

Changing Customer Scope of Suppliers in the Korean Automobile Industry after Currency Crisis

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Abstract

By analyzing the buyer-supplier relationship in the Korean automobile industry after the currency crisis, it was found that the customer scope of suppliers, that is, the number of assemblers that suppliers traded with had increased than in the past. This suggests that the once closed and exclusive buyer-supplier relationship that existed in the Korean automobile industry eased. However, when considering the characteristics of parts, some suppliers decreased the number of trading assemblers during the process of optimizing customer scope. The main factors behind the changes of customer scope in the Korean automobile industry can be attributed to the severe economic recession that occurred just after the currency crisis and the efforts of suppliers to optimize the number of customers. Foreign investment into domestic suppliers did not have the influence as was expected.

Introduction

In essence, the automobile industry is a representative assembly industry. The final assembler procures over 60% of its components from outside suppliers in terms of production costs. Therefore, it seems that one of the most essential factors for enhancing competitiveness in the automobile industry is to build up efficient buyer-supplier relations. In fact, the world-famous competitiveness of the Japanese automobile industry is largely attributed to their efficient buyer-supplier relationships. These are characterized by: long-term relationships, a multi-tier supplier network, significant involvement of suppliers in product development, forced competition among a few suppliers, and sharing risks and rewards between assembler and suppliers.¹ Though Korean suppliers engage in long-term relationships with assemblers, previous studies have pointed out inefficient aspects of Korean buyer-supplier relations such as exclusive and closed relations, a one-tier supplier network, alienation of suppliers from the product development process, insufficient competition among suppliers, and the lack of sharing risks and rewards between assembler and supplier.²

Among the many shortcomings, it is pointed out that the exclusive and closed buyer-supplier relationship is the major problem, and a peculiar feature of the Korean automobile industry comparing with the American and Japanese automobile industries.³ Exclusive and closed relations are characterized by the fact that suppliers have relations with only one or two assemblers and subsequently it is very difficult to win new contracts with other assemblers. This limited customer scope makes it difficult for suppliers to achieve economies of scale and scope and to attain new information and technologies. As a result, Korean automobile component suppliers remain to be of small-scale and to lag in technologies. However, since the currency crisis there have been signs that this exclusive and closed buyer-supplier relationship is changing.

First, the Korean automobile industry experienced a severe recession as a result of the currency crisis at the end of 1997, which led to domestic sales plummeting to half the average

level. This challenging economic environment initiated the break down the exclusive and closed supplier relationship as suppliers searched for new automakers to survive. Another cause of change was the capital investment of foreigners into Korean suppliers. Unlike Korean suppliers, foreign firms are not subordinated to a specific automaker, and have a big-scale business with advanced technologies; therefore these factors are expected to ease the exclusiveness in existing supplier relations. Furthermore, the environment surrounding domestic supplier relations have been in transition due to fierce competition in the global and domestic automobile market after the crisis. Since assemblers want to reduce procurement costs and improve quality in order to survive in a tough competitive market, they introduced competitive bids in selecting suppliers and also asked of them to participate in product development. These changes have allowed suppliers the opportunity to establish new relationships with other assemblers; however, on the other hand, they are burdened by the responsibility of new component development. The decision making process of suppliers in determining the optimal level of automakers will have a significant effect on the customer scope of all suppliers.

Hereafter, in Chapter II, existing studies about changing customer scope are reviewed and the factors behind the changes in the Korean automobile case are analyzed. Then the hypotheses for empirical analysis are presented. In Chapter III, the model for empirical study is established and then data from 1996 to 1999 is tested empirically. Lastly, the issue is summarized in Chapter IV and the limits of this paper and implications for business strategy and government policy are inferred.

Factors behind the Change

Literature Review

There are a small number of papers that study changes in customer scope of suppliers with time series data. Recently, there has been some research that study the changes in customer scope, including Cho(1998), Nobeoka(1999) and Lamming(2000).⁴

Cho(1998) examined the effects of massive inflow of foreign capital investment into the Korean automobile industry during the period from 1997 to early October 1998. He analyzed the status and characteristics of foreign capital investment into the Korean automobile industry and analyzed the expected effects. Although the focus of the literature does not specifically examine the changes in supplier relations and is mainly descriptive, it expects that the existing exclusive relationship between automakers and suppliers will be somewhat lessened due to foreign capital investment.

