

THE DETERMINANTS OF INTERFIRM TRUST: EVIDENCE FROM SUPPLIER AUTOMAKER RELATIONSHIPS IN THE U.S., JAPAN, AND KOREA

Jeffrey H. Dyer
Stanley Goldstein Term Assistant Professor of Management
Wharton School, University of Pennsylvania
2000 Steinberg Dietrich Hall
Philadelphia, PA 19104-6370
tel: 215 898 9371
fax: 215 898 0401
Dyer@wmgfac.wharton.upenn.edu

Wujin Chu
Assistant Professor of Marketing
School of Management, Seoul National University
Shinlim Dong, Kwanak Ku
Seoul 151, Korea
tel: 82 2 880 6947

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ABSTRACT

The determinants of interfirm trust are examined in 453 supplier automaker relationships in the U.S., Japan, and Korea. The findings indicate high supplier trust emerges when (1) suppliers receive assistance from the automaker, (2) the automaker has a track record of maintaining a continuing (repeated) exchange relationship with the supplier. Although there were some differences across institutional environments, notably higher trust in Japan, the findings are robust across the three institutional environments. Indeed, in a sample of U.S. suppliers that worked with both U.S. and Japanese automakers in the United States, we found that Japanese automakers were more effective than U.S. automakers at building trusting relations with U.S. suppliers. Thus, firm level practices appear to be more important than the institutional environment in the development of interfirm trust.

A central issue in the literature on strategic alliances and interfirm cooperation is how firms create trust and control opportunism, particularly when the transactors have made investments in transaction specific assets.

Under these conditions, trust has been described as an important antecedent to interorganizational cooperation and economic efficiency (Sako, 1991; Smith, Carroll, and Ashford, 1995). In fact, recent research suggests that trust in supplier buyer relations may be an important source of competitive advantage because it: (1) lowers transaction costs and allows for greater flexibility to respond to changing market conditions (Dore, 1983; Sako, 1991; Barney & Hansen, 1995; Dyer, forthcoming), (2) facilitates investments in special purpose assets and technologies which enhance productivity (Asanuma, 1989; Lorenz, 1988; Dyer, 1994), and (3) leads to superior information sharing routines which improve coordination and joint efforts to minimize inefficiencies (Fruin, 1992; Clark & Fujimoto, 1991; Nishiguchi, 1994). Moreover, some scholars claim that national economic efficiency is highly correlated with the existence of a high trust institutional environment (North, 1990; Casson, 1991; Hill, 1995; Fukuyama, 1995). For example, Fukuyama (1995:7) argues that the economic success of a nation, "as well as its ability to compete, is conditioned by the level of trust inherent in the society." The findings from these, and other, studies have increased our attention on the important role of trust in economic exchanges.

A natural response to these studies has been to exhort companies to build trust with their trading partners (Business Week, 1986, 1992) and to call for increased research on the role of trust in coordinating economic activity (Smith, Carroll, and Ashford, 1995). However, before an explicit strategy for developing trust can be developed, or considered feasible, the determinants of trust must be identified. Despite considerable academic and managerial interest in trust between trading partners, to date there has been little empirical research on the antecedents or determinants of interorganizational trust (i.e. between supplier buyer). Further, there has been little research on whether the determinants of trust differ in different institutional (i.e. country) environments.

The purpose of this paper is to examine the determinants of supplier trust in a sample of supplier/automaker relationships in the United States, Japan, and Korea. Given the recent attention on the importance of trust in exchange relationships, an examination of the determinants of trust is, by itself, a valuable undertaking. However, due to the globalization of industries and a dramatic increase in international joint ventures, a study of the determinants of trust in different institutional environments is particularly valuable. Such a study is useful because it allows for an examination of those factors that are important determinants of trust both within, as well as across, countries.

THEORETICAL FRAMEWORK AND HYPOTHESES

Defining Trust

Williamson (1993:453) has noted that "trust is a term with many meanings." Indeed, various scholars have offered different definitions of types of trust, including goodwill or relational trust (Sako, 1991; Sabel, 1993; Hesterley et al, 1995), process based trust (Zucker, 1986; Zaheer & Venkatraman, 1995), institutional trust (Arrow, 1974; Zucker, 1986), competence trust (Sako, 1991), and calculative or contractual trust (Sako, 1991; Williamson, 1993). Among organizational scholars, trust has received attention as a mechanism of organizational control, and more specifically as an alternative to price, contracts, and authority (Ouchi, 1980; Bradach & Eccles, 1989; Powell, 1990). In this study we consider dyadic trust between a supplier and its customer. We define trust as mutual confidence that no party to an exchange will exploit another's vulnerabilities (Dore, 1983; Sako, 1991; Sabel, 1993; Barney & Hansen, 1995). This suggests that parties to an exchange: (1) make good faith efforts to behave in accordance with prior commitments, (2) make adjustments as market conditions change in ways perceived as "fair" by the exchange partners, and (3) do not take excessive advantage of another even when the opportunity is available. In many respects, opportunism may be viewed as the opposite of trust. A firm's actions are opportunistic to the extent that it does not live up to prior commitments and takes advantage of another's exchange vulnerabilities. Our definition of trust is similar to the "goodwill trust" description given by Sako (1991) and the "trust" definition offered by Sabel (1993) and Barney & Hansen (1995). Trust, as defined here, is not based upon contracts or third party sanctions but rather is based on non contractual mechanisms.

Trust is generally considered to be of most economic value to transactors when it is based on non-contractual, rather than contractual mechanisms. The rationale for the economic value of non contractual trust is straightforward: trust eliminates the need for formal contracts, which are costly to write, monitor and enforce (Hill, 1995; Barney & Hansen, 1995). Thus, trust reduces transaction costs because transactors engage in self monitoring which reduces the need for costly formal third party monitoring and enforcement mechanisms.

The Determinants of Trust

A firm may trust trading partners to refuse to break confidences and exploit vulnerabilities for a variety of reasons. However, typically we would expect trading partners to behave in a trustworthy manner because failure to do so would result in self imposed moral sanctions (Firth, 1951; Mauss, 1967; Macauley, 1963; Hill, 1990), social sanctions (Sahlins, 1972; Dore, 1983; Grannovetter, 1985; Powell, 1987) or economic sanctions (Klein, 1980; Williamson, 1983/1993).

