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**SUPPLIER RELATIONS IN THE AUTO INDUSTRY:
A LIMITED JAPANESE-US CONVERGENCE?**

RESULTS OF THE 1993 IMVP SUPPLIER SURVEYS

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MITJP 96-14

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and its Working Paper Series

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ABSTRACT

This paper analyses data from a survey of over 600 automotive suppliers in the United States and just under 500 suppliers in Japan, conducted as part of the International Motor Vehicle Program of the Massachusetts Institute of Technology. The paper shows that closely linked "voice" relationships have performance advantages for automakers and their suppliers in both the USA and Japan. Although such high-performance relationships with customers are still more prevalent in Japan than in the USA, the nature of supplier relations in the two countries is converging in some respects.

Supplier Relations in the Auto Industry: A Limited Japanese-US Convergence?

Introduction

This is a time of fast changes in supplier/customer relationships in the United States. Where once contracts were short-term, and relationships were arm's-length, now contracts are increasingly long-term. Suppliers are asked to provide customers with detailed information about their processes, and customers increasingly talk of "partnership" with their suppliers.

Such close relationships between customers and suppliers have been shown to have beneficial effects on performance in several areas. Clark (1989) found that early supplier involvement in product design was a key part of Japanese automakers' edge in introducing new models both faster and with fewer total labor hours than their US and European counterparts. Noordeweier, John, and Nevin (1990) found that more "relational" purchasing arrangements reduced acquisition costs in the presence of high uncertainty. Heide and John (1988) found that customers and suppliers who were mutually dependent invested more in specific assets.

Despite the movement toward closer supplier relations in the US reported above, and the evidence that such relationships improve performance on a variety of dimensions, contradictory trends remain. A 1989 survey of US auto suppliers by Helper (1991) found that customers increased the length of the contracts they offered, and suppliers were more likely to provide process information. However, suppliers still felt a lack of customer commitment, since their level of trust in the customer did not increase. Performance improvements often came at suppliers' expense. For example, JIT delivery was not matched by JIT production, so in 1989, 48% of suppliers ended up stockpiling inventory to meet their customers' delivery demands, compared with 20% in 1984. In addition, customers often obtained price reductions by reducing supplier margins rather than supplier costs.

In order to see if a clear trend had emerged from these conflicting patterns, Helper conducted another survey of U.S. automotive suppliers in 1993. Around the same time, Sako conducted a similar survey of automotive suppliers in Japan. Both surveys were sponsored by the International Motor Vehicle Program (IMVP) at MIT. The surveys yielded an unusually comprehensive database. In the USA, 673 responses came from Japanese transplants and vertically-integrated divisions of US automakers as well as independent US-owned firms, representing a response rate of 55%. In Japan, 471 responses were received from vertically-integrated divisions of Japanese automakers and a few foreign-owned companies as well as independent Japanese-owned firms, representing a response rate of 30%. Both rates are far above the norm for business surveys. (See the Appendix 1 for a description of the survey methodology.)

The surveys were designed to answer the following questions:

- 1) What is the extent of the changes in supplier relationships described above? How

different or similar are the trends in the USA and Japan?

2) What types of relationships are likely to lead to good performance by both suppliers and buyers?

Supplier/Customer Relations: A Conceptual Framework

Traditional studies of purchasing have emphasized the distinction between "make" and "buy" (see for example, Kaserman (1978), Williamson (1975)). However, in order to analyze different options within the "buy" alternative, another framework is necessary. Here, we employ the exit-voice framework, adapted from Hirschman (1970) by Helper (1990, 1991) to classify supplier relations according to the methods used to resolve problems which arise between the parties. In an "exit" relationship, a customer who has a problem with a supplier finds a new supplier. In a "voice" relationship, the customer works with the original supplier to resolve the problem.

In most cases a voice relationship is more efficient, since a rich flow of information between the parties makes possible effective use of techniques such as value analysis and value engineering.

However, a customer who wants to have a voice relationship with its suppliers must make a commitment to them. Commitment refers to the supplier's degree of certainty that the customer will continue to buy its products for some length of time. This assurance can be provided by any mechanism that makes it harder for the customer to exit from the relationship, such as vertical integration, long-term contracts, or desire to retain suppliers' trust (Sako, 1992). Commitment is necessary both to obtain suggestions for improvement (which may be based on proprietary information) and to make investments that respond to these suggestions.

Below, this framework is used to investigate first, the types of customer/supplier relationships that are associated with good performance, and second, the trends in adopting these high-performance practices. This paper focuses on similarities and differences between US and Japanese supplier relations and performance. Unless otherwise noted, all comparisons reported are statistically significant at the .05 level or better according to the Kruskal-Wallis test (a non-parametric version of the t-test.)