Nobeoka(1999) analyzed changes in the number of suppliers traded by automakers in the Japanese automobile industry, from 1992 to 1996. Using points from Bakos and Brynjolfsson(1993), which searches the conditions for optimal number of buyers in a theoretical framework, he points out that Japanese assemblers, in finding the optimal number of suppliers per component, increased the number of suppliers compared with those in 1992. Additionally, he found that the increase in the number of suppliers was even more apparent for standard components.

Lamming(2000) examined the effects of Japanese economic recessions, since the early 1990s, on Japanese buyer-supplier relationships considering that Japanese supplier relationships are exclusive partnerships and that these relationships have supported the competitiveness of the Japanese economy up to date. According to the survey, which was conducted for the automobile, electronics and computer industries, buyers in these industries tried to breakthrough severe economic recessions by selling out their affiliated suppliers and introducing competitive bids among domestic and foreign suppliers in order to focus on the technological levels of the suppliers in addition to price and quality. As well, buyers appeared to encourage contracted suppliers to trade with other buyers to deal with decreased demands and to learn new

technologies and management skills. Based on these changes, Lamming(2000) concluded that the relationship between buyers and suppliers, once a closed partnership before the economic recessions, was in transition to a more competitive and open relationship.

Based on observations made in existing studies and the changes experienced by the Korean automobile industry since the currency crisis, the paper will refer to the three factors that stimulated changes in customer scope; 1) the economic recession just after the currency crisis, 2) the increased foreign capital investment into domestic suppliers and 3) the suppliers' efforts to search for the optimal number of trading automakers due to the changed circumstances in supplying automobile components in Korea.

The Effects of Economic Recession

Domestic automobile industries suffered from an unprecedented plummet in domestic sales in 1998 just after the currency crisis, due to an economic slump and large layoffs. Automobile demand declined steeply by 48.5% yoy to 780 thousand units in 1998 from more than 1,500 thousand units in the mid 1990s. Even though the export of automobiles was expected to increase owing to the large depreciation of the Korean won, it merely increased by 3.4% yoy due to the downgrading of the nation's sovereign credit rating. The production of automobiles plummeted to 1.95 million units in 1998, recording a negative increase rate of 30.6% yoy from 2.82 million units in 1997. Accordingly, the sales revenue of components decreased by 25.6% yoy to 13.1 trillion won in 1998 from 17.7 trillion won in 1997.

Insert <FIGURE 1> here

It was anticipated that a decrease in the sales revenue of suppliers, caused by an economic slump, would result in an increase in the number of customers for suppliers. One of the reasons for this is that suppliers that suffer from decreased sales revenue might try to make contracts with other assemblers in order to offset decreased demands. Increasing the number of customers is a matter of survival for the suppliers. Also, assemblers might allow suppliers to make contracts with other assemblers in an economic recession because it is beneficial for automakers in terms of cost reduction because assemblers need not support a large network of suppliers and it also allows them to find lower priced and better quality supplies. Indeed, in the Japanese automobile industry, which has been in a slump since the early 1990s, suppliers tended to establish new relations with new customers to offset decreased component demands and assemblers tended to induce suppliers to make other contracts with other assemblers.⁵ With the factors mentioned above, we can draw the hypothesis as follows:

Hypothesis 1: To offset decreased sales revenue caused by the currency crisis, it is anticipated that suppliers will increase the number of assemblers.

The Effects of Foreign Capital Investment

The amount of capital investment of foreign suppliers into domestic suppliers has increased since the currency crisis. In the past, the types of investments have been minor equity investments or a technological alliance, but it has changed to the acquirement of management control through increased capital investments or through buying major equity. The main motives behind the expanded capital investment of foreign suppliers can be to increase their share in the Korean component market, the second largest market in Asia after the Japanese component market, and to secure a production base for Asia. Also domestic suppliers willingly accept foreign capital investment to handle liquidity squeezes and to deal with deteriorated business conditions.

Investment of foreign capital also allows domestic suppliers to learn advanced technologies and management skills.

Increased capital investment from foreign suppliers might induce domestic suppliers to increase the number of customers because foreign suppliers, which are independent from specific assembler, have stronger bargaining power when deciding the number of customers it wants than do domestic suppliers.

Though supplier relationships in the Korean automobile industry are generally closed and exclusive, the relationship is even more exclusive for affiliated suppliers who are connected with a specific assembler in a capital or human network. Affiliated suppliers are more inclined to make a contract with only their affiliated assemblers. Thus, the number of customers for affiliated suppliers is much less than that of general suppliers and the dependence of sales revenues of that specific assembler are high. A recent research indicates that a general supplier makes contracts with 2.89 customers on average while an affiliated supplier deals with 2.31 customers and also it suggests that more than 90% of sales revenue of affiliated supplier is from specific customer.⁶ However, many affiliated suppliers received capital investment from foreign suppliers after the currency crisis, and as a result, affiliated suppliers seemed to have gained independence from their assembler. Concluding, it has become easier for suppliers to provide components to other non-affiliated assemblers.

