

**The Influence of Customer Scope on Supplier Learning
and Performance in the Japanese Automobile Industry**

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ABSTRACT

Most studies on Japanese supplier-automaker relationships have focused on the nature of the dyadic inter-firm relationship and the performance of the assembler. We examine the relationship between a Japanese supplier's "customer scope strategy" (i.e. number of customers) and the supplier's performance. By analyzing data on 125 suppliers, we found that a supplier with broad automotive customer scope tends to be more profitable and is better off with *less* exclusive ties. This relationship held even after controlling for supplier size, product type, and the underlying competitiveness/efficiency of each supplier. We argue that a broad customer scope strategy leads to superior performance primarily due to learning opportunities. This finding highlights a key liability of vertical integration since integration of inputs often limits the ability of in-house divisions to access new customers. However, there is a limit to the advantages of a broad customer base, since sales to "unrelated customers" (e.g., non-automotive) did not have a significant impact on performance. In short, there appear to be diminishing returns to customer scope as suppliers add "dissimilar" customers with requirements further from their core knowledge domain. Thus, these findings offer empirical support for the knowledge based view of the firm which suggests that the efficient boundaries of firms are driven by knowledge domains/considerations. Our findings also suggest that studies that focus only on the advantages of long-term cooperative relationships may be misleading if interpreted to mean that an exclusive supplier-assembler relationship is the optimal solution for the supplier. (Key Words: Organizational Learning; Knowledge-Based View; Japanese Supplier Relations).

Introduction

The formation of partnerships between firms has been described as an increasingly important way for firms to develop and maintain competitive advantage (Nishiguchi, 1994; Mohr & Spekman, 1994). Indeed, “Japanese style” alliances have been heralded as a critical source of competitive advantage for large Japanese assemblers (Clark & Fujimoto, 1991; Gerlach, 1992; Dyer & Ouchi, 1993; Nishiguchi, 1994). In particular, numerous studies have emphasized the advantages of long-term, cooperative partnerships in Japan, comparing them with arms-length relationships in Western industry (Abernathy, Clark and Kantrow, 1983; Cole and Yakushiji, 1984; Cusumano, 1985; Asanuma, 1989; Womack et al, 1990; Clark and Fujimoto, 1991; Nishiguchi, 1994; Helper and Sako, 1994; Dyer, 1996a). The literature has suggested that cooperative supplier-assembler relationships in Japan outperform their U.S. counterparts by sharing more information, investing in relation-specific assets, and minimizing transaction costs. These studies have also implied that cooperative supplier-assembler relationships are supported by the Japanese keiretsu system wherein suppliers have highly exclusive relationships with particular assemblers (Lincoln, et. al., 1992; Dyer and Ouchi, 1993). To date, most studies on Japanese supplier-assembler relationships have focused on the nature of the inter-firm relationship and the benefits to the assembler of managing suppliers in a particular way (e.g., as partners). However, despite the extensive list of studies on the nature of dyadic inter-firm relationships, the flip side of this relationship (i.e. the supplier’s customer strategy and performance) has rarely been considered or examined.

This paper examines the relationship between a supplier's "customer scope strategy" (i.e. the number of customers it has and proportion of business to each customer) and the supplier's performance. In developing a customer scope strategy, suppliers face the following dilemma: "As a supplier am I better off selling 1/4 of my output to four different customers, or am I better off achieving the same sales volume by concentrating on a single customer and selling 100 percent of my output to that customer?" Past researchers have found a positive relationship between cooperative inter-firm relations and both automaker and supplier performance (Cusumano and Takeishi, 1991; Helper and Sako, 1994; Nishiguchi, 1994). Indeed, a supplier with a single customer will presumably find cooperation easier with that customer (when compared to a supplier with four competing customers) because the customer does not have to worry about knowledge spillovers to competitors through the supplier. These types of exclusive supplier-assembler relationships are believed to be critical for enabling Japanese firms to achieve the cooperation necessary to realize high levels of performance.

However, as recent studies have suggested (Takeishi and Cusumano, 1995; Dyer, 1996b), the emphasis on cooperative supplier relationships and the notion of the keiretsu group sometimes leads to a misunderstanding that there are exclusive one-to-one relationships between assemblers and suppliers in the Japanese automobile industry. In reality, many suppliers sell their components to multiple competing automobile manufacturers (Nishiguchi, 1994; Nobeoka, 1995), and auto manufacturers also buy most components from multiple suppliers (Itami, 1988; Richardson, 1993). Therefore, there is a

complicated network consisting of multiple automobile competitors and component suppliers with respect to transactions.

From this perspective, some researchers have found that multiple sourcing is common and could be beneficial to assemblers in the Japanese automobile industry (Itami, 1988; Asanuma, 1989; McMillan, 1990; Martin, et. al., 1995; Nobeoka, 1995). The literature suggests that leading Japanese auto assemblers might have the ability to maintain cooperative relationships with each supplier, while at the same time enjoying benefits from supplier competition. This proposition contrasts with the notion of Japanese auto assemblers maintaining a cooperative relationship with suppliers through a quasi-hierarchical industry structure. Our study explores similar issues but from a supplier's perspective. The underlining premise is that some suppliers may realize superior performance by developing a highly cooperative and close relationship with multiple customers simultaneously.

The paper is organized as follows. In section 1 we discuss a conceptual framework that hypothesizes specific benefits of customer scope. We also hypothesize that the ability to realize these benefits will diminish as the needs of incremental customers become more dissimilar from existing customers. Section 2 explains the research design, sample, and operational measures. In section 3 we present the results from our analysis of data from 125 component suppliers in Japan. The results indicate a positive relationship between customer scope and supplier performance although there appear to be diminishing returns to customer scope as suppliers add "dissimilar" (i.e. non-automotive) customers with

requirements further from their core knowledge domain. Section 4 discusses the results from the data analyses and offers implications for management.