Voice Improves Performance Dramatically

The 1993 surveys show that in today's competitive environment, use of voice can benefit both automakers and their suppliers. For example, consider the performance impacts of a very relaxed definition of a voice relationship: one where (A) suppliers provide customers with a detailed breakdown of their process steps, (B) suppliers believe there is a high probability that they will continue to provide products to this customer for more than three years, and (C) If a competitor offers a lower price, suppliers expect the customer to help match the competitor's effort.

US firms with such relationships do better for their customers (they receive 28% more

awards from the automakers), and for themselves (their market-share growth for the product line as a whole was 1.5 percentage-points greater), and they were 10% more likely to adopt JIT delivery without a cost increase. However, only 29% of respondents had relationships that met even these minimal voice criteria in 1993.

Japanese firms with such relationships also performed much better than those without. A supplier with a voice relationship receives on average 18% more awards per supplier from the automakers. Also, it is 50% more likely to adopt JIT delivery without a cost increase. (No market-share growth advantage was evident for voice suppliers in Japan). But even in Japan, only 32% of respondents had relationships that met the relaxed voice criteria in 1993.

Trends in Supplier Relations Practices: Unclear in both USA and Japan

As noted in the Introduction, the 1989 US survey identified contradictory trends in supplier relations during the 1980s. Have these problems been resolved in the 1990s? As discussed below, supplier relationships are moving in contradictory directions not only in the USA but also in Japan.

Figure 1 shows that more suppliers in the US are providing their customers with a detailed breakdown of the steps they use in their production process. This increase is compatible with a move toward voice relationships. This information should help automakers insure that their component designs are compatible with suppliers' processes, thus improving productivity and quality. An accelerated increase in information disclosure in the USA, from an average of 38% in 1984 to 50% in 1989 to 80% in 1993, is in stark contrast to the stagnant situation in Japan at around 80% for both 1989 and 1993. (No Japanese data is available for 1984 unfortunately).

Also indicating some progress toward voice in the USA, contract lengths have increased on average from 1.2 years in 1984 to 2.3 years in 1989 to 2.4 years in 1993. (However, the increase in the average conceals a sharp decrease in contract lengths reported by suppliers to one automaker.) In Japan, the practice of no product-specific contracts prevailed for two-thirds of the respondents in both 1989 and 1993. The US-Japanese difference cannot be measured by a comparison of contract lengths because the implicit contract in Japan tends to be longer than the basic contract which is renewed annually. An alternative measure of customer commitment is the duration over which the supplier thinks there is a high probability that it will continue supplying to the same customer. As shown in Figure 2, 87% of Japanese suppliers, as compared to 68% of firms in the US, thought that their customer's commitment would last more than 4 years, a typical duration of a model cycle. The actual record of trading with the same customer to date was significantly longer in Japan than in the USA. Almost 2/3 of US firms (but only a quarter of Japanese firms) had supplied their customer a product in their product line for 10 years or less, and less than 5 percent had supplied the customer for more than 20 years. In contrast, just over half of Japanese suppliers had traded with their customer for 20 years or longer.

The third indicator of voice is an orientation towards joint problem solving. If a competitor offered a lower price for a product of equal quality, an increasing proportion of US suppliers (from an average of 34% in 1989 to 53% in 1993) said their customers would help match a competitor's effort (see Figure 3). The US move towards a "voice" reaction is in contrast to the Japanese move towards "exit". Japanese suppliers who expected their customers to offer help declined from 45% to 40%, while those who expected them to switch to the competitor "as soon as is technically feasible" rose from 6% to 12% during 1989 and 1993.

A disturbing trend is the fall in the percent of respondents agreeing that they "can depend upon their customer to treat them fairly." In 1984, 36% of US respondents agreed with the statement, a figure which rose to 49% in 1989 (still below half!). The figure then fell to 41% in 1993. In Japan, well over half (68%) of respondents agreed with the statement in 1989, a proportion which saw a slight decline (though insignificant) by a few percent in 1993. (Again, the average masks very different policies by different automakers; for some customers, perceptions of fairness actually increased between 1989 and 1993.)

To summarize, more and more US suppliers have provided their customer with a detailed breakdown of process steps, so that the US-Japanese gap in this respect is eliminated by 1993. At the same time, customer commitment, measured either by past record or by suppliers' future projection, remains higher in Japan than in the USA. With respect to the orientation towards joint problem-solving, suppliers' expectations of voice response have increased in the USA but declined in Japan. Thus, there has been a limited, yet noticeable, convergence in the nature of US and Japanese supplier-customer links.