In addition, the weak bargaining power of suppliers is one of the reasons that domestic suppliers were restricted in selecting customers. Reality shows this, as domestic suppliers are inferior in scale and in technology, and have a deteriorated financial structure, and therefore have little bargaining power with automakers. However, foreign suppliers, which are independent from domestic assemblers and are superior in scale, technology and financial structure, likely, have stronger bargaining power than domestic suppliers. Thus, domestic suppliers, which have had capital investment from foreign suppliers, might be more inclined to make contracts with more than one assembler. With factors above, we can draw a hypothesis as follows:

Hypothesis 2: The number of customers is likely to increase if a domestic supplier receives capital investment from a foreign supplier.

The Effects of a Supplier's Search for the Optimal Number of Customers

In general, there are many benefits for a supplier to trade with multiple customers. These benefits, called "economies of customer scope", can be stated as follows.⁷ First, trading with multiple customers can allow suppliers to achieve economies of scale and scope. As the supplier is able to sell the same or similar components to many assemblers in large volumes it is able to utilize facilities, technologies and personnel to a greater extent. Second, a supplier with multiple customers enables them to have more learning opportunities. They receive various ideas and produce components suitable for various demands and therefore can supply various types of components by dealing with multiple assemblers. Also, since a supplier uses technologies already adopted by a specific assembler on other contracts, it can reduce costs or develop new technologies based on those experiences. Third, as a supplier develops multiple relationships with numerous assemblers, it can strengthen its bargaining power. This is because it can avoid threats by one assembler to unreasonably cut component prices by changing to other assemblers.

However, there are some negative side effects of trading with multiple customers. Firstly, it may be difficult to receive assistance in the areas of finance and technology from one assembler, as assemblers are usually afraid of the spillovers from their investment to other rival assemblers. Secondly, suppliers who deal with a number of customers are less attractive for assemblers to invest in relation-specific assets.⁸ A supplier with multiple assemblers may obtain more bargaining power, but the benefits of the relation-specific investments for the assembler are reduced due to weakened bargaining power. Therefore assemblers feel uneasy in making relation-specific investments in trading with suppliers that have multi customers. Such mechanisms are also not beneficial to suppliers since it is difficult to achieve the benefits of relations-specific

investments made by assemblers. Thirdly, increasing adjustment costs can be another negative factor in dealing with many assemblers. Adjustment costs, in this vein, mean the costs for information sharing and the communications costs between suppliers and automakers to develop new products and to enhance their quality.⁹ As competition becomes increasingly fierce in the automobile industry, more assemblers demand suppliers to participate in new product development by cooperating in component design. As a result, suppliers with multiple customers might be burdened with increasing development costs.

The factors mentioned above indicate that suppliers with multiple customers can gain benefits, as well as some negative effects that include difficulties in receiving assistance and assembler's less relation-specific investments, and an increase in adjustment costs. Therefore, it is not always beneficial to unilaterally increase or decrease the number of customers. Instead suppliers should choose the optimal number of customers by considering both aspects.

As the buyer-supplier relationship in Korea has been in transition since the currency crisis, there has been room for domestic suppliers to decide the optimal number of automakers rather than resort to an exclusive and closed relationship. As competition becomes fiercer in the domestic and global automobile markets, Korean assemblers tend to select suppliers in terms of price, quality, and technological level more than ever before. For example, since 1996, Hyundai Motor, the largest automobile company in Korea, has implemented competitive bids in the case of new model development when selecting its suppliers, and Kia Motors, the second largest automobile company, also planned to introduce competitive bids for component development for models developed from 1997. Also Korean assemblers have increased the introduction of new products. In fact, the period in which this paper examines, from 1996 to 1999, more than half the models in the Korean market were changed or newly developed. To be specific, among total 39 automobile models, which are on the market as of the end of 1999, 23 models or 59% are models that have been changed and newly developed during the period from 1997 to 1999. As a result,

suppliers have felt more burdened with the increased role in product development as automakers have asked suppliers to participate in the process. To sum up, we can draw hypothesis as follows:

Hypothesis 3-A: Korean components suppliers will choose the optimal number of customers rather than simply resort to a closed and exclusive buyer-supplier relationship owing to the changed circumstances in the Korean automobile industry.

