

**AN EXPLORATORY STUDY OF THE INTRODUCTION
OF ONLINE REVERSE AUCTIONS**

Sandy D. Jap**

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** Sandy Jap is Associate Professor of Marketing at the Goizueta Business School at Emory University. Her address is 1300 Clifton Road, Atlanta, GA 30322. Phone 404.727.7056, fax 404.727.3552, Sandy_Jap@bus.emory.edu, www.bus.emory.edu/sdjap

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ABSTRACT

Buyers are increasingly turning to online reverse auctions in their negotiations with suppliers. How do these price competition mechanisms affect buyer-supplier relationships? I consider this question in the context of a quasi-experiment involving six online reverse auctions conducted in the supply base of a major industrial buyer. The results indicate that these auctions increase both new and current suppliers' beliefs that the buyer would act opportunistically, particularly when open-bid auctions are used. Paradoxically, the supplier's response in sealed-bid auctions is to *increase* willingness to make dedicated investments toward the buyer. Although these auctions can yield cost savings, the savings are category-specific and not systematically related to an open or sealed-bid format. Implications for the use of online reverse auctions in industrial sourcing activities are also discussed.

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INTRODUCTION

In recent years, Internet technologies have yielded a wide suite of tools to manage sourcing between industrial buyers and their suppliers. These tools aid in contract negotiation, expenditure analysis, supplier selection, risk management, and optimal supplier performance. In fact, technological efficiency could produce nearly \$1 trillion of savings from the \$7 trillion annual expenditure on components, suppliers, and services worldwide, according to one estimate (*USA Today*, 2/7/00, B1). How this will happen remains an open question; across virtually all industries, buyers and suppliers wrestle with how to use Internet technology effectively. I am particularly interested in how emerging Internet-based tools will influence the ongoing relationships between buyers and suppliers. Extensive research has already examined successful interorganizational exchanges, but almost none of it considers the *interface* between emerging technologies and ongoing relationships between buyers and suppliers. This research addresses this gap.

I consider how the use of online reverse auctions affects the firm's relationship with the supply base. Such auctions have been dubbed "reverse" because *sellers* bid instead of buyers, and prices are bid *down* instead of up. These auctions are standard in ECommerce toolkits of companies such as Ariba, CommerceOne, Freemarkets, Oracle, B2E Markets, and a variety of vertical hubs (Scott-Lewis 2001) and have been adopted by leading firms in many industries including aerospace, automotive, communications, consumer products, pharmaceutical, and technology industries as well as the United States military (Friedman et al 2001).

Buyers tend to believe that online reverse auctions are efficient, although anecdotal evidence suggests that the online auction experience can be extremely disturbing:

I am a supplier and very recently had this experience with my major customer. To sit for five hours and watch business that you have developed, maintained and serviced for forty years being carved up and slowly

disintegrate is a very traumatic experience. Are we seeing the demise of a purchasing staff and sales force, as I know it today? — Jack Bailey (*Purchasing*, June 15, 2000)

[The buyer] talks about the relationship being a partnership and this [the auction] really takes that away. There is not a partnership there at all. What they do is take your existing business that you have worked very hard to achieve and maintain. You work with them to give them cost reductions over the years and they send it out across the board for a competitive bid. I just do not think that is fair. -- Supplier who participated in the online open-bid auctions in this research

The possibility thus remains that the *process* may produce grave consequences for supplier attitudes and perceptions of the buyer. This research focuses on this possibility.

I consider online reverse auctions in industrial sourcing contexts and ask questions like:

How does open vs. sealed-bids in an online reverse auction affect a supplier's attitudes and strategic position or bidding performance and motivation? Are suppliers motivated to serve the buyer better? Do the effects differ for current and new suppliers? I investigate how such auctions influence (i) supplier suspicions toward the buyer, (ii) the buyer's cost savings from the auction, and (iii) the supplier's willingness to make idiosyncratic investments. The goal is to expose the general effects of online reverse auction *processes* on supplier attitudes, motivations, and performance. I do not attempt to explain how specific components of these auctions (e.g., the number of rounds of bidding, the nature of price visibility, etc.) affect supplier behavior. Future research can address these questions.

The research involves six quasi-experiments in the supply chain of a major industrial manufacturer. While it is too early to know the long-term effects of online reverse auctions on buyer-supplier relationships, one can examine the short-term effect. Drawing on existing economics, marketing, and psychology theories as well as my own experience and extensive interviews with participating sourcing managers, suppliers, and auctioneers, I consider the extent to which these theories generalize to the firm's use of an open or sealed-bid auction across a variety of products.