1. Theoretical Discussion: The Benefits of Customer Scope

There are a number of benefits that a supplier may realize by adopting a broad customer scope strategy. These benefits can be divided into three types: (1) learning opportunities, (2) economies of scale, and (3) bargaining power.

Learning Opportunities

First, firms with more customers will have more diverse opportunities to learn. Various scholars have recognized that *interorganizational* learning is critical to competitive success, noting that organizations get ideas and “learn” by observing and importing the practices of other organizations (March & Simon, 1958:188; Von Hippel, 1988; Levinson & Asahi, 1996). For example, Von Hippel (1988) found that in some industries he studied, a firm’s customers were its primary source of innovative ideas. This is particularly relevant in Japan where Nishiguchi (1994) found that the most important sources of technical knowledge for Japanese electronics and automotive suppliers were the suppliers' customers, *not* the suppliers' internal R&D units. Indeed, Japanese automakers purposefully create interorganizational routines designed to facilitate knowledge transfers between the automaker and its suppliers. For example, most Japanese automakers have established supplier associations and internal consulting teams with the explicit objective of facilitating interorganizational learning. Sako's (1994) and Fruin's (1992) studies suggest that supplier associations are an important vehicle through which Japanese firms receive technology

transfers and ideas. Moreover, Lieberman et al (1997) found that suppliers that were involved in supplier associations, particularly Toyota's, had higher productivity than suppliers who were not. Consequently, suppliers that deal with multiple customers may be able to add value to, or reduce the production costs of, the products they supply to a particular customer based on information (technologies and processes) acquired from other customers. Thus, we would expect suppliers that transact with many customers to have more opportunities for learning, and therefore be more productive and profitable, than suppliers that deal with few customers.

In addition, an assembler may choose to purchase components that have already been tested by other assemblers, other conditions being equal. In this case, an assembler may be willing to pay a premium to a supplier for quality assurance that the supplier has acquired through testing the product with other customers. In addition, there are distinct benefits for customers buying components that have already been tried out by other buyers. As a Toyota manager noted in an interview, Toyota can simplify its internal testing procedures when a component has already been used by some other assemblers in the market (Interview, April 1997).

Finally, a supplier with many customers may develop capabilities at managing inter-organizational transactions better than single-customer suppliers (Martin, et. al., 1995). For example, a supplier may develop negotiation skills that allow it to extract a greater percentage of the profits through its experience in negotiating with multiple customers. Relationship-management capabilities are critically important to suppliers and are difficult

to develop (Eccles, 1981; Heide and John, 1990). The ability to develop a broad customer base provides a supplier with more chances to develop these types of relationship-management capabilities than those that follow a single-customer strategy.

Economies of Scale

Second, a broad customer base may provide suppliers with more opportunities to capture benefits from scale economies. Figure 1 explains the way customer scope may lead to economies of scale in a simplified model that compares a broad customer-scope strategy with a single-customer strategy. In the customer-scope strategy, the supplier sells Component A to three different customers with minor modifications made to adjust to each firm's needs.

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Figure 1
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This model assumes that Firm 1 wants to buy only a limited amount of component A from this supplier. Therefore, if the supplier follows a single-customer strategy and wants to achieve the same amount of total sales, it needs to sell three different components to the single customer. Otherwise, the supplier will be able to sell only one third of the amount, if it only sells Component A to firm 1. Because the supplier can sell similar components to multiple customers with the broad customer scope strategy, it can enjoy economies of scale unavailable to the supplier with a single customer strategy. Of course, the supplier with a single customer strategy may attempt to increase its sales volume by selling multiple products to the same customer. This may be a rational strategy, but given the need to diversify into new product domains the single-customer supplier will be at a scale

disadvantage relative to the supplier selling a similar product (with perhaps some minor variations) to multiple customers.

The competitive environment in many industries, including automobiles, has experienced increasingly rapid technological and environmental changes which have shifted the nature of market demand toward increased product variety (Stalk and Hout, 1990; Wheelwright and Clark, 1992; Pine, 1993; Sanchez, 1995). In the automotive industry, the end-customer has demanded increased product variety and automakers have responded by increasing the number of different models they produce (Clark & Fujimoto, 1991). Consequently, as product demand has become more diversified, small orders from an assembler have been increasing. In this environment, there is a greater need than before for suppliers to achieve scale economies by supplying similar components to multiple assemblers. This may be one strategy for achieving the benefits of “mass-customization,” which Pine (1993) and Kotha (1995) have discussed.

Finally, suppliers with a broad customer scope strategy may realize scale advantages because they have greater opportunities for growth (and hence, size/scale). Single-customer suppliers are constrained by the growth of that particular customer whereas suppliers with many customers can tap into the growth opportunities of multiple customers. Thus, suppliers with many customers have diversified growth opportunities which are likely to increase the scale and scope of their operations.

Bargaining Power

Finally, a supplier with a broad customer scope tends to have more relative

bargaining power with each customer because it is less dependent on a single customer for its profitability (Porter, 1980; Cowley, 1988). A supplier with many customers will find it less important to give into customer demands (e.g., for price decreases) because the loss of a single customer has less impact on total sales and profits. It is easier for the supplier to refuse/walk away from less profitable business when other opportunities are available from other customers.

Because of the factors discussed above, this study hypothesizes a positive relationship between a supplier's customer scope and its performance. Specifically, we hypothesize a positive relationship between a supplier's customer scope (i.e. number of customers) and the supplier's profit performance. Stated another way, we expect a negative relationship between customer concentration and supplier performance.

Hypothesis 1: There is a positive relationship between the number of automotive customers an automotive supplier has, and the supplier's performance.