In the process of choosing the optimal number of customers, the characteristics of components manufactured by suppliers are anticipated to affect the number of customers for each supplier. For the purposes of this paper, components are divided into two groups: standard and non-standard parts. Standard or commodity-like parts are components such as tires, batteries and wiper blades that can be multi-used and modularized. Multi-use means that a component is not customized for a particular customer's model and that it can be used in various customers' models. Modularization means here that there is a lower interdependency on other components during the development of new cars. Thus, suppliers making standard components adapt easier when producing for a new assembler and spend less on adjustment costs when they are involved in new product development with assemblers. Therefore, suppliers making standard components are expected to be involved with more customers than suppliers making customized parts.

Hypothesis 3-B: Suppliers producing standard components are likely to increase the number of customers more easily than suppliers making customized components.

<Figure 2> summarizes the hypotheses mentioned above as factors behind the changed customer scope of suppliers in the Korean automobile industry

<Insert Figure 2 here>

Empirical Analysis

Data

The subject of this research is to analyze the changes in customer scope of suppliers in the Korean automobile industry. Related sources can be found in the "Handbook of the Korean Automobile Industry," an annual publication by the Korea Automobile Industries Cooperation Association (KAICA). KAICA is an association composed of suppliers that supply components to the assemblers. The "Handbook of the Korean Automobile Industry" includes the name of suppliers, products they manufacture, the name of supplier's customers, and the sales revenue, net profit, total assets & capital of these suppliers during the past five years.

Among the 312 major domestic auto parts manufacturers listed in the "Handbook of the Korean Automobile Industry (2000 edition)," 202 auto parts manufacturers were selected as samples that could be used in the time series data analysis of this paper, which covered the period from 1996 to 1999. As this research focuses on analyzing the change in the number of assemblers that suppliers transact with, certain suppliers were excluded, which include those auto parts manufacturers that supply parts to other suppliers rather than to final assemblers, those that have shifted to other businesses, those that have closed their businesses, those that merged with other suppliers, and those that seceded from the KAICA during 1996 - 1999.

To observe the current state of capital investment by foreign auto parts suppliers, the "Current State of Capital Investment by Foreign Auto Parts Manufacturers" published by the KAICA at the end of October 2000 was examined. This publication includes the name of foreign

firms and domestic auto parts manufacturers that had received investment capital, the time of investment, and the invested amount. Based on calculations from the aforementioned information, it turned out that there were 48 cases of investment by foreign auto parts suppliers from 1997 to 1999. However, when combined with information regarding the 202 suppliers from the handbook, it turned out that we could use 18 cases of investment by foreign firms because of data consistency. Inconsistency of the data stems from the formation of new firms after the investment by foreign firms, separate sell-off of firms by unit of plant, and the withdrawal from KAICA after the foreign investment.

During the 1996-1999 period, the number of assemblers declined to 4 in 1999 from 7 in 1996. This was the result of increased mergers and acquisitions (M&As) between Hyundai Motor and Hyundai Precision, between Kia Motors and Asia Motors, and between Daewoo Motor and Daewoo Heavy Industries & Machinery. In order to maintain the time series of 1996 with that of 1999, assemblers that were separate affiliates in 1996 but were created as new companies through M&A in 1999 were counted as one company. The average and standard deviation of the major variables and the correlations are shown in <Table 1> below.

<Insert Table 1 here>

Estimation Model

In order to analyze the changes in customer scope of suppliers through regression analysis, the estimation model was set up following Nobeoka(1999)'s specification;

$$\begin{aligned} Y = & C + b_1 * \text{change in the rate of sales revenue of suppliers from 1997 to 1998} \\ & + b_2 * \text{dummy variable of capital investment of foreign suppliers} \\ & + b_3 * \text{the number of assemblers recorded in 1996} + b_4 * \text{dummy of standard component} \\ & + b_5 * \text{major customer dummy 1 (Hyundai Motors)} \\ & + b_6 * \text{major customer dummy 2 (Daewoo Motors)} \dots\dots\dots(1) \\ & + b_7 * \text{major customer dummy 3(Kia Motors)} \\ & + b_8 * \text{size of supplier} + u \end{aligned}$$

where Y is the dependent variable, which refers to the change in the number of assemblers of suppliers from 1996 to 1999. C refers to a constant term, b_i ($i = 1, 2, \dots, 8$) estimated coefficients, and u is an error term.