Various scholars have observed that some individuals derive substantial "utility" from behaving in ways that they perceive to be "moral" or "ethical" (Firth, 1951; Mauss, 1967; Donaldson, 1990). Indeed, studies of exchange in both primitive and modern societies indicate that many individuals do not behave opportunistically because they are afraid of the "moral" sanctions that could be imposed by a powerful deity or supernatural force, or they embrace the value of being "ethical" (Mauss, 1967; Macauley, 1963; Hill, 1990; Barney & Hanson, 1995). As Hill (1990:502) argues, "Even if the asset specificity is high, there will be actors who, perhaps for reasons of principle, will never be the first to act opportunistically. Rather they will choose to cooperate and trust others." Of course, the difficulty for transactors is knowing ex ante which potential trading partners are the honorable "type."

Alternatively, if a transaction is embedded within a broader reciprocal social relationship, then transactors may rely on social sanctions to protect their interests. Various types of social sanctions

may control opportunism, including: withdrawal of love, respect, prestige, and/or (worst of all) banishment from the social community (Light, 1972; Smith, 1983; Grannovetter, 1985; Ellickson, 1991). Thus, a firm that takes unfair advantage of a trading partner may find any of a number of sanctions imposed by other members of the social network.

Finally, transactors may be trustworthy (refuse to be opportunistic) due to economic sanctions that can be imposed on them by trading partners or other members of the economic network (economic sanctions have received the greatest attention in the law and economics literature; See Macneil, 1978; Klein, 1980; Williamson 1983; Kronman, 1985; Klein & Kenny, 1989). For example, trading partners may make financial or investment arrangements (stock swaps, equity participation) which are purposefully designed to align the economic fortunes of trading partners. These types of arrangements are often referred to as an exchange of hostages.

In summary, a variety of mechanisms may persuade transactors to behave in a trustworthy fashion in trading relationships. The issue of interest here is how can we predict when high trust relations will emerge in supplier buyer exchanges. We offer the following hypotheses regarding the determinants of interorganizational trust in the automotive industry.

Assistance

The importance of gift exchange in creating trust and reciprocity in exchange relationships has been long argued by a distinguished line of anthropologists and sociologists (Malinowski, 1922; Mauss, 1967; Gouldner, 1963). Gouldner (1963) suggests that a norm of reciprocity begins with a starting mechanism which may take the form of a gift or other acts of generosity. More recently Camerer (1988) has argued that even small, inefficient (with little practical value) gifts often serve as important and meaningful economic signals and social symbols.

The rationale behind the trust creating value of gift giving is that when an exchange partner offers a "free" gift it serves as a symbol of goodwill and benevolence. Such a gift suggests that the giving party is genuinely concerned with the well being of the receiving party. Also, the gift may be viewed as a signal that the giving party does not have opportunistic intent (is the "honest type") and feels benevolent towards the receiving party. Benevolence is the perception of a positive orientation of the trustee toward the trustor and has been hypothesized to be positively associated with trust (Larzelere & Huston, 1980; Mayer et al, 1995). In supplier buyer relationships, when buyers offer "free assistance" to the supplier (i.e. if assistance is not fully costed), suppliers are likely to interpret such actions as a manifestation of commitment and benevolence by the buyer, and may be a basis for 'goodwill trust' (Sako, 1992).

Hypothesis 1: The greater the assistance provided by the buyer to the supplier, the greater the supplier's trust in the buyer.

Length of Relationship

Various scholars have suggested that trust is a valuable asset which takes time to develop and can only be built slowly over time (Arrow, 1974; Sako, 1992). Related to this view is the notion that social knowledge, or knowledge gained through long term interactions, may be the basis for trust by allowing economic actors to understand and predict others' patterns of behavior (Tolbert, 1988; Sohn, 1994). For example, Sohn (1994) found that in-depth social and cultural knowledge facilitates coordination of transactions by making a potential partners' behavior both understandable and predictable. Moreover, as social knowledge between transactors increases, information asymmetries decrease, thereby reducing behavioral uncertainty. Higher levels of trust

are believed to develop when information asymmetries are low (transaction conditions approximate perfect information) and there is less behavioral uncertainty (high predictability of behavior). Further, acquiring social knowledge through long term interactions provides insights into the "moral character" of trading partners, thereby allowing transactors to better screen for "honest" partners (Hill, 1990; Barney & Hansen, 1995).

Finally, when transactors engage in long term exchange relationships they develop a history together. The past history of interactions of transactors is extremely important in developing personal and social ties (i.e. the potential to use social sanctions to discourage opportunism). Most of us recognize that we are less likely to take advantage of those with whom we've had long and stable past interactions (e.g., family members, friends, etc.). We typically refuse to behave opportunistically towards these individuals because they can impose real social sanctions on us. In these situations, a "social memory" is created and transactors can achieve "serial equity" (equity/reciprocity over a longer period of time) rather than requiring immediate or "spot equity" (Ouchi 1984). Thus, we would expect higher levels of trust in exchange relationships where the transactors have a longer history of interacting.

Hypothesis 2: The longer the duration since the supplier and buyer first began doing business together, the higher the supplier's trust in the buyer.

Continuity of Relationship

In addition to length of relationship, continuity of the supplier buyer relationship may contribute to the development of interorganizational trust. It is possible for trading partners to have had a long term relationship (i.e. many years have passed since the initial transaction) and yet the relationship may not have been continuous in the sense that suppliers continue to "re win" the same business year after year. For example, some U.S. suppliers reported that they began selling parts to a particular automaker 50 years ago. But there have been occasions when they have lost the part business to competitors. In game theory parlance, the repeated game of exchange has been broken. In other instances, a supplier's relationship with the automaker is a repeated game in the sense that the supplier continues to "re win" the "contract" year after year. Thus, there is a high degree of continuity in the relationship. Interfirm trust is built incrementally as firms repeatedly interact (Gulati, 1995).

The logic for how repeated games result in more cooperative behavior is well documented in the game theory literature (Axelrod, 1984; Fudenberg and Maskin, 1986; Parkhe, 1993). We would predict that supplier trust would emerge under conditions of repeated exchange due to buyer purchasing routines that are predictable and consistent and which do not switch (perhaps opportunistically) business to competitors (Boyle & Bonacich, 1970; Butler, 1991). Repeated exchange is particularly important to the development of supplier trust in situations where suppliers have invested in transaction specific investments. Under these conditions, a buyer's willingness to stay with the same supplier is likely to be interpreted by the supplier as a manifestation of commitment and trustworthiness. Thus, we would expect supplier trust to be higher when the buyer has a history of continuous, repeated exchange with the supplier.