This research thus makes several contributions. We can better understand the effects of Internet technology on relationships between industrial buyers and their suppliers, based on a systematic, empirical test in the supply base of a major industrial manufacturer. The research asks if interorganizational relations theories are generalizable to online contexts. It also suggests when and how a firm should use auctions for its supply base, providing insight into how buyers and suppliers might better organize and manage their electronic procurement activities.

The paper is structured as follows: In the next section, I discuss the role of online reverse auctions in the buyer's relationships with suppliers, and I then describe two types of online reverse auctions commonly used in industrial sourcing activities. This is followed by hypotheses as to how supplier attitudes, motivation, and performance might vary between open or sealed-bid auctions and between new or current suppliers. The research setting is described and hypotheses are tested. The paper concludes with a discussion of results, limitations, and managerial implications.

ONLINE REVERSE AUCTIONS

RELATIONAL AND TRANSACTIONAL EXCHANGES

Buyers can develop a wide array of purchasing arrangements with suppliers. On the one hand, they can take an arms-length transactional approach, which explicitly defines buyer and supplier roles in pre-established contracts; buying is focused around the specific transaction, and the orientation is win-lose. Alternatively, buyers could foster more collaborative sourcing arrangements involving specific knowledge and implicit understandings, in which parties focus on mutually beneficial activities and processes. Most purchasing arrangements fall between these two extremes. Heide (1994) further discusses the differences between these two types of exchange.

The present research context involves a variety of sourcing relationship types, ranging across the spectrum of transactional to collaborative arrangements. Many supply relationships are transactional, yet it is also possible that a supplier's contract is renewed every 2-5 years on a long-

term basis. Hence, suppliers may have considerable experience with the buyer over the years. This mix of relationships is considered across six product categories that vary widely in terms of their sourcing and supply management strategies. This is done to enhance the generalizability of the research. The only type of relationships not represented in this research are strategic sourcing agreements in which the buyer and supplier are highly interdependent, make mutual idiosyncratic investments and actively create mutually beneficial, “pie-expanding” opportunities together (cf., Jap 1999). Suppliers in such relationships are rarely asked to participate in online reverse auctions.

Online reverse auctions have increased in popularity because they emphasize short-term price savings and can simplify and support negotiation. In fact, such auctions have been shown to achieve gross savings (over historical cost in unit prices) from 5-40% (Tully 2000), with an average of 15-20% (Cohn 2000). These auctions also drastically reduce the average time involved in negotiation (measured as the point of mailing a request for purchase to the compilation of a subset of viable bid offers) from six weeks to the span of a few hours. Online technologies now enable temporal and geographical conveniences, reduced cost of contact, instant feedback, and privacy, which manual auctions could not offer. Hence, such auctions are ideally suited for transactional exchange contexts, but may be less appropriate for relational exchanges. Some have argued that auctions hinder collaboration in relational contexts (Emiliani and Stec 2001). This may be because such auctions do not allow the expression of non-price attributes such as quality, service and reliability. It might also be that such auctions threaten buyers’ very existence and purpose in long-term exchanges. Consider the comments of Roger A. Whittier, director of corporate purchasing at Intel:

Intel has run several successful auctions to move surplus equipment and material. [However,] I haven’t had that much interest out of buyers. Frankly, when you go to buyers and say I want to start reverse auctions, they feel very threatened by it. They feel they add value as negotiators and through sourcing and so forth. In any kind of business where you actually make a difference by negotiating, picking specifications and having some kind of relationship, then reverse auctions don’t make a lot of sense. (*Purchasing*, June 21, 2001, p. S2).

Despite this doubt, some writers continue to maintain that online reverse auctions should play a key role in long-term sourcing arrangements since they provide the greatest payback in a direct purchase expenditure (Scott-Lewis 2001). No systematic research effort has yet examined the impact of online reverse auctions on mutually beneficial relational exchanges between industrial buyers and suppliers.

THE AUCTION PROCESS

I focus on one-sided (one buyer and multiple sellers) sealed and open-bid auctions, because these two kinds differ starkly in format. Open and sealed-bid auctions mark opposite ends of a continuum of auction types that differ in their degree of price visibility (suppliers' ability to view their competitors' bids): Sealed-bid auctions have no price visibility, while open-bid auctions have full price visibility to bidders. Most online auction formats developed since are essentially variations of these two types. For a more complete discussion of the evolution and direction of online reverse auctions in industrial sourcing activities, see Emiliani (2000) and Jap (2002).