The definition of each variable is as follows. For each supplier, the change in the number of assemblers is defined as follows;

$$\begin{aligned} \text{The change in the number customers} = & (\text{number of customers in 1999} - \text{number} \\ \text{Of customers in 1996}) / & \text{number of customers in 1996} \dots\dots\dots(2) \end{aligned}$$

According to this definition, the difference will be increased when suppliers trade with small number of assemblers in 1996. The reason that this type of definition is used is because when suppliers, which had been dealing with a small number of assemblers, increase the number of assemblers they deal with, it will have a much bigger impact on the transaction structure.

The first independent variable, the rate of change in sales revenue for suppliers during 1997-1998, refers to a variable that shows the degree of the domestic economic recession right after the currency crisis. As aforementioned, it is generally expected that suppliers would increase the

number of customers in order to survive the recession brought on by the currency crisis. As most suppliers record negative rates in their sales revenues in times of recession, it is generally expected that the estimated coefficient of this variable would mark a negative figure. This implies that as their sales revenue decline, auto parts suppliers tend to increase the number of assemblers they transact with.

The second independent variable refers to the amount of capital investment by foreign firms, which is a dummy variable that indicates whether domestic suppliers received foreign capital or not. As explained in hypothesis 2, suppliers that received foreign investment would tend to increase the number of customers they deal with, which implies that the estimated coefficient would record a positive figure.

The third independent variable refers to the number of customers that suppliers deal with in 1996. This variable measures whether suppliers optimize the number of automakers they deal with. If the suppliers optimize the number of customers, considering the change in the auto parts transaction environment, then the suppliers that had less assembler than the optimum level in 1996 would increase their number of assemblers. Conversely, those that had more assemblers than the optimum level in 1996 would decrease the number they dealt with. That is, when the suppliers optimize the number of their assemblers, the number of customers they dealt with in 1996 and the change of customers during the period from 1996 to 1999 would record an opposite sign. Accordingly, the estimated coefficient of this variable is expected to post a negative figure.

The fourth independent variable, which refers to standard components, demonstrates the characteristics of the auto parts. The independent variable equals 1 if the auto part is standard one and 0 if they are not standard. Since it is easier for suppliers making standard parts to make transaction relationships with new customers than suppliers producing non-standard parts as explained in the hypothesis, it is estimated that the estimated coefficient of the standard parts will record a positive figure.

Additionally, in order to make clear the effects of independent variables as shown in the hypothesis, some control variables were used. First, the "dummy of major customer of suppliers" is chosen as a variable since it moderates the effects that can result from the differences of major customers, such as parts procurement strategy, scale, technology etc. The major customer that suppliers deal with was designated according to the weight of these suppliers' transactions with the customers. The four major domestic assemblers were Hyundai Motor, Daewoo Motor, Kia Motors, and SsangYong Motor. Among them, SsangYong Motor, the smallest company, was placed as the standard dummy. Finally, as for the "size of suppliers," this was used in order to correct the change in the customer scope that could be brought on by the difference in the size of suppliers. Here, the size of suppliers based on the total asset volume in 1999 was set as the proxy variable.

Estimation Results

Ordinary Least Squares (OLS) method was used to test the aforementioned estimation model (1). The results of which were shown in <table 2>.

First, it turned out that the estimated coefficient of the change in the rate of sales revenue of suppliers caused by the economic recession, recorded a negative figure that is statistically significant. This implies that the decline in the amount of sales revenue of suppliers caused by the currency crisis contributed to the increase in the number of customers that the suppliers dealt with.

In the case of the effects of foreign capital investment, a negative figure was recorded, but it was not as statistically significant. In other words, this means that the capital investment by foreign firms into Korean suppliers did not affect the changes in the number of customers that domestic suppliers deal with. A detailed explanation of the above results will be examined in the next chapter.

<Insert Table 2 here>

The number of automakers in 1996 turned out to have a negative figure and was statistically significant. This implies that suppliers, which had secured less automaker than the optimum level in 1996, had increased the number of automakers they deal with, and also that those securing more automakers than the optimum level in 1996 decreased the number they deal with. In addition, the dummy variable of standard parts marked a positive figure and was statistically significant, which means that suppliers producing standard parts had increased the number of customers they dealt with compared to those that did not.

The size of supplier was statistically significant and was a positive figure. That is, the bigger the size of company, the bigger they increase the number of customers that suppliers deal with. However, it turned out that the estimated coefficients of the major customer posted different figures according to the models, and also were statistically insignificant.

Finally, the multicollinearity among independent variables that arose in the regression analysis was examined. The variance inflation factors (VIF), one of the indices measuring multicollinearity, turned out to have a range from 1.03 to 1.22 against each independent variable, which means that the degree of multicollinearity was very low.