Hypothesis 3: Supplier trust is higher when the buyer has a track record of continuous repeated exchange with the supplier

Face to Face Communication

Sociologists have frequently argued that proximity and face to face interaction are likely to lead to the development of positive feelings of attraction (Lorenz, 1988; Argyle, 1991). Further, cooperation and trust between individuals has been found to emerge in laboratory settings when individuals can see and talk to each other and engage in social interaction (Wichman, 1972 reported in Argyle, 1991). Face to face communication has been described as having a high knowledge carrying capacity because it presents immediate feedback opportunities and makes use of both visual and audio channels of communication (Daft & Lengel, 1986). Thus, face to face contact is considered useful for developing trust because it offers more cues for interpreting a trading partner's behavior and motivations. Moreover, face to face contact is viewed as an effective means of developing personal ties, thereby increasing the efficacy of social sanctions. From an economic perspective, previous studies have suggested that face to face contact leads to the development of interfirm cooperation and trust by increasing behavioral transparency and reducing information asymmetry (Heide & Miner, 1992; Sako, 1991). Thus, face to face communication would be expected increase supplier buyer trust by: (1) developing personal ties, thereby increasing the efficacy of social sanctions, (2) providing superior information to assist transactors in detecting or identifying untrustworthy trading partners. Thus, we would expect that as the frequency of face to face contact between transactors increases, so does interorganizational trust.

Hypothesis 4: The greater the face to face interaction between the supplier and buyer, the higher the level of supplier trust in the buyer

Stock Ownership

Klein (1980) and Williamson (1983) suggest that one way to foster trust and prevent opportunism is through the exchange of hostages. In particular, Klein (1980:358) argues that opportunism can be controlled by having the potential cheater put up a "forfeitable-at-will collateral bond equal to the discounted value of the premium stream." For example, "in the case of a franchising contract the franchisee may be required to make an initial lump sum payment to the franchiser, thereby largely shifting the potential threatened breach from the franchisee ('free riding' on a common trademark by supplying lower quality service) to the franchiser (terminating or threatening to terminate the franchisee without cause and purchasing the franchisee investment at a discounted price). The initial lump sum is equivalent to a collateral bond forfeitable at the will of the franchiser" (Klein & Kenny, 1989:41). Other financial hostages, which diminish in value if a transactor is opportunistic, include stock swaps or equity participation in a trading partner (Pisano, 1989; Dyer & Ouchi, 1993; Bolton et al, 1994). We argue, as has Pisano (1989) and Bolton et al (1994), that partial equity ownership constitutes one visible and highly appropriate collateral bond which reduces opportunism by aligning the incentives of each partner. The fact that the value of the equity will decrease in value if a party is opportunistic provides an incentive for trading partners to behave in a less opportunistic, or more trustworthy, fashion. Thus, we would expect equity ownership to be positively associated with interorganizational trust.

Hypothesis 5: The greater the buyer's ownership of supplier stock, the higher the level of supplier trust in the buyer.

Research Setting

The auto industry in the U.S., Japan, and Korea was chosen as the research setting to examine the determinants of trust in supplier buyer relationships. This research setting was an unusually good test site for two reasons. First, it was important to study a set of transaction relationships in which trust might be important and valuable. For example, many researchers have argued that risk, or having something invested, is requisite to trust. The need for trust only arises in a risky situation (Deutsch, 1958; Mayer et al, 1995). The automobile is a complex product with thousands of components that must work together as a system. Components are often tailored to specific models and as a result suppliers must make automaker specific investments (Nishiguchi, 1994; Dyer, 1994). Since these investments are not easily re-deployable, suppliers are at risk if automakers choose to behave opportunistically. Furthermore, the auto industry is characterized by a high degree of market uncertainty (Pine, 1993), which also increases the risks associated with transacting (Lorenz, 1988). Supplier trust is of particular importance since suppliers make customer specific investments that place them at risk and automakers are in a stronger relative power position.

Second, the automotive industry is a large and important industry in the U.S., Japan, and Korea. Studying supplier buyer relationships in the same industry across different institutional environments allows for some control of extraneous variation, thereby allowing a focus on the impact of the institutional environment. Studying the determinants of trust in different institutional environments is valuable because numerous scholars have argued that national culture can attenuate opportunism by fostering trust and cooperation. For example, the U.S. is typically considered a low trust environment whereas Japan is often presented as a model environment for fostering trust and cooperation (Ouchi, 1981; Shane, 1994; Hill, 1995). Korea, is culturally more similar to Japan than the U.S., but its management practices have been influenced by both the U.S. and Japan (Dubinsky et al, 1994; Hamilton & Biggart, 1988). By examining supplier buyer relationships in three countries, we can determine which factors influence trust across all countries, as well as which are country specific.

Sample and Data Collection

The sample consisted of three U.S. (General Motors, Ford, Chrysler), two Japanese (Toyota, Nissan), and three Korean (Hyundai, Daewoo, Kia) automakers and a sample of their suppliers. The authors visited each company's purchasing department and asked the department manager to select a representative sample of suppliers which included both partners (i.e. keiretsu/chaebol suppliers) and non partner (i.e. independent) suppliers. We interviewed a total of 30 purchasing managers at the eight automakers' purchasing departments to obtain feedback on the appropriateness, completeness, and clarity of the questionnaire, and to gain a better understanding of the issues arising in automaker supplier relations.

We also interviewed sales and engineering vice presidents at 70 suppliers (30 U.S., 20 Japanese, 20 Korean), during which the survey was developed and pre-tested. Most importantly, the interviews helped us to gain a better understanding of the industry and the nature of the supplier automaker relationship. To minimize key informant bias and follow the general recommendation to use the most knowledgeable informant (Kumar et al, 1993), we asked the purchasing managers at each automaker to identify the supplier executive who was most responsible for managing the day to day relationship. This person was typically the supplier's sales vice president, sales account manager, or in some cases, the president. The final survey was then sent to the key supplier informant identified by the automaker. Key informants had been employed at their respective

organizations for an average of 16 years and thus had a long history of working with the automaker. Usable responses were obtained from 135 U.S. (66% response rate), 101 Japanese (68% response rate) and 217 Korean (55% response rate) suppliers. The data collection was done between 1992 and 1994. The U.S. and Japanese data were collected in 1992, reflecting data for 1991, and the Korean data were collected in 1994, reflecting data for 1993. We do not believe this will bias the results since our analysis focuses on rather stable measures (i.e. length of relationship, stock ownership, trust) which Korean suppliers indicated had not changed in any significant ways since 1992.