Diminishing Returns to Customer Scope

Although we expect an automotive supplier to generate value from attracting an incremental customer due to learning, scale, and bargaining power, the ability to realize these benefits will diminish as the needs of incremental customers become more dissimilar from existing customers. This argument is related to the nature of the firm and its efficient boundaries. Recently, scholars have argued for a "knowledge-based" view of the firm, suggesting that firms exist in large part due to the firm's superior ability (relative to markets) to create, transfer, and recombine knowledge (Conner, 1991; Kogut & Zander,

1992; Conner & Prahalad, 1996; Grant, 1996). However, knowledge is costly to “produce, maintain, and use” (Demsetz, 1988:177). The costs of internalizing or organizing exchanges are directly related to the “dissimilarity of transactions” or knowledge (Coase, 1952 [1937]: 342-343; Poppo & Zenger, forthcoming). Presumably, more similar transactions are those activities that are co-specialized and share common routines, language, and knowledge domains with other activities. As Conner (1991:141) argues, “the scale and scope of the firm...depends critically on the degree to which new undertakings actually are specific to the firm’s existing asset [knowledge] base. It is such ‘relatedness’ that provides opportunity for the gains from generating new, redeployable resources...”

Thus, we would expect diminishing returns to customer scope as suppliers add customers with requirements that are different from existing customers (e.g., customers in different industries). For example, in the automotive industry we would expect the knowledge that automotive suppliers obtain from non-automotive customers to be less valuable in servicing existing automotive customers. Furthermore, as the products produced for additional customers become more dissimilar (due to different customer needs) the supplier will not be able realize significant benefits from economies of scale. Thus, we hypothesize that adding “related” customers may have a positive relationship with performance, while additional “unrelated” customers will have a less significant impact on performance. In the latter case, the potential advantages of customer scope discussed earlier such (i.e. learning and scale) are less applicable. In addition, there is some evidence indicating that diversification into unrelated businesses could have a negative influence on

profit performance (Rumelt, 1982).

Hypothesis 2: There are diminishing returns to customer scope as suppliers add customers with needs further from their core knowledge domain (e.g., outside automotive). Thus, an incremental unit of sales to a non-automotive customer will provide less of a performance benefit than an incremental unit of sales to an automotive customer.

2. Sample and Variables

To analyze the relationship between a supplier's customer scope strategy and performance, we used a publicly available database (Japanese Automotive Parts Industry Association, 1995) which contained data on 348 major automotive component suppliers. The Japanese Automotive Parts Industry Association (JAPIA) is the primary industry association of automobile component suppliers in Japan. Therefore, we believe that this database is highly reliable because the data are provided directly by the suppliers and the accuracy of the data is monitored by JAPIA.

Among those suppliers covered in the database, complete data as needed in this study are provided for only 164 suppliers. Since this study focuses on the supplier's relationship with vehicle assemblers as direct customers, it further excludes suppliers that do not have more than 50% of total sales to vehicle assemblers. For example, Matsushita Electronic Component Co. in the database sells only 14% of its products in the automobile industry. This would not be a problem if we could obtain performance data for Matsushita's automotive component businesses; but we only have performance data for Matsushita as a corporation which includes a variety of diversified businesses. Regarding the 50% cut-off point, we have tested the sensitivity of the analysis using several alternative percentages,

such as 40%, 60%, 70%, and 80%. The sensitivity analysis did not change our results or conclusions. We also chose the cut-off point at 50% because we wanted suppliers where the automotive industry would be considered as their core business, whereas non-automotive would be considered as non-core. The final number of suppliers in the sample was 125, all of which are listed in Appendix 1.

This study used the profit performance of suppliers as the dependent variable measuring supplier performance. More specifically, we used the annual ordinary pre-tax profit divided by sales in the fiscal year ending in 1994. Independent variables are also measured for the same time period.

Customer Scope

This study primarily focuses on automobile assemblers (OEM's) as the customers. Customer scope is measured by two alternative variables: the absolute number of OEM customers and a Herfindahl index of customer concentration. There are seven groups of automobile assemblers in Japan: namely, the Toyota group, the Nissan group, Honda, Mitsubishi, Mazda, Suzuki, and Isuzu. The Toyota group includes Toyota, Daihatsu, Hino, Toyota Auto Body, Kanto Auto Works, and Araco, all of which assemble complete vehicles for Toyota. The Nissan group includes Nissan, Fuji Heavy, Aichi Machine Industry, Nissan Shatai, and Nissan Diesel Motor. For simplicity, this study considers these firms as seven independent assemblers, although Toyota and Nissan are actually groups of assemblers.

The first measure of customer scope is a simple count of customers, the number of

assemblers out of the seven. Although a simple count of customers provides one measure of customer scope, it does not fully capture a customer's dependence on its main customers which is captured with the Herfindahl index. The Herfindahl Index was calculated by using the percentages of a supplier's sales to each assembler among the seven. Total percentages of these seven assemblers were re-scaled to add up to 100% (actual percentages could be lower than 100% if a supplier sold to other automotive suppliers or non-automotive customers). The Herfindahl Index and the number of customers naturally have a strong correlation ($r=-.88$; see Table 1). This study hypothesizes that the simple count of customers will have a positive relationship with supplier performance, while the Herfindahl index will have a negative relationship with supplier performance.

We also defined two other types of customer scope variables. First, some suppliers sell components to other automobile suppliers in addition to the seven automobile assemblers. Second, some suppliers also sell components to non-automobile customers. We calculated ratios of these two types of sales out of total sales. We define the first as a "related-customer ratio," which is a ratio of supplier's sales to other automobile suppliers divided by total sales. The second is an "unrelated customer ratio," which is a ratio of a supplier's sales to non-automotive firms divided by total sales. As mentioned earlier, because suppliers that do not primarily deal directly with auto assemblers are excluded from the sample, a sum of the related-customer and the unrelated-customer ratios does not exceed 0.5. We would expect the related customer ratio (percent sales to other automotive suppliers) to have a significant positive relationship with performance while the unrelated

customer ratio (percent sales to non-automotive customers) to have a less significant relationship on performance than the related customer scope measures.