Voice and Auto Industry Performance: Further Evidence on Just-in-Time and Cost Reduction

Just-in-time production and delivery

Voice relationships also help alleviate another problem documented by the 1989 survey: the large batch sizes in which suppliers produce. Comparing 1989 with 1984 in Figure 4, we can see that lot sizes for both production and delivery became smaller in the USA. However, much of the change took place in lot sizes delivered, indicating that much suppliers were stockpiling their product. In 1993, over half of US suppliers were delivering in batches smaller than those in which they produced, indicating that they were stockpiling inventory. But the median difference between production and delivery lot sizes has shrunk for all firms since 1989 (see Figure 4). However, the median lot sizes for both production and delivery are significantly smaller for firms which have had voice relationships. Four years ago, the median production lot size was the same for both low-voice and high-voice firms. Since then, however, the high voice firms have made investments that have allowed them to reduce production lot sizes from ten days to five days. In contrast, low-voice firms have reduced their production lot sizes only to seven days. Delivery performance for voice suppliers is also superior: they deliver every two days,

while non-voice firms deliver every 4 days.

In Japan, as Figure 4 shows, there has been no improvement in the average production and delivery lot sizes since 1989. Without comparable survey observations before 1989, we must refer to other studies which show that production and delivery batches were reduced a great deal in Japan in the 1970s and early 1980s (e.g. M. Lieberman's work). What the 1993 survey does show, however, is that high-voice suppliers perform better than low-voice suppliers. In 1989, the median lot sizes for delivery was the same for high-voice and low-voice suppliers. Since then, only the high-voice suppliers have achieved a reduction in delivery batches. Moreover, median production batches have been significantly smaller for high voice suppliers since 1989. In 1993, high voice suppliers produced in lots that last the customer 12 hours, and delivered every 5 hours.

Overall, despite dramatic improvements in the last 10 years in the USA, US suppliers, on average, produce in lots which are four times as large as Japanese suppliers, while Japanese suppliers deliver six times more frequently than US suppliers (if one day is converted to 16 hours with two shifts per day). But as in the USA, around half of Japanese suppliers were delivering in batches smaller than those in which they produced, indicating that they were stockpiling inventory.

The continuing gap between production and delivery batch size explains why over half of all suppliers in the USA and just over a third of all suppliers in Japan agree with the statement "JIT only transfers inventory responsibility from customers to suppliers." The percentage of all US suppliers agreeing with the statement is slightly higher than in the 1989 survey. In both the USA and Japan, the statement was less likely to be endorsed by suppliers with voice relationships (one-third in the USA and 30% in Japan).

Costs and Margins

The last figure (Figure 5) shows one area in which voice relations have not made much of a difference in the USA: costs and profits. Despite the promise of "continuous improvement", little has occurred in the way of supplier cost reduction: average supplier costs actually rose almost 2% per year in nominal terms between 1988-1992, although costs did fall slightly between 1991 and 1992 (see figure 5). Supplier margins fell almost one percentage point per year between 1988 and 1992, and at an even faster rate between 1991 and 1992. (See Appendix 2 for definition of "percentage point"). Voice suppliers did not have any greater success at cost reduction than non-voice suppliers, and were not significantly more able to defend their margins.

In Japan, average supplier costs declined at 0.2% per year in nominal terms between 1988-1992, but 0.7 per cent in 1991/2. Supplier margins fell also, at one percentage point per year between 1988 and 1992. In contrast to US firms, Japanese voice suppliers did outperform non-voice suppliers in cost reduction by 1.5% per annum (see Figure 5). But they were not significantly better at defending their profit margins.

As a result, suppliers in the USA are reducing their prices, but this is often due to reduced supplier margins rather than reduced supplier costs. In Japan, suppliers are reducing their costs, but since prices are falling even faster, supplier margins are squeezed.

Conclusion: Supplier Relations at a Crossroads

In both the USA and Japan, the surveys identified better performance among suppliers who provide detailed process information to their customers, perceive their customer commitment to be long-term, and expect to engage in joint problem-solving with their customer. However, these "voice" suppliers constituted only a minority: 29% in the USA and 32% in Japan.

This cross-country comparison disguises different dynamics within each country. In the USA, suppliers are significantly more likely to provide detailed information to their customers, to have long-term contracts, to believe that their customers are serious about product quality, and to have defect-prevention systems in place than they were five years ago. These results all indicate progress toward a "voice" model of supplier relations, in which suppliers play an important role in solving joint problems and in coming up with fresh ideas about products and processes.

On the other hand, US suppliers do not feel their customers are more trustworthy than they were five years ago, do not receive much assistance from them in reducing costs or adopting new techniques, and are not convinced of the efficacy of just-in-time. All of these factors show that a "voice" model of supplier relations is not yet firmly in place in the US auto industry.

One factor which might account for a mixed picture in the USA is the divergence in purchasing strategy adopted by automakers producing in the US. Three distinct supplier relations strategies are identified by the survey. One strategy is largely a return to exit: suppliers receive only short term contracts (which average only slightly more than a year), and must bid against many other suppliers, largely on the basis of price, for renewal. A second strategy has been consistently voice-based, and has produced significant supplier cost reductions. The third group of companies was fairly exit-based in 1983, but has consistently moved toward voice, with longer contracts, and steady increases in suppliers' perceptions of their fairness. While these strategies are internally consistent, it remains to be seen whether they are compatible with each other. Given that the US-based automakers share much of the same supplier base, it may be unrewarding for some of them to use voice in an attempt to promote investment, while other customers are reducing supplier margins in a short-term effort to cut their own costs.