Operational Measures

Recall that the survey was administered to the suppliers. Therefore, the measures reflect the perceptions of the suppliers regarding the supplier automaker relationship. However, during our interviews with the purchasing managers of the automakers we discovered that both the supplier and automaker perceptions regarding the relationship were very similar in specific cases we discussed. There were no instances where the perceptions of suppliers and automakers were dramatically different. Our anecdotal findings are similar to those of Anderson and Narus (1990) who found that suppliers' and buyers' perceptions of relational governance were quite consistent.

Trust

Consistent with previous studies we operationalized trust using multiple scale items designed to measure the extent to which the supplier trusted the automaker not to behave opportunistically (Anderson & Narus, 1990; Heide & John, 1990; Zaheer & Venkatraman, 1995). Trust (TRUST) was operationalized as the sum of the following variables. The extent to which the supplier trusts the manufacturer to treat the supplier fairly. The extent to which the automaker has a reputation for trustworthiness (following through on promises and commitments) in the general supplier community.. If given the chance, the extent to which the supplier perceives that the automaker will take unfair advantage of the supplier (reverse scored). Our trust construct includes key elements of our definition of trust, including fair dealing, a reputation of following through on promises and commitments, and a willingness to forego opportunism even when the chance is available. Each scale item was measured on a 7-point Likert scale (1=Not at all, 7=To a very great extent).

Automaker Assistance to the Supplier

Our interviews with suppliers and automakers prompted us to classify assistance (ASSISTANCE) into three types: assistance with the supplier's product quality, assistance with cost cutting efforts, and assistance with inventory management. The degree of assistance offered by the automaker to the supplier was measured through three items. The extent to which the automaker provides assistance to help the supplier improve product quality.. The extent to which the automaker provides assistance to help the supplier reduce manufacturing costs.. The extent to which the automaker provides assistance to help the supplier improve inventory management/delivery. A 7-point Likert scale was used to indicate the degree to which the supplier felt that these three types of assistance were provided by the automaker. The total amount of assistance was the sum of the three respective sub measures.

Length of the Relationship

This measure (LENGTH) was operationalized as the number of years since the supplier first began selling products to the automaker. This measure represents the length of the relationship, rather than the intensity of the relationship, which is captured by other measures.

Continuity of the Relationship

Continuity of relationship (CONTINUITY) was operationalized as the percentage of time the supplier's business has been renewed when there is a model change. In the automotive industry, the model change is a natural time for buyers to reevaluate suppliers and make a change if deemed appropriate. Suppliers who have a history of "re winning" the business at the model change would be expected to have greater continuity in their relationship with the automakers when compared with suppliers with a low "re win" percentage.

Face-to-Face Communication

This measure is operationalized as the annual "man days" that the supplier automaker spent in face-to-face contact during the year the data were gathered. This measure (FACE) includes face to face contact between supplier sales and engineering personnel and automaker purchasing and engineering personnel. Days of contact was calculated by having the key informants identify the number of sales people that worked directly with the particular automaker. Then, s/he indicated the average number of days per week that the typical salesperson would spend having a face to face meeting with automaker personnel. Key informants provided the same information for engineers. Thus, the measure consists of face to face communication that occurs between sales and purchasing employees, as well as between engineers from the two respective organizations. The assumption behind this measure is that as the number of days of face to face contact increases, so does trust.

Stock Ownership

Both the automakers and suppliers provided data on the percent of supplier stock owned by the automaker. However, this percentage was not directly used in the analysis because out of the 453 suppliers surveyed, less than 15 percent of the suppliers had their stock owned by the automakers. Therefore, treating the variable stock ownership (STOCK) as a normally distributed independent variable was unreasonable. Instead, we coded stock ownership as a dummy variable as either having stock ownership or not having stock ownership. It should also be noted that all suppliers in our sample were legally separate entities. In no case did the automaker own more than 50 percent of a supplier's stock.

The Model

The following linear regression model was run in order to test the hypotheses:

Model 1: $TRUST = a + b_1ASSISTANCE + b_2LENGTH + b_3CONTINUITY + b_4FACE + b_5STOCK$.

A linear regression model was used because there was no reason to assume a non linear relationship among the variables. The use of a linear model was later justified by an examination of the residual distribution, which was homoskedastic and indicated no problems with serial correlation. We also ran a second model, adding dummy country variables, to control for country specific effects.

Model 2: $TRUST = a + b_1ASSISTANCE + b_2LENGTH + b_3CONTINUITY + b_4FACE + b_5STOCK + b_6JAPANDUM + b_7KOREADUM$.

We acknowledge that the direction of causality between trust and the independent variables LENGTH, CONTINUITY, and FACE is open to debate. For example, one can argue that high trust leads to long term, continuous relationships and face to face contact rather than vice versa. We have offered theoretical arguments which explain why these particular independent variables may lead to high trust. However, we would expect some degree of reciprocal causality with these variables in effect, a virtuous circle where the independent variables both influence, and are influenced by, trust.

Results

The simple descriptive statistics shown in Table 1 indicate that supplier trust is significantly higher in Japan than in Korea or the United States which have similar levels of supplier trust. Automaker assistance to suppliers is highest in Korea and Japan, with U.S. automakers offering significantly less assistance to suppliers. The high degree of automaker assistance in the Korean sample may be reflective of the immaturity of Korean automobile suppliers, who still need large amounts of assistance from the automaker in order to meet the automakers' minimum quality standards. The degree of assistance in Japan is high, despite the strong capability of Japanese suppliers. In the U.S., the degree of assistance is still rather low, perhaps because U.S. automakers and their suppliers have traditionally maintained arms length relationships.

The length of the supplier automaker relationship is highest in Japan (41.4 years), followed by the U.S. (32.6 years) and Korea (12.4 years). We would expect this result given the long history of the automobile industry in the two former countries compared to that of Korea where the industry is less than 30 years old. There is much greater continuity in the supplier automaker relationship in Japan than in the U.S. or Korea. Japanese suppliers re win the "contract" over 90 percent of the time at a model change while U.S. and Korean suppliers re win the contract approximately 78 percent of the time. These findings are consistent with previous studies which have suggested that Japanese automakers do not switch suppliers nearly as often as do U.S. automakers (Helper, 1991; Dyer & Ouchi, 1993). Our data also indicate that there is more face to face communication between suppliers and automakers in Japan than in the U.S. or Korea. We conjecture that face to face contact among Japanese automotive transactors may be facilitated by the physical proximity of suppliers and automakers in Japan.