Control Variables

A major challenge in this research was to capture the actual relationship between customer scope and supplier performance by controlling for other factors. Consequently, we included several control variables. These variables include a supplier's scale, the idiosyncratic influences from specific customers, primary product groups, and the underlying competitiveness/efficiency of each supplier. The control variables regarding a supplier's underlying competitiveness are particularly important because these variables could be common causes of both customer scope and a supplier's profit performance. For example, suppliers with innovative products may attract many customers and achieve considerable size and scale which in turn is likely to lead to high levels of profitability. In this case, the relationship between customer scope and a supplier's performance could be a spurious one.

First, suppliers were divided into three sub-industry categories depending on the primary type of products they manufacture: electronics, non-metal or plastic molded parts, and others (primarily mechanical parts). It may be the case that certain types of products (e.g., electronics) may be higher value added and inherently more profitable than others. These variables are included as dummy variables to control for the effects of product type.

Second, a "customer proportion" variable measures the ratio of a supplier's sales volume to each customer divided by total sales to the seven assemblers: Toyota, Nissan,

Mitsubishi, Honda, Mazda, Suzuki, and Isuzu. The idiosyncratic nature of each assembler (e.g., differences in supplier-management practices) could influence a supplier's performance. For example, a large proportion of sales to a price-sensitive customer may have a negative influence on a supplier's profit performance (Porter, 1980). Because these seven assemblers add up to 100%, our regression models include dummies for six of the seven assemblers.

Third, the total sales of each supplier is included to control for scale effects, which would be expected to have a positive influence on the supplier's performance. The scale variable also could be a common cause of both customer scope and supplier performance, thereby creating a spurious relationship between the two variables tested in this model.

Finally, we try to control for variables with respect to the underlying competitiveness of a supplier. To control for a supplier's underlying efficiency (i.e. labor productivity) we include a proxy of labor efficiency which is the supplier's sales divided by the number of employees (sales per employee). We also use each supplier's sales growth in the past four years as a proxy of the underlying market competitiveness of the firm's products. We would expect both of these variables to have a positive influence on a supplier's performance.

3. Results

Table 1 shows descriptive data and correlation matrices for the variables used in this study. The average profit-sales ratio (ROS) for suppliers in the sample is 2.2%. Sales proportions for each customer are comparable to the actual total production volume of each

customer in Japan, which indicates that the sample is representative of the population of suppliers in Japan. On average, a supplier sells to 2.40 automaker customers and 14% of a typical supplier's sales are to other automobile component suppliers while 8% are to non-automotive customers. Therefore, on average, the seven assemblers are responsible for 78% of a supplier's sales.

Table 1

Table 2 shows the results from OLS regression analyses on supplier performance. Models 1 and 2 do not include the supplier competitiveness variables. Models 1 and 3 use number of customers as the customer scope variable, while Models 2 and 4 use the Herfindahl Index. As can be seen in Figure 2, the customer scope variables have, as predicted, a significant positive relationship with supplier performance in all models, *even after controlling for other factors that may influence profitability*. An increase in one automaker customer is associated with a .4% increase in ROS, which represents a roughly 20 percent increase in profitability. The two customer scope measures are highly correlated and seem to be roughly equivalent predictors of supplier profitability.

Table 2

The related-customer ratio also had a positive and significant influence on supplier performance. This result indicates that in addition to a broad customer scope among auto assemblers, diversified sales to other automotive suppliers also has a positive influence on supplier performance. Thus, the data offer strong support for hypothesis one.

Also in line with our predictions, we found that the unrelated-customer ratio had a much less significant relationship with performance. Although the relationship between unrelated customer and performance was positive, it was not significant and had a very low correlation (.04) with profitability. These findings indicate that non-automotive customers are less valuable to suppliers than are automotive customers. Thus, these findings support the idea that dissimilar customers are less valuable than related customers.

Surprisingly, a supplier's scale, as measured by sales, did not have a significant influence on performance in the multivariate analysis. This result implies that a high absolute level of sales does not necessarily lead to high profits and that the positive effects of customer scope on supplier performance are independent of scale/size. In this analysis, we need to be careful about a possible multi-collinearity problem between the two independent variables: customer scope and total sales. The customer scope variables do have some correlation with total sales; however, we do not believe that a significant multi-collinearity problem exists for the following two reasons. First, tolerances for total sales and customer scope variables are both above 0.7. Second, the correlation matrix in Table 1 shows that although the sales variable has a weak positive relationship with our customer scope variables (number of customers and the Herfindahl Index), there is a strong relationship only between the customer scope variables and performance, but not between total sales volume and performance.

Among the customer proportion variables that are used to control for the idiosyncratic influence of each customer, suppliers that sell more to Honda, and to a lesser

extent Toyota, tend to make higher profits. Most automobile experts agree that Honda is a firm that focuses on a product differentiation strategy, as opposed to low-cost strategy, to the greatest extent among the seven Japanese assemblers (Kajihara and Takagi, 1994). The nature of Honda's differentiation strategy may explain this result because a cost-sensitive customer tends to lower a supplier's profit (Porter, 1980). Moreover, Honda and Toyota are both recognized as leading automakers in developing supplier capabilities (Sako, 1994; Helper & MacDuffie, 1997; Dyer & Nobeoka, 1997).

Finally, as expected there was a significant positive relationship between both market competitiveness variables and supplier performance. Suppliers with greater efficiency and sales growth realized higher profits.