The survey data show that Japanese suppliers, as compared to US suppliers, still enjoy superior performance in a number of respects, including just-in-time production and delivery. This is a pay-off from long-term customer commitment and investment in voice-based relationships over the last few decades. But disturbing trends towards exist are on foot among some suppliers in Japan. Just when some US-owned automakers have come to realize the need to establish truly voice-based relationships with suppliers in order to compete on quality and technology in the global auto industry, some Japanese automakers are

sending signals to avail themselves of the exit option. One possibility is that this Japanese trend towards exit is a temporary and minor adjustment to the present contraction in car sales volume. Another possibility is that the exit strategy is adopted more widely as some Japanese automakers feel that their suppliers' continuous improvement effort is no longer paying off. It is hard to choose between these two possibilities now. And it is uncertain how much a voice model of supplier relations might become undermined in the Japanese auto industry.

Thus, the automotive industry is at a crossroads. The current situation in both the USA and Japan represents a compromise between pressures for short-term cost reduction (which lead toward an intensified Exit system) and the goal of long-term competitiveness (which is promoted by a Voice system).

Appendix 1: Survey Methodology

In spring 1993, the North American survey was mailed to every automotive supplier and automaker component division named in the Elm Guide to Automotive Sourcing (available from Elm, Inc. in East Lansing, Michigan). This guide lists the major first-tier suppliers (both domestic and foreign-owned) to manufacturers of cars and light trucks in the United States and Canada.

The target respondent was the divisional director of marketing at independent firms, and the divisional business manager or director of strategic planning at automaker components divisions. These individuals were selected on the grounds that they would have the broadest knowledge about both customer relationships and about their firms' products and processes. The respondents had a wealth of experience: they averaged more than 18 years in the auto industry, and more than 11 years with their company.

In Japan, the survey was sent out in July 1993 to all members of the Japan Auto Parts Industries Association (JAPIA), all automotive suppliers named in Nihon no Jidosha Buhin Kogyo 1992/1993 (Japanese Automotive Parts Industry) (published by Auto Trade Journal Co. Inc. and JAPIA, Tokyo, 1992), and automakers' component divisions. This publication lists all the first-tier suppliers (both domestic and foreign-owned) to the eleven assemblers of cars and trucks in Japan. In order to maintain consistency with the US sample, respondents were asked not to respond with respect to heavy trucks and buses.

The target respondent in Japan was the Director of Sales and Marketing at independent firms. For member companies of JAPIA, the survey was sent to the main contacts named by JAPIA, many of whom were either chief executives or marketing directors. JAMA (Japan Auto Manufacturers Association) took responsibility to identify the respondents for automaker components divisions. The Japanese respondents were generally well experienced; they had worked on average 22 years at their company.

Because many companies supply their customers with several different types of products, and their relationships with their customers differ by product, respondents in

both North America and Japan were asked to answer the survey for their most important customer regarding one product which was typical of their company's output.

The responses were far above the norm for business surveys. For the 1989 survey (carried out in the US only) it was 49%. For the 1993 surveys, it was 55% in North America and 30% in Japan (45% among JAPIA members), after taking into account those firms which were unreachable (mail sent to them was returned undelivered), and those which were not eligible to answer the survey (they were not first-tier automotive suppliers, or they specialised in supplying for heavy truck and buses).

A similar survey will be conducted under Sako's supervision in Europe in early 1994 with sponsorship from the IMVP and the UK Department of Trade and Industry.

Appendix 2: Note on terminology

A percentage point change measures the difference between one rate and another rate. For example, the change between a 6% margin and a 4% margin is 2 percentage points.