The online reverse auction process typically begins with the buyer posting a request for purchase (RFP) to a website and inviting specific suppliers to view the RFP. In a sealed-bid auction, suppliers are asked to submit their bids a few days or weeks later, and a winner is subsequently selected. Only the buyer views the bids. In this research, the sealed-bid event involves a single round of bidding. In the open-bid auction, suppliers bid sequentially through a series of product lots or sub-groups and can view their competitors' bids and respond in real time. A moving end-time (a "soft close") is used for each lot, meaning that any bid within the last minute of the closing time will automatically extend the close time for a few minutes to allow other bidders to respond.

DEVELOPMENT OF HYPOTHESES

This section begins by considering the theoretical literature on auctions, and then draws on economics, marketing, and psychology research, as well as interviews with auction participants to develop specific hypotheses. The theoretical literatures illuminate the motivational and strategic concerns of participants while the interviews identify specific organizational characteristics that constitute the sourcing context. A critical set of dependent variables emerges: opportunism suspicions, willingness to make idiosyncratic investments, and cost savings. I consider how these variables may differ across auction (open and sealed) and supplier (new or current) type.

A PERSPECTIVE ON THE THEORETICAL LITERATURE ON AUCTIONS

A large number of economics studies examine auctions from theoretical and empirical perspectives (see Milgrom 1989, McAfee and McMillan 1987, and Kagel 1995 for an overview). While some similarities exist between the online reverse auctions used in industrial sourcing today and the auctions of the theoretical literature – for example, the focus on price competition in a structured negotiation format with well-defined rules for the submission and modification of bids – a number of significant differences make it difficult to generalize from the economics literature to industrial settings. Major differences include product type, winner determination, interdependent bidding practices, and emphasis on bidder behavior over context. The products in the auctions of the theoretical literature tend to be commoditized, with price determining the product's complete value. In the marketplace, many online reverse auctions may involve products differentiated by price, quality, or other attributes.

A second major difference is that the vast majority of auctions examined in the theoretical literature specify how to determine the winner of the event, typically on a first- or second-price basis (e.g., Bulow and Klemperer 1996; Holt 1980; Milgrom 1989). In the marketplace, however, buyers have full latitude to select the winning supplier on *any* basis; the only explicit commitment

that the buyer makes is to award the contract to one of the participants. Suppliers in the marketplace may not understand how competitive their offer is, while bidders in the auctions of the theoretical literature understand exactly where they stand relative to their competitors and are able to use this information to determine their responses to competitive bids.

A third major difference lies in the sequential bidding of interdependent product lots in online reverse auctions. Bidders must consider not only individual prices, but also their capacity to accommodate the lots. This bidding problem can be complex, as the bids placed in the first lot may determine the supplier's bids for the next lot, and so forth. Although some researchers have examined multi-unit purchases of homogenous commodities (Kagel and Levin 2001; Swinkels 2001), interdependence among heterogeneous non-commodities has yet to be addressed.

Finally, the theoretical literature focuses on the *processes* by which individual actions translate into prices but not on the auction context. Economists thus consider differences among bidders' valuations of auction objects, bidder characteristics (e.g., risk aversion), psychological mistakes (e.g., the winner's curse), and the effect on prices in a variety of auction formats (e.g., sealed, open, English, Dutch, etc.) that vary in allocation rules. I therefore draw on the economics literature on auctions only in a limited way to develop the hypotheses. Instead, there is a heavier reliance on interorganizational theory, particularly transaction cost economics, to determine the influence of online reverse auction processes on supplier attitudes and perceptions of the buyer.

SUPPLIER SUSPICIONS OF OPPORTUNISM

Although both buyers and suppliers want to make profit, they differ in approach. Buyers want to reduce the price of purchased materials so as to reduce the cost of goods sold. Suppliers want to maximize sales, particularly through long-term relationships that emphasize quality and delivery. These conditions breed discord and suspicion. The buyer's choice to use a sealed or

open-bid auction may arouse the supplier's suspicion that the buyer is using the auction opportunistically against the supplier.