4. Discussion

The results support our main hypothesis that customer scope has a positive influence on supplier performance, even after controlling for supplier scale/size, type of product, idiosyncratic influences from specific customers, and the underlying competitiveness/efficiency of each supplier. Readers who are knowledgeable about Japanese supplier-automaker relationships may question whether or not we are missing the effect of stock ownership or affiliated suppliers (*kankei kaisha*). One plausible explanation for our findings is that suppliers with few customers are those who are affiliated (partly owned) with a particular automaker and that what we are picking up is the fact that affiliated

suppliers are less profitable than independent suppliers (*dokuritsu kaisha*).¹ To test this we ran a separate analysis to assess whether or not the effect of customer scope seemed to be independent of stock ownership. We divided both independent and affiliated suppliers into two groups: those with few customers (less than 3) and those with many customers (3 or more) to determine whether both affiliated and independent suppliers with many customers outperformed those with few customers (See Table 3).

Table 3

The results indicate that affiliated suppliers with many customers make significantly higher profits than those with few customers, and the relationship holds true for independent suppliers as well.² Thus, the value of customer scope seems to exist whether or not a supplier is affiliated or independent.

Although we cannot determine which of the theoretical justifications—learning, scale economies, or relative bargaining power—best explains the results obtained, our qualitative interviews with suppliers offer additional insights into the relationship between

¹ Previous studies that have examined the profit performance over time of independent companies versus affiliated companies have found that independents outperform affiliates but have higher profit variance, and thus higher risk (Nakatani, 1984; Lincoln, Gerlach & Ahmadjian, 1995). Our analysis was done during a recession year in Japan, a year in which affiliates would presumably perform better due to support from the parent company. We find that supplier profitability is better explained by the number of customers a supplier has rather than whether it is independent or affiliated.

² Consistent with some previous studies (Nakatani 1984; Lincoln et al, 1995), we also found independent suppliers to be more profitable than affiliated suppliers. Our research suggests that one reason for that finding is that independent suppliers are more likely to have multiple customers.

customer scope, supplier learning, and performance. Our interviews with suppliers³ indicate that the ability of suppliers to learn from multiple customers perhaps best explains the positive relationship between customer scope and performance. Let us offer two illustrative cases: Daido Metal (a bearing supplier) and Keyence (a sensor supplier).

Daido Metal is one of three major suppliers of engine bearings in the Japanese automobile industry. As is true in many product categories, the other two suppliers, Taiho Kogyo (a Toyota keiretsu firm) and NDC (a Nissan keiretsu firm) sell most of their output to their keiretsu customer. In fact, historically Toyota has not purchased components from Nissan keiretsu suppliers and Nissan has not purchased from Toyota keiretsu suppliers.⁴ As an independent firm, Daido Metal must protect the confidences of each customer but has been able to supply to both Toyota and Nissan. Among these three suppliers, Daido Metal has been the most profitable and most efficient from both a cost and quality standpoint. According to an engineering manager at Daido Metal, this performance advantage is due to “competencies developed from data and knowledge accumulated in the long term interactions with multiple customers, especially Toyota and Nissan” (Author Interview, April, 1996). In particular, he indicated that Daido Metal was able to improve the quality and reliability of its products through the engineering tests conducting by multiple customers using prototypes and computer simulation. Customer firms typically conduct

³ Between 1995 and 1997 we conducted interviews with executives at 11 Japanese suppliers.

⁴ The reason typically offered for this practice is that the rivalry between Toyota and Nissan has been so strong that they would not “allow” their keiretsu suppliers to sell to their major rival, though it would be acceptable to sell to smaller competitors such as Isuzu, Mitsubishi, Suzuki, and Mazda.

numerous engineering tests after integrating parts supplied by Daido Metal into a system product or vehicle product. The customer then gives this feedback to Daido Metal. Data (e.g., quality, performance, etc.) are also collected and passed on to Daido by OEMs after products are sold in the market. Consequently, Daido is able to learn from a variety of customers, a variety of vehicle products, a variety of applications, and so on. Daido managers indicated that the quantity and quality of these data influence the performance of new component development. Finally, feedback from engineers at both Toyota and Nissan has been extremely valuable in helping Daido engineers learn about new technologies and develop ideas for new product designs.

We found similar results at Keyence, a supplier of sensors for plant automation and one of the most profitable suppliers in the industry. One of the keys to Keyence's success is its ability to learn from, and integrate, the needs of multiple customers in developing its products. Indeed, Keyence has consciously tried *not* to become too closely aligned with any single customer (keiretsu group) and, according to CEO Takemitsu Takisaki, has a practice of never developing completely customized products for a customer, even when large customers like Toyota ask for a specialized sensor. However, this does not mean that Keyence has not been able to develop highly cooperative relationships with each of its multiple customers. Instead, the firm works closely with each of its multiple customers and tries to come up with a family of products that integrate the needs from a variety of customers. By integrating this knowledge effectively, the firm is able to create products that have similar value as customized products but can still benefit

from economies of scale associated with standardized products (Takashima, 1993). This results in products that have characteristics and value that the customer may not have thought of, and at a lower price than the customer would have paid for a fully customized product.

In summary, the multiple customer strategy has provided learning opportunities for these two suppliers that were not unavailable to competing suppliers who chose, or perhaps were forced to choose, a single (or narrower) customer scope strategy. These learning opportunities translated into ideas for new products and product designs, feedback on product quality and reliability, new process technologies, etc. These case examples suggest that learning plays an important role in the positive relationship between customer scope and performance.

However, the fact that “unrelated” customer scope was not significantly correlated with performance suggests that the *type* of customer matters. In other words, suppliers may only gain substantial benefits if they can add customers from whom the supplier can obtain relevant knowledge that is transferable to other customers.⁵ Clearly, Daido and Keyence benefited from their relationships with multiple customers *with related needs*. Although related customer diversification may provide learning opportunities that increase productivity and growth, unrelated customer diversification provides less relevant learning.

⁵ This is not to suggest that it *never* makes sense to add customers with needs that are dissimilar from existing customers. Indeed, dissimilar customers may provide opportunities for learning that stretch the firm in new directions or provide radically new insights for existing customers. However, in the short run more similar customers are more likely to provide more relevant knowledge.