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Figure 1

Information provided to customers

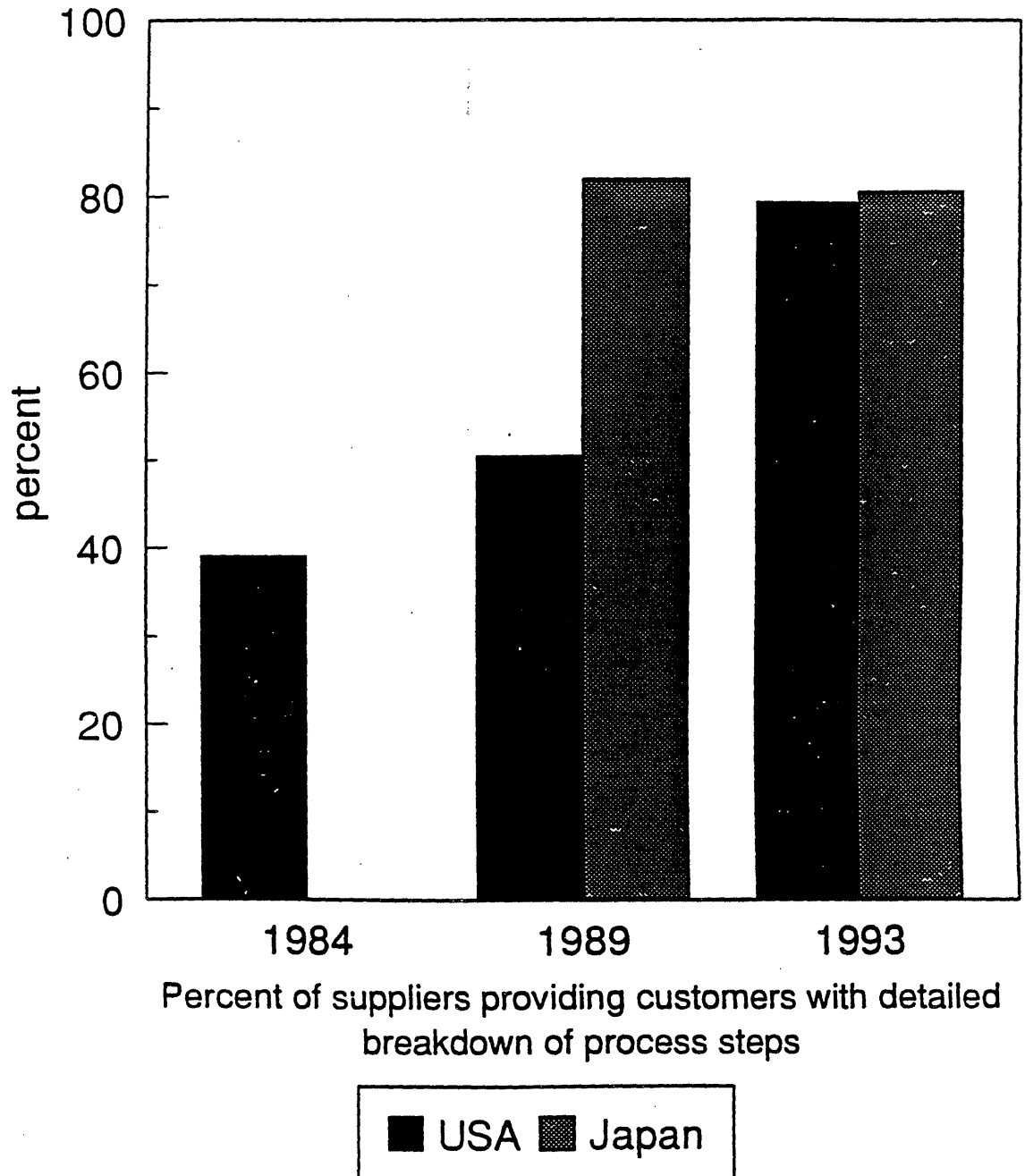


Figure 2

Customer Commitment

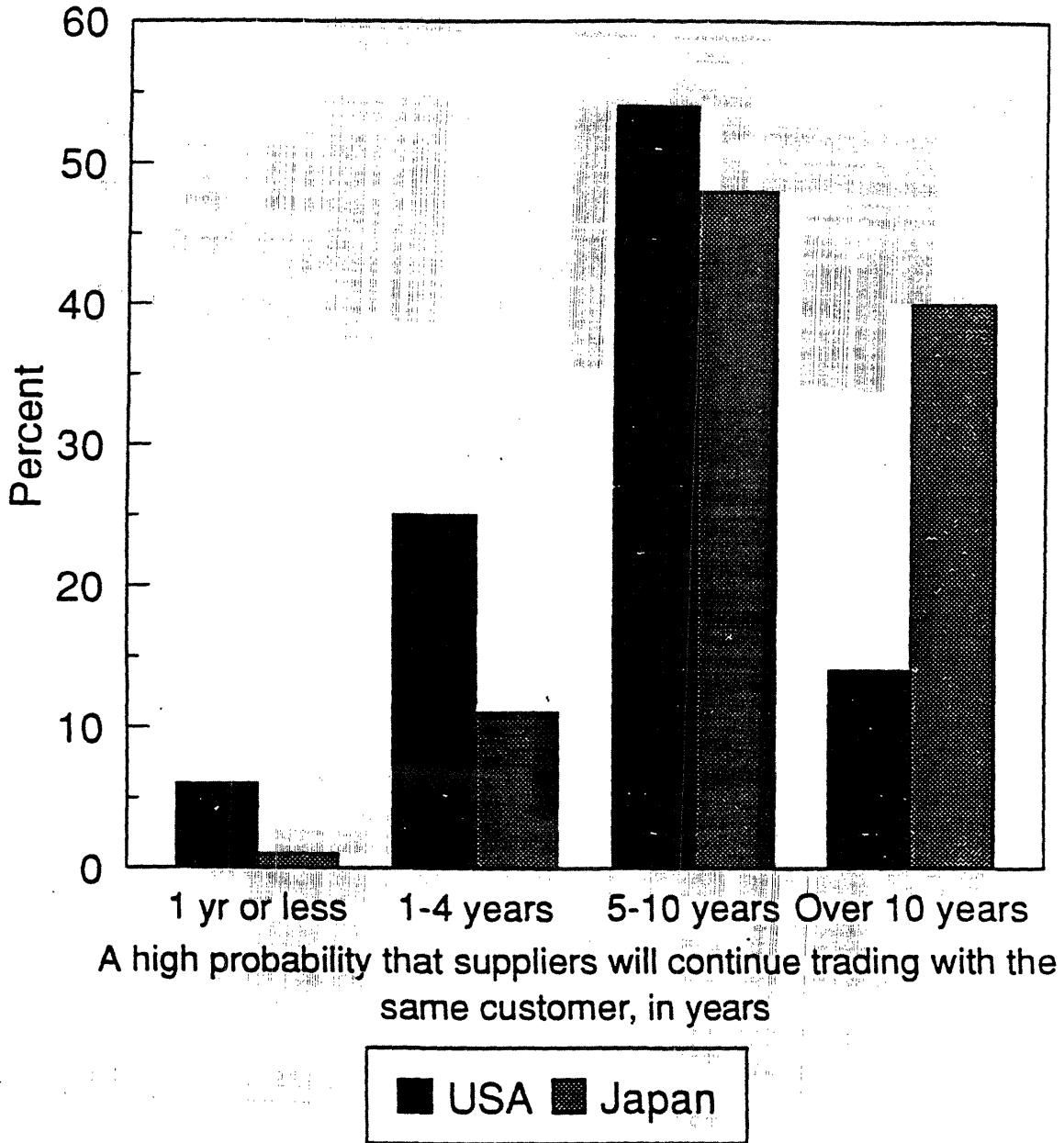


