Australia/NZ (_____) -Other East Asia (_____)
(Korea, Taiwan, Hong Kong)

-South Asia (_____) -South America (_____)

-Other Place: please specify (_____)

If you do have one or more R&D center or technology department outside your home country, please answer the following questions, for your most important R&D center or technology department, which is in_____(please specify the country).

3-2. What is(are) the function of your overseas R&D center ? Rate on a scale from 5 to 1 the importance of the following activities in your home country R&D organization.

	Very important 5	4	3	2	Unimportant 1
A. Basic Research					
B. Applied Research					
C. Information Collection (eg.External technology,Patent info.etc)					
D. Acquisition and evaluation of External Technology					
E. Design or Human Factor					
F. Reliability evaluation of the products					
G. Special Project					
H. Others (please specify:)					

3-3. What is the ratio of engineers/scientists from Home country country vs. those of engineers/scientists employed locally among R&D people in that facility ?

Ratio:
(Home country engineers) / (Local engineers)

3-4. In that R&D facility, have you adopted the same incentive system as in the home country ?

A. Yes B. No

3-5. How about the salary and human resource management of those engineers/scientists in that facility ? Compared to the home country, they are

A. Very similar.
B. Adjusted somewhat according to the local environment.
C. Totally localized.(Different from above A and B)
D. Other (please specify:)

3-6.What is the biggest obstacles to do R&D activity in overseas?

A. Language
B. The difference of culture and custom
C. Lack of suitable managers
D. Lack of Financial resources/cost
E. Salaries
F. Difficulties of hiring good local people
G. Maintaining effective control
H. Other( )

3-7. Did your company make any of the following changing in your initial human resource management strategy ?
(select all)

A. Increase the number of home country engineers.
B. Decrease the number of home country engineers.
C. Increase the number of home country managers.
D. Decrease the number of home country managers.
E. Recruited an experienced local manager.
F. Recruited an experienced home country manager.
G. Recruited more mid-career employees.
H. Changed the salary/incentive systems.
J. Gave intensive training to managers (only).
K. Gave intensive training to engineers.
L. Gave intensive training to other employees.
M. Usage of consulting company.
N. Modified the other primary overseas R&D strategy.
O. Other (Please specify:)

Comments:_____

3-8. In future in your company, the R&D activity in overseas will be

A. Expanded
B. No change
C. Reduced
D. Very dependent on the future situation
(I don't know now)
E. No decision
F. Other ( )

3-9. In future, do you expect change in the level of autonomy and local strategic initiatives in this facility ?

A. Yes, autonomy will increase.
B. It will stay about the same.
C. It will likely decrease.
D. Not yet decided.
E. Other ( )

3-10. Do you think that the localization of R&D in overseas is valuable for your company ?

A. Yes B. No C. I don't know

This is all. Thank you very much for your time and effort.

APPENDIX B

[List of the Respondent Companies]

-Allied-Signal Inc.(Bendix Automotive Systems Group)
-Behr GmbH and Co.
-Borg Warner Automotive Inc.
-Corning Inc.
-Dainippon Ink and Chemical Inc.
-Eaton Corporation
-FAG Kugelfischer Georg Schafer KGaA
-GEC-Marconi Electric Systems Corporation
-General Electric Co.-GE Plastics
-General Motors-Packard Electric Division
-General Motors-Delco Products
-Goodyear Tire and Rubber Co.
-Hitachi Limited
-Hoechst AG
-Lucas Automotive Ltd.
-Matsushita Communication Industrial Corporation
-Mitsubishi Electric Corporation
-Motorola Inc.
-NSK Corporation
-N.V. Bekaert S.A.
-Philips Plastics and Metalware
-Robert Bosch GmbH
-Samusung Electronics Co.
-Siemens AG
-TRW Inc.
-United Technologies
-Valeo
-Yazaki Corporation