Thus, there seems to be diminishing returns to customer scope. Just as some studies (Bakos & Brynyolfsson, 1993; Uzzi, 1997) have found that buying firms benefit by working with an optimal number of suppliers (e.g., too few result in incentive problems, too many a lack of information sharing, investment, and high administrative costs) our findings suggests that there may be an optimal number of customers. These findings offer empirical support for the knowledge-based view of the firm which suggests that the efficient boundaries of firms are driven by knowledge domains/capabilities (Kogut & Zander 1992; Conner & Prahalad, 1996; Grant, 1996; Poppo & Zenger, forthcoming).

Of course, scale and bargaining power arguments may also be important even though suppliers did not consciously report them as being as important as learning opportunities. However, if scale alone were of particular importance we would have likely found a relationship between supplier size and performance. We found no such relationship. Moreover, although multiple customers may give the supplier some relative bargaining power, the fact that Japanese auto assemblers have a two-vendor policy (Itami, 1988; Richardson, 1993) and have typically been in the dominant relative bargaining position (Nishiguchi, 1994) suggests that Japanese automotive suppliers are unlikely to be able to use relative bargaining power to much advantage. Although we cannot discount these explanations completely, we believe that “learning opportunities” better explains the positive relationship between automotive customer scope and performance.

Customer Scope and Cooperative Inter-Firm Relationships

A common perception of the keiretsu system is that relatively exclusive inter-firm

relationships facilitate close inter-firm ties and that these close ties are beneficial to both assemblers and suppliers (Nishiguchi, 1994; Helper & Sako, 1994). However, we found that *a less exclusive relationship is generally more beneficial to Japanese suppliers*. This raises an important issue for the performance of the entire network of assemblers and suppliers: Are relatively exclusive one-to-one relationships necessary to realize the benefits associated with highly cooperative inter-firm relationships (e.g., information sharing, relation-specific investments, etc.)? Or is it possible for suppliers to simultaneously develop close, cooperative partner-like relations with multiple customers?

Our results suggest that it may be possible for suppliers to cultivate relationships with multiple customers, while at the same time maintaining cooperative relationships with each customer. This proposition suggests that it is important to distinguish between these two dimensions--customer scope (or relationship exclusivity) and the degree of inter-firm cooperation--rather than to simply assume a relationship between the two variables (i.e. the fewer the customers, the more cooperative the inter-firm relationship). There is some empirical support for the idea that there is an independent relationship between the inter-firm relationship and the supply structure. Indeed, Walker & Poppo (1991), Helper (1989), and Eccles (1985) found that the degree of cooperation and coordination is not necessarily high between internal component divisions and sister assembler divisions. These studies indicate that even when an assembler and a supplier form an exclusive relationship, the inter-firm relationship could be either cooperative or arms-length depending on how the relationship is managed. Our interviews with automaker executives also revealed that a

supplier with a broad customer scope was not necessarily penalized with regard to its ability to develop a cooperative relationship with that particular customer. For example, Denso, a major Toyota keiretsu supplier, also sells its components to most of Toyota's Japanese competitors, as well as to Ford, Chrysler, and GM. Denso has developed a reputation for cooperative joint product-development efforts with each customer. Many automakers, including Chrysler, identified Denso as a "partner" supplier and did not penalize Denso for being a Toyota keiretsu supplier.

Moreover, a supplier like Denso that has interactions with many customers may develop capabilities to manage cooperative inter-firm relationships more effectively. For example, Martin, et. al. (1995) found that suppliers with experience in dealing with more assemblers have superior abilities to establish additional links with new assemblers or with the same buyers in new locations such as foreign markets. Their findings imply that firms may be able to develop inter-organizational management capabilities, which are accumulated through a variety of inter-firm transactions and can be applied to new inter-firm linkages. Thus, customer scope may contribute to a supplier's capabilities in implementing cooperative joint efforts with each assembler.

Implications for Customer Management

Although this study has emphasized the importance of customer scope for suppliers, it is not sufficient for suppliers to simply increase the number of customers in order to benefit from customer scope. In order to fully enjoy the economies of customer scope, a supplier may need to: (1) carefully cultivate relationships with *related* new customers from

which they can absorb, and apply, relevant knowledge, and (2) develop organizational (customer management) capabilities to allow it to develop highly cooperative relationships with multiple customers simultaneously.

Our analysis suggests that suppliers should develop the following capabilities if they hope to take full advantage of economies of customer scope:

- 1) *Customer management capabilities*; suppliers would do well to carefully examine, document, and then transfer best practices in managing customer relationships (e.g., selling and negotiation skills, conflict management, inter-firm knowledge sharing routines, etc.). The ability to simultaneously manage multiple *cooperative* customer relationships is a key capability if suppliers hope to take full advantage of customer scope.
- 2) *Absorptive capacity*; suppliers must develop the necessary knowledge bases and processes to effectively assimilate and apply knowledge from each of their many customers (see Cohen & Levinthal, 1990). Suppliers should attempt to cultivate relationships with customers that can provide relevant knowledge, or knowledge most closely applicable to the suppliers' knowledge domain.
- 3) *Intra-firm knowledge-transfer capabilities*; suppliers must develop internal processes and routines which allow them to not only learn from each customer, but also to transfer that knowledge internally so that it can be usefully applied to other customers (Szulanski, 1996). Indeed, effective intra-firm knowledge transfer processes will have a positive relationship with a firm's total absorptive capacity, or the ability to absorb knowledge from external sources.

Thus, the ability of firms to benefit from economies of customer scope will be dependent on other organizational capabilities with regard to knowledge management.