Opportunism, long a hallmark of the transaction cost economics framework, is defined as self-interest seeking with guile. It is synonymous with misrepresentation, cheating and deception, subsuming a range of (mis)behavior such as adverse selection, moral hazard, shirking, sub goal pursuit, agency costs, and free riding (Williamson 1996a) and has received growing attention in recent years (Brown, Dev and Lee 2000; Wathne and Heide 2000). It is worth noting that opportunism is not merely a form of distrust. Trust is a broad, meta construct with many facets and levels; scholars across multiple disciplines do not fundamentally agree on the meaning of trust (Rousseau, Sitkin, Burt and Camerer 1998). Opportunism is more delimited and behavioral in nature. It is observable by the supplier and grounded in specific actions. It should create reduced attributions of trust.

I focus on the supplier's *suspiciousness*--its perceptions--that the buyer is acting opportunistically, rather than on *proven* opportunism, because the supplier typically cannot verify the buyer's guile. The supplier's behavior is affected by its misgivings about the buyer's character (cf., Rusbult and Van Lange 1996); when the supplier suspects the buyer, the supplier usually holds back from the relationship, avoiding vulnerability to further opportunism (Ping and Dwyer 1992, Williamson 1985, 1993). Suspicion might also motivate the supplier to use additional safeguards (contracts, incentives, or monitoring) to protect and enforce the exchange.

Sealed versus open-bid online reverse auctions. Which auction format raises supplier suspicions of opportunism in industrial contexts? I expect that the supplier's opportunism suspicions will increase in online open-bid reverse auctions more than in sealed-bid reverse auctions because price competition is greater and more explicit in open-bid auctions. The fast-paced, dynamic bidding, along with the need to respond quickly to competitors' bids yields tense

negotiation and pressure on suppliers to cut prices vigorously. An open-bid auction increases the supplier's bargaining costs, making the process so disagreeable to suppliers that they will accept renegotiation rather than persist with current pricing levels (cf. Masten 1988). For the supplier, the open-bid format can force additional price concessions from the supplier, becoming a form of opportunistic rent seeking on the part of the buyer.

One could, however, argue that price visibility in open-bid auctions should reduce supplier suspicions since suppliers can gauge their bids relative to the competition and can choose whether to reveal their own value of the contract by responding to competitive bids. By contrast, the optimal bidding strategy in a sealed-bid auction demands that suppliers reveal their bottom line bids, as there will be no opportunity to change the bid, view competitors' bids, or respond to others' bids. In this sense, sealed-bid auctions appear to be more opportunistic.

In field interviews with suppliers, I learned that the compressed time frame of open-bid auctions creates a stressful context for the supplier. In private conversations, many suppliers complained that the format prevented them from carefully considering price bids and gave them a sense of being "out of control." Hence, the following hypothesis:

H1: The increase in supplier opportunism suspicions before and after the auction is greater in online open-bid than in online sealed-bid reverse auctions.

New versus current suppliers. Opportunism suspicions may also differentially increase between new and current suppliers. Current suppliers may have a rich history of exchange with the buyer. They understand the buyer's needs and constraints and may benefit from trust, implicit understanding, or relational norms. Their history could act as a switching cost, making it difficult for the buyer to choose a new supplier. But current suppliers do not have the benefit of past experience, which significantly reduces their bargaining power. A buyer's decision to use an electronic format could increase a current supplier's suspicions:

H2: In online reverse auctions, the increase in supplier opportunism suspicions before and after the auction is greater for current than for new suppliers.

THE SUPPLIER'S WILLINGNESS TO MAKE IDIOSYNCRATIC INVESTMENTS

The dedicated investments made by buyer and/or seller are a key aspect of their relationship. Such investments may be tangible (plant equipment, tooling, and design systems) or intangible (human resources, training) and typically increase the effectiveness and efficiency of one or both parties (Dyer and Singh 1998; Heide 1994; Lusch and Brown 1996; Noordeweir, John, and Nevin 1990). The supplier's idiosyncratic investments are a risk on behalf of the buyer to produce superior returns and joint value; they represent a supplier's commitment toward the buyer (Anderson and Weitz 1992). They are difficult for the supplier to redeploy if the relationship ends.

Sealed versus open-bid auctions. I expect that the supplier's willingness to make idiosyncratic investments decreases in open-bid auctions, because this format's rapid, dynamic price competition emphasizes price reduction more strongly. Open-bid auctions may also signal a focus on price in the short-term, fostering a market governance structure focusing on discrete transactions. Such a relationship does not foster mutual value or benefit in the long-term. The supplier's incentive to make idiosyncratic investments is therefore reduced, as payback is unlikely to be realized over time.