Figure 3

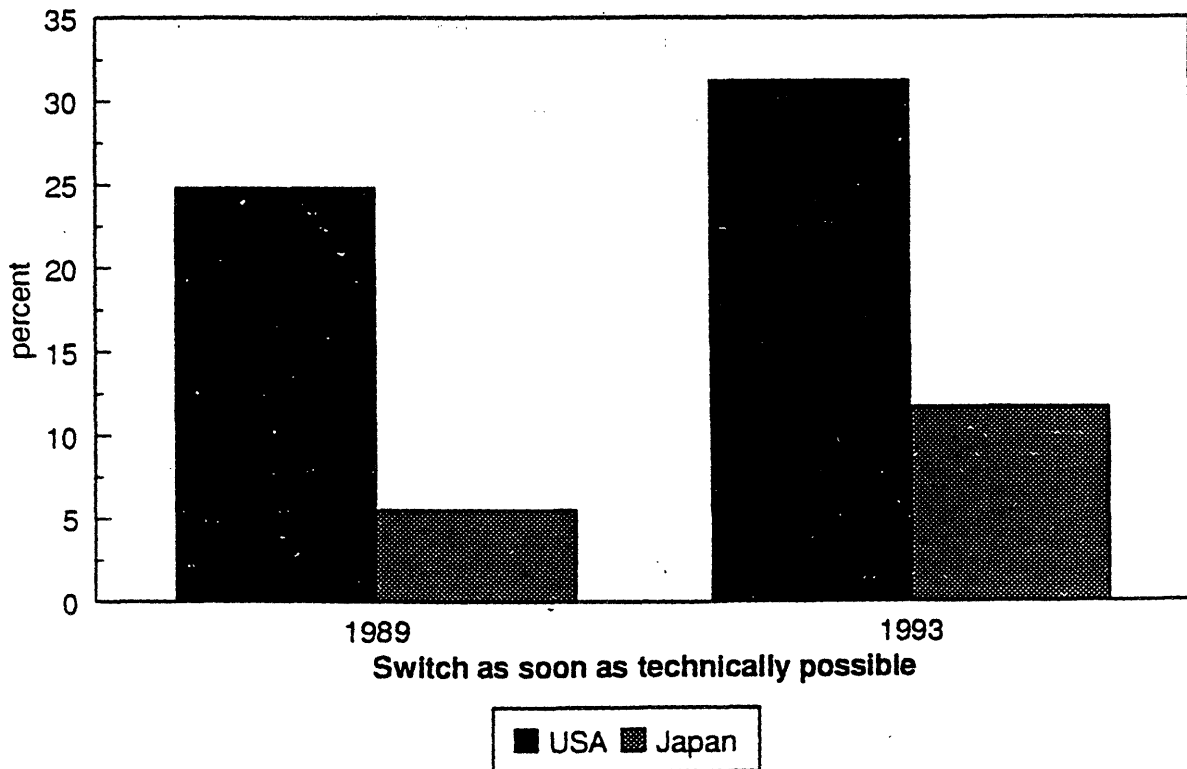
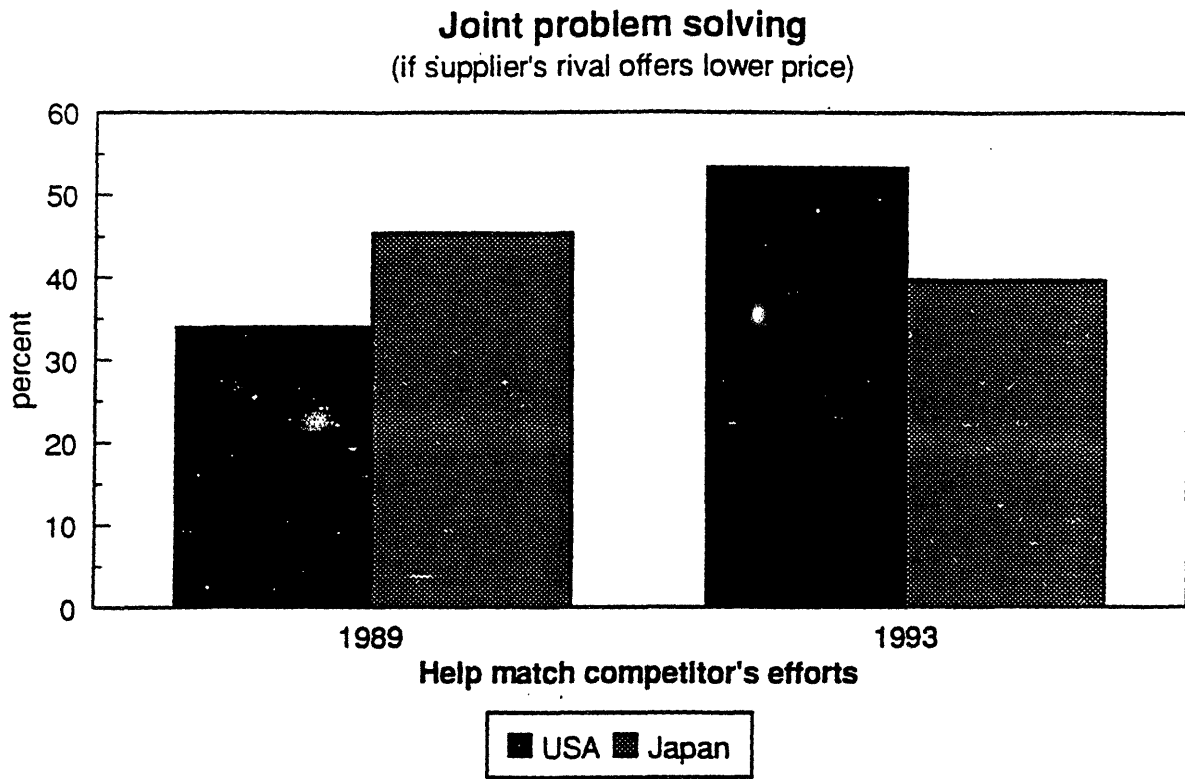