Finally, this study has an important implication for vertical integration strategies on the part of buyers. If vertical integration limits the ability of the in-house component division to access other customers, as some studies indicate that it does (Collis, 1992; Dyer, 1996b), then in-house supply divisions will likely be less productive over the long run.

Thus, *this study highlights a key liability of vertical integration which is reduced access to customers*. This may explain why some firms with high levels of vertical integration (e.g., General Motors, IBM, DEC) have over the long run been at a strategic disadvantage relative to less vertically integrated competitors.

Conclusion

The findings from our study indicate that Japanese suppliers with broad automotive customer scope tend to be more profitable. This relationship held even after controlling for supplier scale/size, type of product, idiosyncratic influences from specific customers, and the underlying competitiveness/efficiency of each supplier. It also held for both independent suppliers (*dokuritsu kaisha*) as well as affiliated suppliers (*kankei kaisha*). We argue that a broad customer scope strategy leads to superior performance primarily due to learning opportunities. However, there is a limit to the advantages of a broad customer base, since sales to “unrelated customers” (e.g., non-automotive) did not have a significant impact on performance. In short, there appear to be diminishing returns to customer scope as suppliers add “dissimilar” customers with requirements further from their core knowledge domain/capabilities.

Our findings also suggest that studies that focus only on the advantages of long-term cooperative relationships may be misleading if interpreted to mean that an exclusive assembler-supplier relationship is the optimal solution for the supplier. Our study suggests that suppliers should develop customer management capabilities which allow them to cultivate highly cooperative inter-firm relationships with multiple customers

simultaneously. This study indicates that the nature of dyadic relationships and supplier-assembler network structures are independent issues.

We also understand, however, that further studies are needed to examine more explicitly the relationships among the assembler-supplier structure, the nature of dyadic inter-firm relationships, and the performance of both suppliers and assemblers. Future research might examine in detail the mechanisms by which suppliers are able to cultivate highly cooperative relationships with multiple customers. As this study has shown, it is important to analyze a supplier's strategy as part of a network of relationships, rather than as a relationship only at the dyadic level.

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Figure 1

A Model for the Economies of Customer Scope

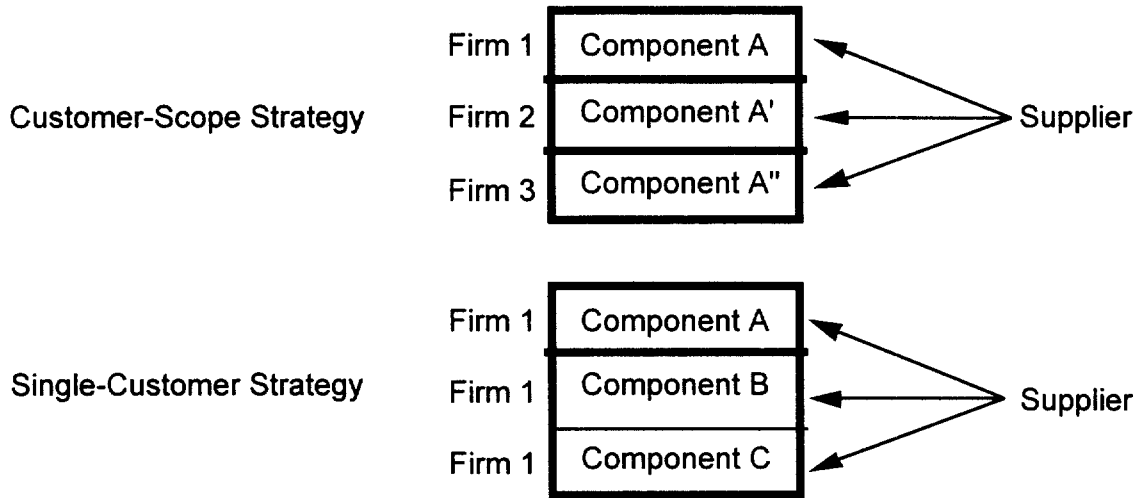


Table 1. Correlation Matrix and Descriptive Data

	Ave	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 Profit-Sales Ratio	0.02	0.02	-													
2 Toyota	0.30	0.41	.05	-												
3 Nissan	0.22	0.35	.01	-.40	-											
4 Mitsubishi	0.11	0.24	-.11	-.19	-.19	-										
5 Honda	0.17	0.33	.23	-.33	-.23	-.17	-									
6 Mazda	0.12	0.28	-.21	-.26	-.19	-.10	-.18	-								
7 Suzuki	0.04	0.14	.06	-.11	-.12	-.02	-.02	-.09	-							
8 Isuzu	0.05	0.16	-.13	-.16	-.02	-.05	-.14	-.08	-.06	-						
9 Number of Customers	2.40	1.70	.26	-.09	.07	.06	-.01	-.09	.04	.13	-					
10 Herfindahl Index	0.77	0.28	-.26	.13	-.06	-.16	.05	.06	-.04	-.14	-.88	-				
11 Related Customer Scope	0.14	0.11	.20	-.07	.16	.08	-.09	-.04	.17	-.17	-.04	-.04	-			
12 Unrelated Customer Scope	0.08	0.10	.04	.04	-.12	.09	-.04	.06	-.04	.05	.21	-.24	-.28	-		
13 Sales (Log)	10.3	0.96	.08	.05	.23	-.23	.07	-.17	-.25	.06	.35	-.19	-.10	-.15	-	
14 Sales / Employee (Log)	3.56	0.38	.14	.05	-.01	-.02	.09	-.11	-.13	.05	.05	-.06	.10	-.16	.42	-
15 Sales Growth	0.07	0.29	.35	.08	-.09	.14	.00	-.04	-.01	-.11	.06	-.10	.21	-.15	.01	.03

.22>: p<0.01, .18>: p<0.05

Industry Dummy Variables:

	0	1	Mean
Electronics	116	9	0.072
Non-metal	101	24	0.192
Others	33	92	0.736

Table 2. Regression Analyses for Supplier Performance (N=125)