H3: The decrease in supplier's willingness to make idiosyncratic investments before and after the auction is greater in online open-bid than in sealed-bid reverse auctions.

One can argue for the opposite effect. Availability of information about pricing in an open-bid auction clarifies the supplier's standing relative to the competition and gives it additional information about the likelihood of recouping the value of dedicated investments in the exchange. After observing competitive pricing, suppliers may be motivated to make idiosyncratic investments so as to attain superior value, improved coordination, or scale economies. By contrast, a sealed-bid

auction does not provide a supplier feedback about its relative standing but rather encourages it to minimize its bid price at all costs.

New versus current suppliers. As buyers turn to online auctions in sourcing, the motivation for current suppliers to make idiosyncratic investments may be reduced, as the current suppliers' value – their knowledge of the buyer and its specific needs – is not readily conveyed in electronic contexts. Little opportunity exists to communicate and explore potential mutually beneficial activities and processes stemming from idiosyncratic investments. As negotiation focuses on short-term price, suppliers see little incentive to create long-term investments with the buyer; accordingly, I anticipate that:

H4: In online reverse auctions, the decrease in willingness to make idiosyncratic investments before and after the auction is greater for current than for new suppliers.

THE BUYER'S COST SAVINGS

A chief concern of the buyer is cost savings, defined as the percentage reduction in price from historical costs, and an important metric in industrial procurement. Does a sealed or open-bid auction yield higher savings? There is a large literature in economics that considers this question for auctions with well-defined parameters (i.e., specific allocation rules, revealed number of bidders, single commodities, etc.). These results indicate that when the bidders have *common* values, the open-bid auction format will produce greater cost savings (Milgrom and Weber 1982). When bidders' values for the contract are common, the value of the item is the same to all bidders, but bidders have different information about the underlying value. These characteristics are true of industrial sourcing auctions. A true value exists for the contract: the worth of the contract in the market. But no one knows this true value, and each bidder guesses differently as to how much the item is objectively worth. In an open-bid format, the bids partially make public each bidder's private information about the true value of the contract. Each bidder is thus able to learn from the bidding process and adjust its bid closer to the true value of the contract.

It is important to note that these results hold in auctions where the rules of allocation are clear; in this research, the rules of allocation are more ambiguous. The buyer retains full latitude in selecting the winner, regardless of the nature of the price bids, which may influence bidder motivation such that they do not bid as predicted by economic theory. Whether or not the theory is able to generalize to the open and sealed-bid auctions of the current marketplace remains an open question. Thus, the hypothesis from the theoretical literature is that:

H5: The buyer's cost savings are greater in online open-bid reverse auctions than in online sealed-bid reverse auctions.

New versus current suppliers. Which suppliers provide greater savings: new or current suppliers? The auction literature is silent on this issue. I believe the question is empirical and yields three possible outcomes. One could argue that new suppliers should be more aggressive than current suppliers, as new suppliers gain not only a purchase contract but also the opportunity to potentially remain in the supply base for the long run. Alternatively, one might argue that current suppliers should be more aggressive than new suppliers as the current suppliers have much to retain. These suppliers have built a history of exchange and learning with the buyer. A third possibility is that both effects operate simultaneously, producing no discernible empirical differences. I reserve prediction on the direction of this result and examine the empirical outcome in a later section.

METHODOLOGY

RESEARCH SETTING

The research was conducted from 1999-2000 in the supply base of a major firm in the automotive industry that bought a variety of components and parts. The automotive industry has been an early adopter of online reverse auctions, developing Covisint, one of the largest online markets in which online reverse auctions play a significant role in materials sourcing for the major auto manufacturers. In 2001, Daimler Chrysler held a reverse auction through Covisint, and the total order volume exceeded \$2.5 billion, making it the largest single Internet-based auction. The

participant firm in this study rarely engaged with suppliers in long-term strategic partnerships. Instead, the buyer's mix of supplier relationships would vary in product categories along the spectrum of transactional to collaborative sourcing arrangements.

In the fall of 1999, the company experimented with various types of auctions over a six-month period and evaluated the financial, relational, and strategic consequences. A variety of sourcing managers were asked to host either an open or sealed-bid online auction. As an independent researcher, I could make recommendations to the firm but ultimately could not intervene as much as I would have liked; for example, I was unable to control the number of suppliers, lots, or product types in each event. I was only allowed to survey suppliers before and after the event, to conduct post-auction interviews with suppliers, and to interview sourcing managers throughout the process.