Figure 4

Lot sizes in USA and Japan

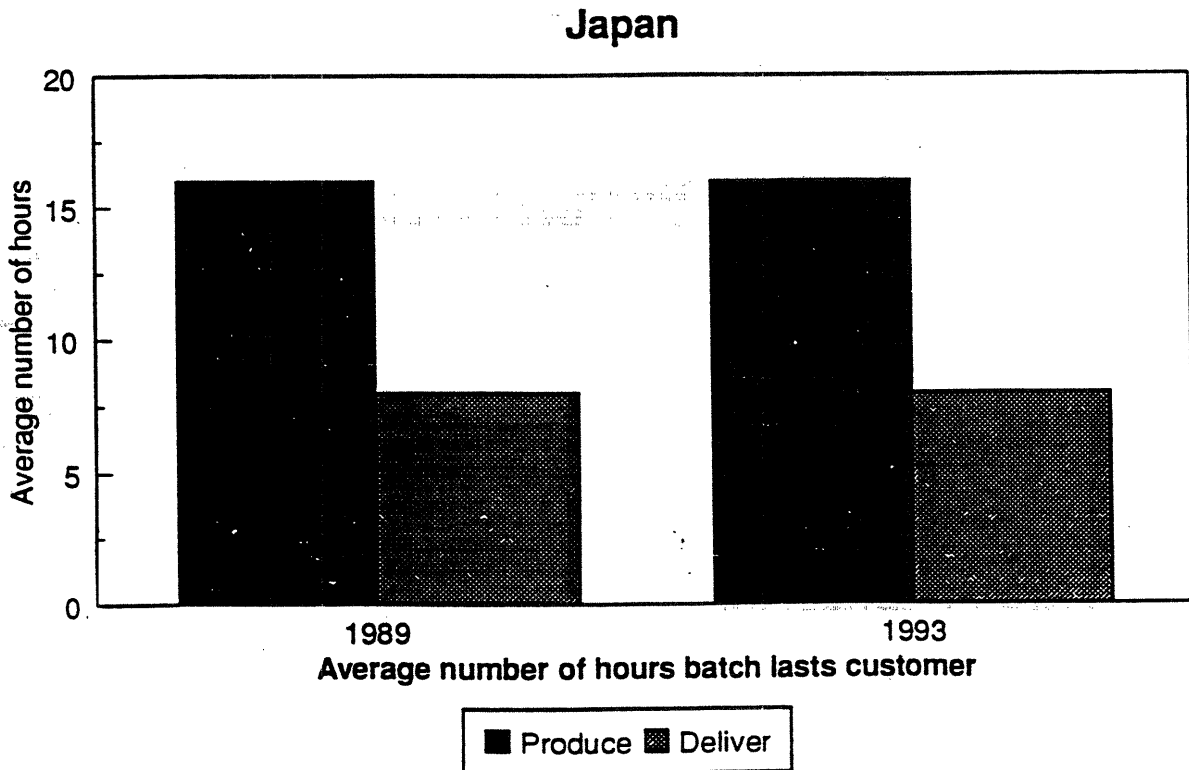
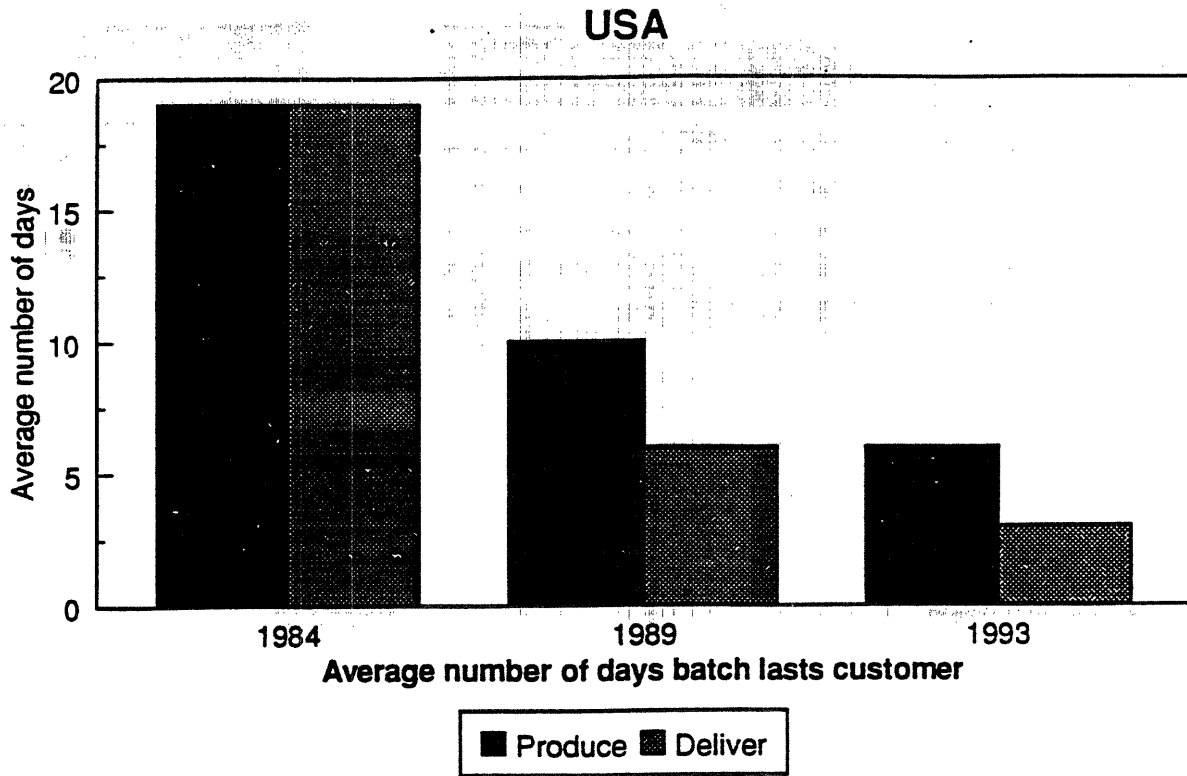


Figure 5