Discussions

Among the results of the empirical analysis, the results of two of the variables need to be discussed in more detail. The first variable to be discussed is that of capital investment by foreign firms, which, contrary to the hypothesis, recorded a negative figure and turned out to be statistically

insignificant. The second variable to be discussed is the change in the number of customers that suppliers deal with according to the characteristics of components.

Effects of Investment by Foreign Firms

Although the hypothesis expected that the foreign capital investment in domestic suppliers would bring about the increase in the number of customers that suppliers deal with, the empirical results showed that it did not. In order to examine the factors of the results, domestic suppliers in which foreign capital investment was invested in and to those in which foreign capital investment was not invested in were divided, and a comparison was made between the two groups in 1996 before foreign firms invested.

In terms of the average number of customers suppliers dealt with, it turned out those suppliers that had received foreign capital investment in 1999 dealt with an average of 2.5 customers in 1996. While suppliers with no foreign investment in 1999 dealt with an average of 2.01 customers in 1996, that is, suppliers without foreign investment had smaller customers by 0.49 than that of suppliers with foreign investment. In terms of a cumulative ratio of suppliers that dealt with two or less automakers, suppliers that received capital investment from foreign firm accounted for 38.9% of total suppliers, while those without foreign investment posted much higher at 67.4%

The above figures show that foreign firms increased their investment in domestic suppliers that had already secured many customers in 1996. That is, the number of customers for the suppliers is not increased by the investment of foreign firm, but the foreign firms invest suppliers that have many customers.

The main reason that foreign firms invested capital into domestic suppliers that already had dealings with many automakers was because, considering the closed and exclusive automaker-suppliers relationship in Korea automobile industry at that time, they found that they faced more

difficulty in receiving sales increases and business expansion when they invested into domestic suppliers that dealt with only a few automakers.

<Insert Table 3 here>

Effects of Characteristics of Components

At a glance, for suppliers producing standard parts, the number of customers increased from 2.29 in 1996 to 2.54 in 1999. On the contrary, for suppliers that produce non-standard auto parts, the number of automakers increased by a mere 0.02 from 2 in 1996 to 2.02 in 1999.

Closely examining the changes of the number of customers that standardized auto parts suppliers dealt with during the 1996-1999 period, showed that those that were dealing with 1 customer showed no change, but those that were dealing with two customers increased the number of customers by 0.47. Furthermore, those that were dealing with three customers increased the number by 0.07. Such increases seem to be due to the fact that the increase in the number of customers that suppliers dealt with does not necessarily accompany the significant increase of costs in participating in new product development, when considering the characteristics of standard parts.

<Insert Figure 3 here>

In the case of suppliers producing non-standard parts, those that were dealing with one customer increased the number of their customers by an average of 0.19. While those that were dealing with two customers in 1996 saw the number of customers they dealt with decline by 0.08, and those that were dealing with three declined by 0.04. These results imply that the increased burdens of participating in new product development deterred suppliers making non-standard parts from maintaining existing customers.

Conclusion

To summarize the trend in the auto parts transaction structure of the Korean automobile industry, during the period from 1996 to 1999, the average number of customers that suppliers dealt with increased. This result implies that the previous closed and exclusive relationship between the two parties had considerably eased. However, in some cases, the number of customer declined, which also means that the number of customers had not increased in a unilateral manner.

For the factors that this research focused on, it turned out that the recession of the domestic economy, right after the currency crisis, affected the increase in the number of customers. The hypothesis, which presumed that suppliers would increase the number of customers they deal with in order to overcome a recession, turned out to be true. In contrast, capital investments by foreign firms, contrary to the hypothesis, did not have much influence on the domestic auto parts transaction structure. It turned out that foreign firms invested in domestic suppliers that already dealt with many customers. Furthermore, it turned out that suppliers optimized the number of customers they dealt with according to the change in the auto parts transaction environments. As competition among suppliers intensified and the requirement of customers to participate in the development of new cars increased, suppliers adjusted the number of automakers they dealt with to an optimum level. Finally, auto parts manufacturers that produced standard parts increased the number of customers they dealt with more than those that did not.

From the results of this analysis, there can be several recommendations towards suppliers' strategy and government policy for the buyer-supplier relations. First, a closed and exclusive buyer-supplier relationship has negative effects on foreign capital investment. As was clearly manifested in the discussion issues, foreign companies tended to invest in suppliers that dealt with many customers. In order to get foreign capital, suppliers are necessary to ease the practice that maintains closed and exclusive buyer-supplier relations. But it is recommended that they

strengthen the capability of engineering in product development to expand customer scope because increasing customers without product development capabilities may cause additional cost.