Approximately \$100 million worth of purchase contracts were made available for bid in three open and three sealed-bid auction events in six different product categories. None of these products were pure commodities, such as MRO supplies or highly customized strategic parts. All the products were used in production or directly for parts in production. The product categories thus differed in non-price characteristics, and supplier relationships could play a significant role in exchange. Table 1 provides an overview of the product categories, as well as the number of bidders and lots in each auction.

The sourcing manager qualified (through visits, questionnaires, and research) a list of viable suppliers before each event. The manager then invited a subset of suppliers to bid in the auction. All the auctions were conducted by a third party auctioneer who informed the suppliers of the event rules: (i) the sourcing manager committed to select a winner from each event on any basis; the lowest bid was not guaranteed to win the contract, (ii) the sourcing manager was prohibited from bidding against suppliers in the auction (an unethical practice known as "shilling"), (iii) all

competitors were viable pre-qualified sourcing options for the buyer, and (iv) supplier bids were legally binding. The suppliers were not told who their competitors were or how many suppliers would bid against them.

Since suppliers in the open-bid auctions had virtually no experience with these formats, the auctioneer trained them to use the online interface, so as to understand cost structures prior to the auction and to bid at, not below, their marginal costs. The auctioneer also helped the supplier imagine various scenarios to help mitigate the pressure of the real-time bidding decisions. The auctioneer's role worked against the probability of my finding significant results. By encouraging suppliers to provide high-quality, educated, and enlightened bids, the auctioneer decreases the likelihood that observed changes in the dependent variables of interest are due to confusion, misunderstanding, or other problems that might arise from suppliers being ill-prepared for the open-bidding experience.

DATA COLLECTION

The data collection is a multi-method approach, involving extensive interviews with participants and an untreated control group quasi-experiment with a pretest and posttest around the auction events (Cook and Campbell 1979). The treatment variables are auction type (i.e., sealed/open) and supplier type (i.e., new/incumbent), and the dependent variables are suspicions of opportunism, willingness to make idiosyncratic investments, and cost savings. The field design features an array of controls, including (1) pretest and posttest survey measures from the same panel of suppliers in the treatment group, (2) control groups, and (3) replication of the auction across multiple product categories. I initially tried to administer the control group survey twice, to correspond to the pretest and posttest surveys, but found that no noticeable change occurred over a week. Also, suppliers resisted completing the survey twice with little change of their circumstances in between.

Procedure. In each product category, in-depth interviews were conducted with sourcing managers to get a better understanding of the exchange context, the composition of the supply base, and the expectations and strategic intentions for each auction. These managers provided the names and contact information of the qualified suppliers in the treatment group. Since buyers do not always involve their entire supply base in a negotiation, for the purpose of this research, the sourcing manager provided contact information for suppliers not invited to the event but equivalent to the treatment group (in production capability, price competitiveness, product offerings, etc.). These suppliers formed the control group. The managers understood the purpose of the control group within the research design and carefully selected participants.

Researchers sent suppliers in the treatment and control group an email invitation one week prior to the event, specifying that the respondent should be knowledgeable about the firm's specific relationship with the buyer. For the treatment condition, the invitation also asked that the respondent be someone who would participate in the upcoming bid process. Suppliers in the control group were not told that the buyer was hosting a competitive bid event in their product space; they were merely asked to participate in a study on buyer-supplier relationships. The invitation directed suppliers to the survey on a university website. It also guaranteed individual anonymity to the buyer and reassured suppliers that the buyer would not have access to individual responses. The survey directed the supplier to complete all items in reference to the specific buying organization. One week after the auction, researchers sent suppliers in the treatment group an email invitation to complete the posttest survey. Throughout the data collection, I monitored the buyer's activities to insure that no major events or initiatives (e.g., retroactive charge backs) occurred to disrupt or alter supplier perceptions and attitudes.

Respondents. Respondents were typically senior executives, vice-presidents, and even owners of the supply business who handled large customer accounts and had the authority to

determine major investment decisions and to make price concessions. At the time this research was conducted, online auctions and electronic bidding had hardly permeated the marketplace, such that suppliers had virtually no experience with these formats.