Finally, Japanese automakers are most likely to hold minority stock ownership positions in suppliers. Korean automakers rarely held stock in suppliers and in the U.S. sample only one supplier was partially owned by an automaker.

Table 2 presents the pooled sample correlation matrix for the dependent and independent variables. An examination of Table 2 indicates that there are no substantial multicollinearity problems: all of the 10 pairwise correlations between the independent variables are less than 0.33, with only one correlation being greater than 0.30.

The regression results for the pooled sample are presented in Model 1 within Table 3. The results show that our model was reasonably effective at predicting supplier trust as demonstrated by an R of 0.268, which was significant at the $p < .001$ level.

Three of the five variables were found to have a significant positive effect ($p < .001$ level) on supplier trust including: automaker assistance to the supplier, length of relationship, and continuity of relationship. The relationship between stock ownership and trust was positive, as predicted, but only significant at the $p < .10$ level. Surprisingly, total face to face communication was not useful as a predictor of supplier trust.

The results from model 2, which includes the country dummy variables, are slightly different from the results in model 1. First, the ASSISTANCE and CONTINUITY variables are significant in model 2 just as they were in model 1. Thus, these variables are robust explanatory variables across the three institutional environments. However, in model 2, LENGTH was found to be insignificant and STOCK was not only insignificant, but the sign was negative rather than positive. The differences between model 1 and model 2 can be attributed, of course, to country effects which were not captured in model 1, as well as multicollinearity problems between the LENGTH and STOCK variables and the country variables. More specifically, length of relationship was positive and significant in model 1 largely because Japanese transaction relationships were long term and high trust while Korean transaction relationships were relatively short term (due to the immaturity of the industry) and low trust. Similarly, stock ownership was common in Japan where transactors exhibited high trust, but rare in the U.S. where supplier automaker relationships were relatively lower trust.

After controlling for country effects, neither the LENGTH or STOCK variables were significant explanatory factors. As might be expected, the Japanese dummy was significant ($p < .001$), as was the Korean dummy ($p < .10$), which suggests that the institutional environment plays an important role in the production of trust in supplier automaker relationships.

In summary, from Table 3 we may conclude the following:

- (1) Automaker assistance to the supplier is positively associated with supplier trust in the automaker. Thus, Hypothesis 1 is supported.
- (2) Although the length of the supplier automaker relationship appeared to have a significant positive effect on supplier trust in the pooled sample, length of relationship was found to be positive, but insignificant, after controlling for the institutional environment. Therefore, Hypothesis 2 is not supported.
- (3) Continuity in the supplier automaker relationship (i.e., history of re winning the contract) had a significant positive effect on supplier trust. Thus, Hypothesis 3 is supported. This variable (CONTINUITY), as well as ASSISTANCE are the two most significant and robust predictors of trust in terms of the significance level at which the hypotheses are accepted. The CONTINUITY variable is similar to the ASSISTANCE variable in that revealed actions or behaviors appear to be important in forging a trusting supplier relationship.

(4) Face to face communication did not have an effect on trust. We did not find support for Hypothesis 4 which proposed that greater face to face interaction would lead to higher trust.

(5) After controlling for the institutional environment, stock ownership was found to have an insignificant but negative, rather than positive, relationship with trust. Thus, we did not find support for Hypothesis 5 which predicted that stock ownership would be positively associated with supplier trust.

Individual Country Results

An important reason for doing this research with samples from different countries was to examine how the determinants of trust may differ across countries. Previous research suggests that trust between trading partners will vary not only with the attributes of the transaction, but also will vary due to differences in societal culture, politics, networks, and business norms in the institutional environment in which the transaction is embedded (Granovetter, 1985; Hill, 1995). Consequently, we wanted to understand the extent to which there were important differences across national boundaries. Let us briefly comment on country specific differences in our sample.

Supplier trust was universally high in Japan and there was very low variance on the trust measures as well as many of the independent variables (See Table 1). These findings offer empirical support for Dore's (1983) observation that "moralized trading relationships of mutual goodwill" generally pervade Japanese transaction relationships, that trust is somehow a byproduct of the Japanese institutional environment. Of the variables in our model, the most important determinant of supplier trust in Japan was assistance from the automaker to supplier. Length of relationship followed assistance as the second most important explanatory variable in the Japanese sample. Interestingly, continuity of relationship was a less important explanatory variable in Japan than in Korea or the U.S. It is worth noting, however, that the "re win" percentage was universally high in Japan with extremely low variance. Thus, it was not as useful at predicting supplier trust. However, this does not necessarily mean that it was not important in developing trust, but rather that it was not as useful in discriminating between higher and lower levels of supplier trust. Finally, we were surprised to find that stock ownership had a negative, though not significant, effect on trust in the Japanese sample. In Japan, stock ownership has been described as an important symbol of a relationship (Gerlach, 1987,1992). One interpretation of this finding is that stock ownership has continued for such a long time in Japan that it has lost its significance as a governance mechanism and thus doesn't affect "trust" anymore. Another interpretation is that stock ownership is simply not an important determinant of supplier trust in Japanese supplier automaker relations. Lincoln et al (1993:4) have argued that in Japan firms "purchase shares in suppliers to increase their control over pricing and production" and that they dispatch personnel to monitor their investment. Although these practices may result in cooperative interfirm behavior, they do not necessarily result in high trust as we have defined trust in this study.

The most important determinant of trust in Korea was assistance from the automaker to the supplier. Continuity of relationship followed assistance as the second most significant explanatory variable in the Korean sample. "Re win" rates, and trust, were generally lower in Korea than Japan with greater variance on both variables. Length of relationship and face to face contact were found to be unimportant as predictors of trust in Korea. Interestingly, like Japan, stock ownership was not significant (and slightly negative) in the Korean sample. Consistent with Lincoln et al (1993), some Korean suppliers indicated that they thought the automaker used their stock ownership position to exert control over the supplier. If true, this may explain why stock ownership was not correlated with trust in either Korea or Japan.