Second, auto parts transaction strategy and policy should differ according to the characteristics of auto parts. As can be seen in the analysis results, suppliers select an optimal number of customers according to the characteristics of the auto parts. Government policy should not focus on increasing or decreasing the number of customers unilaterally, but should provide an environment that allows suppliers to freely select customers that they want to deal with. For suppliers, they should take into consideration the characteristics of parts they produce in selecting their customers.

The limitations of the paper's analysis are as follows. First, as only a partial number of foreign firms were included in the analysis in order to maintain the time series data, a bias in the sample may have been generated in the process of data selection. Second, as there have been restrictions regarding the time period of analysis, the effects of foreign capital investment may not have been properly reflected. The effects of foreign capital investment on the auto parts transaction structure may take a longer time to analyze. Lastly, as the coefficient of determination had a low figure, there could be other factors not measured in this study that could explain the change in the scope of customers of suppliers in the Korean automobile industry.

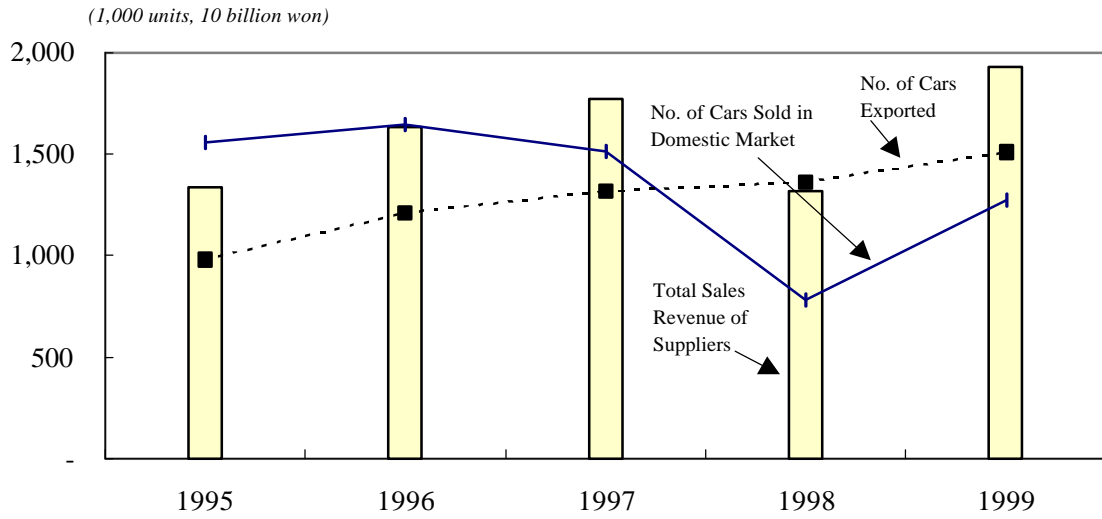
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FIGURE 1. Supply and Demand in Korean Automobile Industry since the Currency Crisis



Source: Korea Auto Industries Coop. Association (2000), Korea Automobile Manufacturers Association (2000)

Figure 2. Hypothesis on the Changes in Customer Scope of Suppliers in Korean Automobile Industry