Sixty-eight of the 154 bidders completed the surveys, yielding a response rate of 44%. Thirty-three of the 68 bidders responded in the open-bid auctions and 35 in the sealed-bid auctions. Twenty-eight of the 68 respondents were new suppliers and 40 were current suppliers. The control group was comprised of 87 suppliers; 50 of these suppliers completed the survey, yielding a response rate of 57%. Thirty three percent of the suppliers in both the treatment and control groups were new suppliers while the remainder was current suppliers.

Respondent competency. Since some of the hypotheses rely completely on suppliers' perceptions, the respondents must be competent to report, while differences in respondent knowledge, position, and perceptions are minimized. This end is accomplished by global and specific measures of respondent competency and knowledge of the phenomena. The global measure was the respondent's tenure with a firm. The respondents averaged 6.3 (sd=5.9) years of experience in their area and had been with their firms 10.7 (sd=5.1) years on average. The respondent's knowledge of the relationship with the buyer was assessed by questions at the conclusion of the pretest and control questionnaire. The respondents were asked, "How knowledgeable are you about the following aspects?" Below were listed items such as "Your firm's willingness to work with [the buyer firm]," "The degree to which your firm trusts [the buyer firm]," or "Your firm's willingness to invest in a customer." Responses varied along a 7-point rating scale (1=Not Very Knowledgeable, 7=Very Knowledgeable). Throughout the manuscript, all scale scores of multi-item measures reflect the mean score of the multiple items, not a sum score. The average response to these scales was 6.4 (sd=.57). Collectively, some confidence emerged that the

selected respondents were knowledgeable, relatively involved in the survey and unlikely to have made up answers to the items.

Measurement. All the scales used in this study are listed in Appendix 1. The supplier's *opportunism suspicions* refer to bad faith in the buyer. To measure bad faith and describe it in survey format, I conducted multiple pre-study interviews with sourcing managers and suppliers in other industrial product categories. Based on these interviews, I decided to measure the supplier suspicion with a four-item scale that reflects the firm's specific opportunistic behaviors (reneging, lying, falsifying information) as perceived by the supplier. The supplier's suspicion of opportunism shows a mean of 2.94 (sd 1.40) ranging in value from 1 to 7; the Cronbach alpha coefficient for this scale is .79.

The mean value reflects the relationship of a powerful buyer and a lower tier supplier. In the automotive industry, higher tier buyers regularly exercise their power over suppliers. It is thus natural that the suppliers would suspect the buyer of opportunistic behavior, although theoretical reasons also help explain this result. Williamson (1993) notes that firms tend to engage in business-as-usual rather than opportunism, partly because managers are well socialized and because governance structures mitigate opportunism. If opportunism is too high, the supplier would likely not exchange with the buyer at all.

The *supplier's willingness to make idiosyncratic investments* is a modified version of the scale developed by Cannon (1992), reflecting tangible and intangible investments that the supplier would find difficult to move into another relationship. The four-item scale indicates the extent to which the supplier is willing to make investments in training, production procedures, equipment, tools, and capacity to accommodate the buyer. The supplier's willingness to make idiosyncratic investments shows a mean of 4.50 (sd 1.68), with values ranging from 1 to 7; the Cronbach alpha

coefficient for this scale is .87. The correlation between this construct and opportunism suspicions is .12 ($p < .17$).

The measurement properties of these two scales are assessed using a confirmatory factor analysis with maximum-likelihood estimation methods in LISREL 8.03 (Jöreskog and Sörbom 1993). The estimated measurement model of the two latent factors, each with four reflective indicators, has a chi-square fit of 38.93 with 19 df ($p < .00$). The comparative fit index is .92, the incremental fit index is .93, and the Tucker-Lewis fit index is .89. All the factor loadings and measurement errors are in acceptable ranges and significant at $\alpha = .05$, providing evidence of convergent validity. The pair of constructs also passes the test of discriminant validity recommended by Fornell and Larcker (1981).

ANALYSIS OF HYPOTHESES

In order to assess the impact of the open- and sealed-bid formats on supplier attitudes, I consider how the supplier scores for these measures change from the pretest to the posttest. Since the quasi-experiment is a nonequivalent (due to its nonrandom selection process) design, the *expected* values of at least one characteristic of the groups are not equal even in the absence of a treatment effect (Cook and Campbell 1979). In order to obtain a reasonable estimate of the treatment effect, the analysis must therefore properly recognize and account for the effects of these initial differences: two steps accomplish this purpose. In the first step, the respondents in the pretest and control group are compared in terms of their demographics and intangible aspects along several dimensions such as annual sales, willingness to collaborate, satisfaction with the relationship and perceived dependence on the buyer. No significant differences are found. For reasons of space, the specific means and t-tests are not presented but are available from the author by request. The scales are listed in the Appendix.