Finally, in the United States continuity of relationship was the only variable significantly correlated with trust. The relationship between automaker assistance and trust was positive, but not significant. One plausible explanation for this finding (offered by suppliers we interviewed) is that U.S. automakers have only recently been offering assistance to suppliers. As U.S. automakers provide increased assistance to suppliers, supplier trust may increase. Interestingly, the relationship between face to face contact and trust was slightly negative in the U.S. sample. Some U.S. suppliers claimed that they spent a considerable amount of their face to face interactions with U.S. automakers on unproductive activities, such as negotiating contracts and assigning blame for problems. This may explain the lack of a relationship between face to face contact and trust. U.S. suppliers also offered a possible explanation for the lack of a relationship between length of relationship and trust. Suppliers claimed that length of relationship did not necessarily have a bearing on trust. Indeed, some suppliers suggested that the longer they had worked with a particular automaker, the more time they had to learn that the automaker was not to be trusted. Increases in time and experience with a particular trading partner may only mean that one can trust one's own judgments about an uncertain situation better. Finally, stock ownership was not a significant explanatory variable because, except in the case of one supplier, U.S. automakers did not hold stock in any suppliers. U.S. automaker executives claimed that they did not want to be tied to particular suppliers and thus had chosen not to purchase stock in suppliers. Similarly, suppliers reported that they wanted to maintain their independence and autonomy from particular automakers and thus have resisted automakers attempting to exert control through stock ownership. Thus, the U.S. institutional environment appeared to play a role in constraining the automotive firms' ability to use stock ownership as a means for establishing interfirm ties.

DISCUSSION

As reported in Table 1, we found significant differences in levels of supplier trust by country. The differences in levels of trust across countries raises an important issue, notably, how important is the institutional environment in allowing for, or fostering, interfirm trust (cooperative/trustworthy behavior)? One view is that the institutional environment is critical for the development of trust between supplier and buyer. According to this commonly accepted view, trust is a by product of norms, embedded in social networks, and rarely brought about through rational instrumental means (Grannovetter, 1985; See Sabel, 1993 for a discussion). If true, Japanese transactors should only be able to develop high levels of trust with other Japanese transactors embedded within the same social and economic network. A differing view argues that the ability to create trusting supplier relations is a firm specific capability (perhaps fostered by a supportive cultural environment) that is transferable across national and cultural boundaries.

To test whether or not trusting supplier relations can be purposefully created across national boundaries, we surveyed a small sample of U.S. suppliers who worked with both U.S. automakers and Japanese automaker "transplants" in the United States.

By surveying U.S. suppliers selling the same component to both U.S. and Japanese automakers within the United States, we are able to control for cultural and component (technical) differences that might influence interfirm trust. The sample consisted of only U.S. suppliers with at least three years experience and five percent of their total sales to Japanese automakers. This was done to exclude U.S. suppliers without significant experience working with Japanese automakers. These 20 suppliers were randomly selected from the 135 U.S. supplier sample. These suppliers were then interviewed and surveyed regarding their relationship with both U.S. and Japanese automakers.

Table 4 provides a summary of the sample means (for the sample of U.S. suppliers selling to both Japanese and U.S. automakers) for a number of the independent and dependent (trust) variables

used in this study. The results indicate that Japanese automakers are more effective than U.S. automakers at building trusting relations with U.S. suppliers. These data suggest that perhaps trust can be developed through rational instrumental means.

The question of how Japanese automakers were able to quickly develop trusting relationships with U.S. suppliers is an important one. An examination of these results in light of our hypotheses provides further insights into the determinants of interorganizational trust. First, U.S. suppliers' relationships with Japanese automakers were only of short duration, 6 years versus 22 years with U.S. automakers. Clearly a long term relationship is not a prerequisite for high trust. Furthermore, given the short term nature of the relationships, there was not enough history to accurately assess the "re win" rates of U.S. suppliers with Japanese automakers. However, in five cases where suppliers were faced with a model change, suppliers reported re-winning the business in each case. Moreover, our interviews with U.S. suppliers revealed that they believed that they would re win their business at the model change because: (1) Japanese automakers had told them that they would re win the business if they performed well, and (2) Japanese automakers had a reputation for not switching suppliers at the model change. Thus, suppliers had the expectation of a high degree of continuity in the relationship. With regard to face to face contact, the sample engaged in 1475 man days of face to face contact with Japanese automakers versus 1657 man days with U.S. automakers. On an absolute basis there are no significant differences.

Stock ownership was not a factor in these relationships since Japanese automakers did not own stock in any suppliers in the sample.

The one variable that seemed to be critical to the Japanese automakers' ability to develop trusting relationships with U.S. suppliers was offering assistance. U.S. suppliers indicated that, compared to U.S. automakers, they received more assistance from Japanese automakers in reducing costs, increasing quality, and improving delivery. Interestingly, the U.S. suppliers rated Japanese automakers as providing even more assistance than did the Japanese suppliers. Some U.S. suppliers indicated that they received more help from the Japanese automaker than they felt they deserved given their short term relationship. They were surprised at the willingness of the Japanese automaker to send consultants, free of charge, to help them improve. This type of helping behavior on the part of Japanese automakers seemed to be the catalyst for creating, in Gouldner's (1963) terminology, "a norm of reciprocal obligation."

Although U.S. suppliers claimed that they trusted Japanese automakers for the reasons suggested in our model (i.e. assistance and continuity of relationship), our interviews revealed another important factor not explicitly captured in our model but related to the idea of continuity of relationship. U.S. suppliers indicated that one reason they did not trust U.S. automakers was because U.S. automakers were perceived as constantly changing management, personnel, and policies. One supplier executive described the "problem" as follows:

We cannot trust U.S. automakers as much as Japanese automakers because whenever they bring in new management, we get a whole new set of procurement rules and policies. The rules of the game are constantly changing. With Japanese companies we don't seem to have the same problems because their policies and personnel are consistent and stable (Author Interview, September, 1992).

The recent experience at GM's purchasing department is instructive. From 1987 until 1992, the policy in GM's purchasing division was to create "global partnerships" with suppliers. GM began to reduce its number of suppliers and encouraged suppliers to take responsibility for development/design work. However, when J. Ingacio Lopez was promoted to run GM's purchasing office in 1992, he required that GM buyers rebid virtually every part. Moreover, he demanded that buyers get bids from at least five suppliers. Suppliers were stunned and outraged because many felt that GM had broken both their explicit and implicit promises (Business Week,

June 22, 1992). Some suppliers, including Rockwell International, refused to rebid and simply walked away from the business (Wrigley, 1992). Then, one year later Mr. Lopez left GM to go to Volkswagen. GM's future direction with suppliers is unclear.

The predictable consequence of frequent changes in purchasing management and policies is that suppliers realize that implicit (and even explicit) promises made by the automaker may be broken when new management arrives. Suppliers in our sample indicated that this problem is not only at the management level but at the buyer level as well. As one supplier put it, "It's not that I don't trust the person sitting across from me at the U.S. automaker. I may trust him completely. But what I don't trust is that he will be sitting there a year from now. U.S. automakers are constantly rotating their people through purchasing (Author Interview, Sept. 1992)."