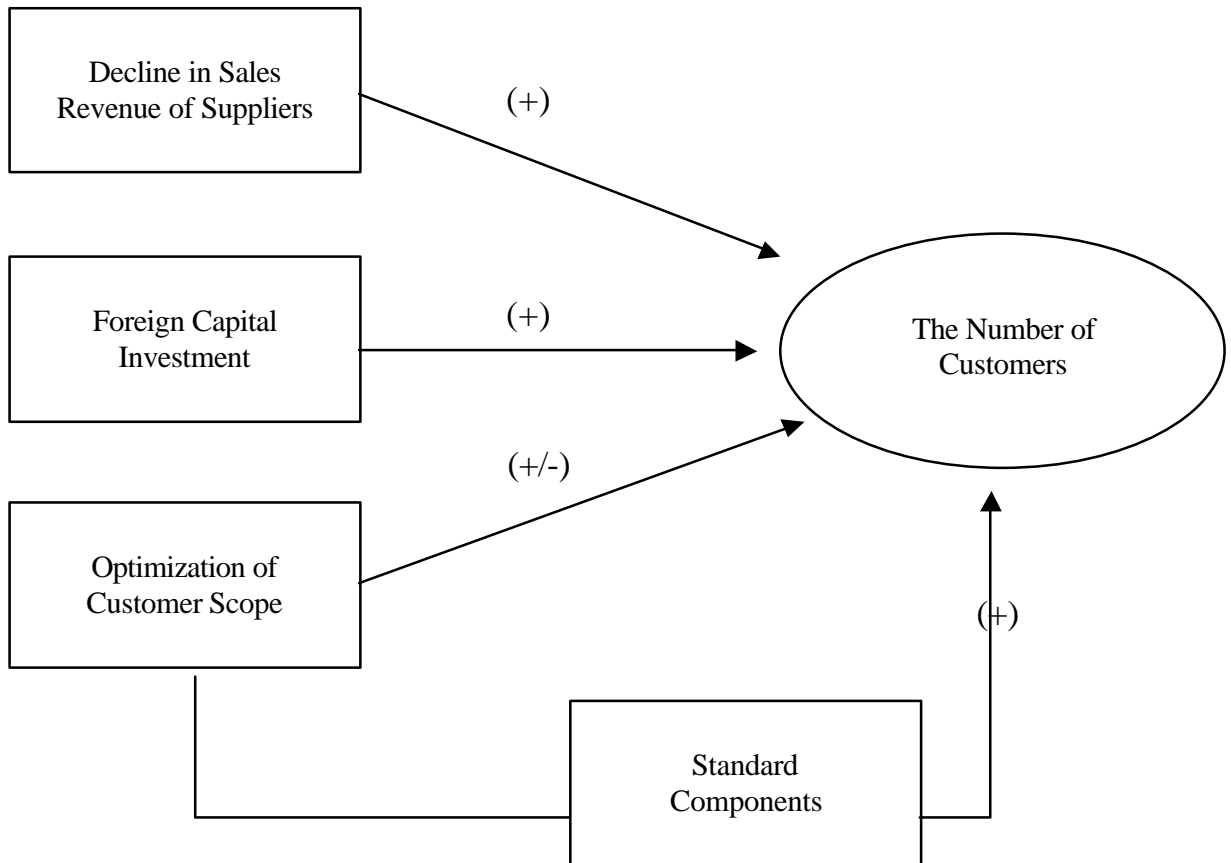


TABLE 1. Correlation Matrix

Variable	Average	Standard Deviation	1	2	3
1. Difference of the Number of Automakers that Suppliers Deal With between 1996 and 1999	0.06	0.32	-		
2. Number of Automakers Dealt in 1996	2.05	0.83	-0.24 ***	-	
3. Rate of Change in Sales Revenue of Suppliers from 1997 to 1998	0.07	3.89	0.16**	0.08	-
4. Asset Size of Supplier (10 billion won)	4.27	6.46	0.21***	0.14***	0.04

Note: ***statistically significant at the 1% level

** statistically significant at the 5% level

TABLE 2. Results of Regression Analysis

Independent Variable	Model 1	Model 2	Model 3
Constant	-0.11(0.82)	-0.10(0.74)	0.13(0.88)
Major Automakers Dummy 1: Hyundai Motor	0.13(0.93)	0.12(0.87)	0.08(0.57)
Major Automakers Dummy 2: Daewoo Motor	0.06(0.42)	0.05(0.33)	-0.02(0.11)
Major Automakers Dummy 3: Kia Motors	0.21(1.44)	0.19(1.34)	0.12(0.89)
Size of Supplier	0.01(2.82)***	0.01(2.91)***	0.01(3.56)***
Change in the Rate of Sales Revenue of Suppliers (1997-1998)	-0.01(2.24) *	-0.01(1.96)*	-0.01(1.74)*
Capital Investment by Foreign Supplier Dummy		-0.07(0.78)	-0.05(0.57)
No. of Automakers in 1996			-0.10(3.78)***
Standard Parts Dummy			0.10(1.85)*
Adjusted R-Square	0.07	0.07	0.14

Note: 1. *** refers to 1% significant level, ** of 5% and * of 10%, respectively.

2. The figure in the parenthesis next to the regression coefficient refers to t-value

TABLE 3. Number of Customers that Foreign Capital-Invested Suppliers deal with in 1996

Classification	Average No. of Automakes	No. of Automakers				Total
		1	2	3	4	
Foreign capital invested suppliers	2.50	3(16.7)	10(94.4)	10(94.4)	1(100)	18
Suppliers Not Invested with Foreign Capital	2.02	60(32.6)	59(99.5)	59(99.5)	1(100)	184

Note: Figures in the parenthesis refer to the cumulated ratio

FIGURE 3. Changes in Customer Scope according to the Characteristics of Components

Change in the No. of Automakers from 1996 to 1999