Independent Variables	(1)	(2)	(3)	(4)
Constant	0.014 (0.572)	0.031 (1.169)	-0.005 (-0.199)	0.010 (0.388)
Primary Products (Dummy)				
Electronics	-0.000 (-0.003)	0.002 (0.276)	-0.002 (-0.305)	0.000 (-0.018)
Non-metal	-0.010 * (-2.261)	-0.010 * (-2.289)	-0.011 * (-2.517)	-0.011 * (-2.469)
Customer Proportion (%)				
Toyota	0.020 † (1.789)	0.021† (1.872)	0.017 (1.624)	0.017 (1.632)
Nissan	0.017 (1.418)	0.018 (1.445)	0.019 (1.647)	0.018 (1.594)
Mitsubishi	0.003 (0.217)	0.002 (0.169)	-0.005 (-0.368)	-0.005 (-0.396)
Honda	0.031 ** (2.645)	0.032 ** (2.727)	0.028 * (2.601)	0.029 * (2.608)
Mazda	0.004 (0.290)	0.004 (0.347)	0.002 (0.216)	0.003 (0.219)
Suzuki	0.015 (0.875)	0.018 (1.040)	0.016 (1.009)	0.018 (1.158)
Isuzu	-	-	-	-
Customer Scope				
Number of Customers	0.004 ** (3.171)		0.004 *** (3.342)	
Herfindahl Index		-0.023 *** (-3.280)		-0.020 ** (-3.054)
Related Customer Ratio	0.048 ** (2.869)	0.044 ** (2.612)	0.041 ** (2.587)	0.037 * (2.336)
Unrelated Customer Ratio	0.015 (0.739)	0.014 (0.722)	0.029 (1.543)	0.029 (1.564)
Scale				
Sales (Log)	-0.002 (-1.022)	-0.001 (-0.632)	-0.005 * (-1.988)	-0.003 (-1.520)
Competitiveness				
Sales/Employee (Log)			0.012 * (2.479)	0.012 * (2.267)
Sales Growth			0.022 *** (3.838)	0.022 *** (3.705)
Adjusted Squared Multiple R	0.190 ***	0.195 ***	0.314 ***	0.303 ***

*** p<0.001; ** p<0.01, * p<0.05, † p<0.10

Table 3

**Performance (ROS) of Affiliated vs. Independent Suppliers
(Segmented by Number of Customers)**

	Affiliated*	Independent
Few Customers (<3)	1.79% (n=45)	1.97% (n=34)
Many Customers (=>3)	2.68% (n=29)	3.22% (n=17)

* 5% or more of stock owned by automaker

**Performance differences by the number of customers are statistically significant at $p < .05$ level for both affiliated and independent suppliers.

Appendix 1: A List of Sample Suppliers

Aisan Industry	Kasai Kogyo	Saga Tekkosho
Aisin Takaoka	Keihin Seiki MFG.	Sakamoto Industry
Akashi Kikai Seisakusho	Keyence	Sango
Akebono Brake Industry	Kikuchi Metal Stamping	Sankei Giken Kogyo
Alpha	Kinugawa Rubber Industrial	Sankyo Automotive
Ansei Industry	Koito Manufacturing	Sanoh Industrial
Araco	Kojima Press Industry	Sanyo Brake Industry
Art Metal Mfg.	Kokusan Kiki	Sensor Technology
Asahi Iron Works	Kotobukiya Fronte	Shinko Kogyo
Asama Giken	Kuroishi Iron Works	Shiroki
Calsonic	Kushiro Brake Industrial	Showa
Chuo Malleable Iron	Kyoho Machine Works	Somic Ishikawa
Chuo Sprin	Marujun Seiki Industry	Sugihara Hosei Kogyo
Chuyo Spring	Maruyasu Industries	Sumino
Daiichi Forging	Meidoh	Tachi-S
Daikin Manufacturing	Meiwa Industry	Takada Kogyo
Delta Kogyo	Microtechno	Takebu Tekkosho
F-Tech	Mikuni	Takehiro
FCC	Minori Industry	Tatsumura Textile
Fuji Kiko	Mitsuba Kogyo	TDF
Fuji Oozx	Mitsuboshi Belting	Technol Eight
Fuji Univance	Mitsuike Industrial	Tiger Sash Works
Futaba Industrial	Mitsuiya Industrial	Tochigi Fuji Sangyo
* Gifu Auto Body Industry	Miura Kogyo	Tokyo Buhin Kogyo
Hashimoto Forming Industry	Murakami	Tokyo Radiator MFG.
Hikari Seiko	Musashi Seimitsu Industry	Tokyo Seat
Hirata Technical	Nagoya Screw MFG.	Topre
Hiroshima Aluminium Industries	Namicho	Toyo Roki MFG.
Hirotec	Nichirin	Toyo Seat
Hoei Industries	Nihon Plast	Toyoda Iron Works
Honda Lock MFG.	Niles Parts	Toyoda Machine Works
Horie Metal	Nippon Cable System	Toyota Kakoh
Hosei Brake Industry	Nippon Leakless	Toyotomi Kiko
Howa Textile Industy	Nippon Light Metal MFG.	Tsuda Industries
Ichikoh Industries	Nippon Piston Ring	Yamada Seisakusho
Ikeda Bussan	Nippon Power Steering	Yamakawa Industrial
Imasen Electric Industrial	Nishikawa Rubber	Yamato Kogyo
Izumi Motor	Nishioka Malleable Iron	Yanagawa Seiki
Jidosha Buhin Kogyo	Nissin Kogyo	Yorozu
Jidosha Denki Kogyo	Nittan Valve	Yutaka Giken
Kanbishi	Ohi Seisakusho	Yutaka Seimitsu Kogyo
Kansei	Press Kogyo	
	Riken	