U.S. suppliers claim that Japanese automakers are more trustworthy due to their lifetime employment and "promotion from within" policies which foster stability. To test these assertions we examined employee tenure in the Japanese and U.S. automakers in our sample. In particular, we surveyed 100 U.S. employees (at 2 U.S. automakers) and 100 Japanese employees (at 2 Japanese automakers) to determine the average tenure of employment of purchasing and engineering employees. We found that employees at the Japanese automakers had been with their employer for an average of 16.2 years, while U.S. automaker employees had only been at their company for 8.8 years. Helper and Sako (1995) found similar results among 472 executives of Japanese automotive suppliers and 671 executives at U.S. suppliers. Japanese supplier executives had been with their companies an average of 22 years, while U.S. executives had only been with suppliers for 11 years. These data suggest significantly greater employment stability at the Japanese firms, both automakers and suppliers. Greater employment stability may lead to higher levels of interorganizational trust because: a) greater employment stability is likely to increase the probability that the individuals who make commitments to suppliers are around to follow through on those commitments, and b) individuals within the two firms have time to develop strong personal ties and social knowledge, thereby increasing the efficacy of social sanctions as a means of deterring opportunistic behavior.

Furthermore, although Japanese automakers also rotate their personnel, many U.S. suppliers claimed that they were more likely to make agreements with teams of individuals and senior managers rather than with individual buyers. Consequently, when the buyer is moved to a new position, the team is still aware of the previously negotiated agreement. Moreover, during a job rotation, Japanese companies are much more careful to make sure that the new person is well trained and is aware of existing commitments.

In summary, an examination of the specific practices employed by Japanese automakers suggests that they are effective at building interfirm trust because they provide assistance to suppliers, make long term commitments and have continuity in the relationship, and maintain consistent management policies. These findings suggest that interorganizational trust is based on trustworthy behavior that is institutionalized and embedded within the firms' culture and routines. Interpersonal trust between individual members of the two organizations does not constitute interorganizational trust. However, while interorganizational trust cannot be created by individuals acting on their own, individual actions may act as a starting mechanism for interorganizational trust if these individuals can influence organization wide routines.

CONCLUSION

In this paper we examined the determinants of trust in 453 automotive supplier buyer relationships in the U.S., Japan, and Korea. The findings offer a number of important insights into the determinants of trust in supplier buyer relationships. First, these findings suggest that providing assistance (i.e. gift giving) is perhaps one of the best ways to create high levels of trust in supplier buyer relationships. Gouldner's (1963) observation that one sided generosity may act as a starting mechanism for non exploitive exchange relations is empirically supported. Automotive suppliers appear to interpret assistance giving behavior as an act of goodwill or benevolence which translates into a high degree of trust. In addition, supplier trust increases when the buyer has a track record of maintaining a repeated, continuous exchange relationship with the supplier. One interpretation of these findings is that trust is built on past history of behaviors or actions rather than promises, face to face contact, or stock ownership (financial collateral bonds).

Second, our findings suggest that the institutional environment is an important factor which influences the development of interorganizational trust. The absolute levels of supplier trust differed by country, with Japanese supplier buyer relations characterized by relatively high levels of trust when compared with their Korean and U.S. counterparts. However, the key role of the institutional environment may be one of influencing the development of firm level practices which influence trust. Indeed, we found that firm level practices which might be expected to influence the development of trust differed somewhat by institutional environment. For example, offering assistance to suppliers was a widely employed practice by Japanese and Korean automakers, but not widely employed by U.S. automakers. Similarly, stock ownership was widely used in Japan, and to a lesser extent in Korea, but not in the U.S. where U.S. automakers and suppliers preferred to maintain arms length relationships. The set of practices employed by Japanese firms which we found were effective at producing high levels of interfirm trust are arguably the product of a particular national culture and a unique set of evolutionary and historical events (Nishiguchi, 1994).

Although the institutional environment appeared to influence the practices used to create supplier trust, we found evidence of similarities in the determinants of trust across countries. For example, "continuity of relationship" and "assistance giving" appeared to be robust as determinants of trust across countries, especially when one includes the experience of Japanese automakers working with U.S. suppliers. Indeed, the ability of Japanese automakers to build high levels of trust with suppliers in the United States suggests that the institutional environment may be less important than firm level practices as a factor influencing levels of supplier buyer trust. Japanese automakers were successful at building high levels of supplier trust in an institutional environment considered to be low trust relative to Japan (Sako, 1992; Shane, 1994). Thus, the creation of trust through rational instrumental means appears to be possible and the set of practices that produce trust seem to be transferable across national borders.

Third, our study suggests that building interorganizational trust is a much more complex process than building interpersonal trust. To build high levels of interorganizational trust requires that multiple individuals within the two organizations develop a high degree of continuity and stability in their relationships. Furthermore, the organization must create a set of organizational routines (an organizational culture) which supports and encourages trustworthy behavior on the part of all organizational actors. This would suggest that a firm's reputation (based on those routines and past behavior) is an important asset in building interorganizational trust.

Finally, we should note that buyers (i.e. automakers) incur real costs in developing high trust supplier relations. These costs come in two forms. First, buyers must expend considerable resources in providing assistance or offering "gifts" to suppliers. In 1992, Nissan and Toyota supported large teams of more than 75 internal consultants to provide assistance to suppliers. Although the Japanese automakers get a "return" on their investment in the form of more efficient

suppliers, they still must incur the expense of maintaining a large staff of qualified individuals to assist suppliers. Furthermore, there is an opportunity cost associated with maintaining long term, continuous relationships with suppliers. The cost of maintaining continuity in supplier relationships includes the opportunity cost of not taking advantage of one's suppliers and the loss of the opportunity to use lower cost suppliers if they came along. The fact that building supplier trust imposes costs on buyers suggests that trust building behavior should be carefully considered with an analysis of both the costs and benefits.

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NOTES

- Investments in transaction specific assets have been found to enhance interfirm coordination and maximize joint performance (Perry, 1989; Parkhe, 1993; Dyer)
- In our sample, the average distance between supplier plants and automaker plants was 82 miles in Japan, 129 miles in Korea, and 477 miles in the United States.
- Although our model did a reasonably good at predicting supplier trust, clearly there must be other important variables which are not accounted for in our model. However, since the formation of a trusting relationship is such a nebulous and complex phenomenon, a formal modeling effort is bound to explain only part of the variance in trust.
- Korean automakers were excluded because they did not have plants in the United States.
- There was no particular reason for choosing 20 relationships other than there were not a large number of suppliers that had significant experience working with both U.S. and Japanese automakers.
- These findings are consistent with those of a market research firm, Planning Perspectives Inc., who conducted a survey of 700 U.S. suppliers for Chrysler and Ford in 1992. This large sample survey found that U.S. suppliers had significantly higher trust in Toyota, Nissan, and Honda than they did in the U.S. automakers.
- However, when we adjust for the volume of transactions (sales) between the supplier and automaker, we find that U.S. suppliers engage in 50 percent more face to face contact (per dollar of sales) with Japanese automakers.
- A vivid, though single case, illustration of the stability and organizational memory nurtured in Japanese firms comes from Dr. Toshihiro Nishiguchi, a Hitotsubashi University professor who worked for Pioneer Electronic Corporation from 1977-1983. Before he was sent to London by Pioneer in 1982, he spent six weeks training his successor. This included not only a process of familiarization with the normal office routine but also an extensive number of visits to other company units and divisions as well as to outside service providers. Furthermore, before he left he gave his successor a 20 page manual with "illustrations" (manga) on how to do the job (Reported in Fruin, 1992, p.15).

TABLE 1

DESCRIPTIVE STATISTICS: POOLED SAMPLE AND BY COUNTRY

| | TOTAL | | UNITED STATES | | JAPAN | | KOREA | |
|----------------------------|----------------------|-----------------------|----------------------|-----------------------|---------------------|-----------------------|----------------------|-----------------------|
| | N=453 | | N=135 | | N=101 | | N=217 | |
| VARIABLE | MEAN | STANDARD DEVIATION | MEAN | STANDARD DEVIATION | MEAN | STANDARD DEVIATION | MEAN | STANDARD DEVIATION |
| Trust | 13.91 | 3.3 | 12.46 | 2.53 | 18.59 | 1.29 | 13.06 | 3.35 |
| Automaker Assistance | 9.83 | 3.5 | 7.39 | 2.02 | 10.15 | 3.66 | 10.51 | 3.97 |
| Length of Relationship | 21.61 | 14.5 | 32.56 | 14.56 | 41.40 | 8.47 | 12.45 | 7.03 |
| Continuity of Relationship | 0.78 | 0.17 | 0.80 | 0.17 | 0.90 | 0.07 | 0.77 | 0.18 |
| Face-to-Face Communication | 2042.56 | 3857.4 | 1245.01 | 1098.5 | 4989.54 | 5357.7 | 1413.42 | 3726.6 |
| Stock Ownership | 54 (yes) 399 (no) | 0.33 | 1 (yes) 134 (no) | 0.09 | 43 (yes) 58 (no) | 0.43 | 10 (yes) 207 (no) | 0.21 |

TABLE 2

CORRELATION MATRIX: POOLED SAMPLE

| Variables | 1 | 2 | 3 | 4 | 5 | 6 |
|----------------------------------|-------|------|------|------|-------|------|
| 1. Trust | 1.00 | | | | | |
| 2. Assistance | .27** | 1.00 | | | | |
| 3.. Length | .23** | -.09 | 1.00 | | | |
| 4. Continuity | .39** | .12* | .09 | 1.00 | | |
| 5. Face-to-Face Communication | .12* | .10* | .18* | .04 | 1.00 | |
| 6. Stock Ownership | .19* | .02 | .32* | .11* | .23** | 1.00 |

N=453

*p < .01

**P > .001

TABLE 3
RESULTS OF REGRESSION ANALYSES

| Dependent Variable = TRUST | | MODEL 1 | | MODEL 2 | |
|----------------------------|------------------------|----------------|-------------------------|----------------|--|
| <u>VARIABLES</u> | <u>COEFFICIENT</u> | <u>T-VALUE</u> | <u>COEFFICIENT</u> | <u>T-VALUE</u> | |
| CONSTANT | 5.48 (.714) | | 6.25 (1.05) | | |
| ASSISTANCE | .23*** (.037) | 6.0 | .27*** (.053) | 5.1 | |
| LENGTH | .04*** (.009) | 4.5 | .006 (.016) | 0.4 | |
| CONTINUITY | 6.52*** (.795) | 8.2 | 6.51*** (1.12) | 5.8 | |
| FACE | 2.82E-05 (3.57E-05) | 0.8 | -1.31E-05 (5.03E-05) | -0.2 | |
| STOCK | .81 (.439) | 1.8 | -0.15 (.674) | -0.2 | |
| JAPAN DUM | | | 1.78*** (.604) | 2.9 | |
| KOREA DUM | | | -0.84* (.498) | -1.6 | |
| R2: | .27 | | .20 | | |
| Adj. R2: | .26 | | .19 | | |
| F : | 32.8 | | 15.8 | | |

N=543; Standard errors are in parentheses

+p<.10 **p<.01

*p<.05 ***P<.001

TABLE 4

SURVEY OF U.S. SUPPLIERS SELLING TO BOTH U.S. AND JAPANESE AUTOMAKERS

| | U.S. SUPPLIER/ U.S. AUTOMAKER N=20 | U.S. SUPPLIER/ JAPANESE AUTOMAKER N=20 | T-VALUE |
|---|--|--|---------|
| TRUST <i>The extent to which the supplier trusts the automaker to treat supplier fairly†</i> | 4.1 | 5.7** | 2.5 |
| <i>If given the chance, automaker might try to take unfair advantage of supplier†</i> | 4.0 | 1.7** | 3.3 |
| LENGTH <i>Length of relationship</i> | 22 years | 6 years | 6.4 |
| CONTINUITY <i>Percent of time the supplier re-wins business at a model change</i> | .77 | 1.00** | |
| FACE <i>Annual man days of face-to-face contact</i> | 1654 | 1475 | 0.19 |
| ASSISTANCE <i>Extent of cost reduction assistance†</i> | 1.7 | 4.1** | 5.5 |
| <i>Extent of quality improvement assistance†</i> | 2.5 | 4.5** | 4.2 |
| <i>Extent of delivery/inventory management assistance†</i> | 1.5 | 2.9** | 2.5 |

† Answers are on a 1-7 Likert Scale: 1 = Not at all; 4 = To some extent; 7 = To a very great extent

* In each of the five cases where the model changed, suppliers re-won the business for the next model.

** Tests of group differences are one-tailed t-tests assuming unequal variances; $p < .01$ level.