While the lack of differences suggests that the groups are equivalent, the groups might show large expected differences on *other* variables that could affect the posttest scores. These differences are accounted for in the second step of the analysis, in which I use a between subjects nested design analysis to examine the hypotheses in the treatment group. The auction type is specified as a fixed factor and the product category and supplier responses as nested random factors. Then the following equation, in which the pretest measure is used as a covariate to adjust for initial differences between groups, is estimated:

$$\text{Posttest} = \text{Treatment} + \text{Product}_{(\text{treatment})} + \text{Pretest}$$

where:

Posttest = the posttest score on the variable of interest

Treatment = the treatment effect for open/sealed auctions or new/current suppliers

Product_(treatment) = the effect of product differences nested within each treatment effect

Pretest = the pretest score on the variable of interest

This analysis of covariance (ANCOVA) matches the pretest value to the predicted posttest value for all levels of the treatment and examines the differences between them. A statistically significant treatment effect would thus suggest that one level of the treatment would have significantly outperformed the other level controlling for differences in the pretest scores. By matching the pretest measure to each posttest measure, the ANCOVA has more power to detect true differences in the treatment effect than an elementary analysis of variance, which would consider only the posttest responses. I also assess the extent to which differences exist across product categories (differences in the value of the purchase contract, number of bidders, response rates, and number of lots). A significant effect of Product_(treatment) indicates a significant difference among the product events nested within auction type.

At this point, some readers might be concerned that suppliers would always suspect buyers of being opportunistic, expressing negative attitudes toward suppliers, or overstating their willingness to make investments. Such biases could increase the scores that I observe. Even so,

such biases would be operative at *both* the pretest and the posttest but would not explain a *change* in the scores over time, which is the focus of this research. It is also worth noting that at the time of the posttest, suppliers have not yet been informed of whether they have won the auction, reducing the likelihood that their responses to the posttest measures are simply a reflection of being “sore losers.”

Examination of H1. The first hypothesis posits the increase in opportunism suspicions to be greater in open than sealed-bid auctions. In the open-bid auction, the pretest mean was 2.64 (sd=1.27) and the posttest was 4.29 (sd=1.17); the difference is significant ($t_{64}=5.51$, $p<.00$). Throughout the manuscript, all t-tests are one-tailed. The pretest mean in the sealed-bid auction was 2.38 (sd=1.02) and the posttest mean was 2.84 (sd=.99); the difference is marginal ($t_{68}=1.94$, $p<.10$). The ANCOVA has an explained variance of .40. A statistical test of the treatment effect of auction type indicates that the effect is significant ($F=16.21$, $p<.05$), suggesting that the increase in scores in the open-bid auction is significantly greater than in the sealed-bid auction. I found no significant differences ($F=1.35$, ns) across the various product categories. Together, the results suggest that opportunism suspicions do not change in sealed-bid auctions but increase in open-bid auctions, and the difference between the conditions is significant: this finding supports H1.

Does a self-selection bias explain the increase in suspicions? I consider the possibility that suppliers who responded to the posttest in the open-bid condition were potential “sore losers” (didn’t offer high savings) of the auction and therefore might be more likely to express opportunism suspicions. This possibility would mean that suppliers who felt they had bid poorly in the auction would be more likely to express their negative attitudes toward the buying organization in the posttest survey than would suppliers who did not bid poorly (offered high savings). In case of such a bias, one should observe that suppliers who responded to the posttest offered systematically lower cost savings than the suppliers at the pretest. However, a t-test of the savings provided by suppliers

who responded to the pretest and posttest survey revealed no significant differences ($t_{64} = -.78$, $p < .44$), suggesting that it is unlikely that a self-selection bias accounts for the results.

Does the auction process explain the increase in opportunism suspicions? It was proposed that suppliers view the open-bid process as an unfair means by which the buyer gains concessions from the supplier. This possibility is further explored in several control items included in the posttest survey to capture the supplier's direct view of the auction process. Suppliers indicated their response to these items using a scale of 1=strongly disagree, 7=strongly agree. One item stated: "This process will reduce my chances of earning a fair margin on the business." The suppliers in the open-bid auctions average a response of 4.8 (sd=1.4), while suppliers in the sealed-bid auction show a mean response of 3.0 (sd=1.4). The difference between the means is significant at alpha .05.

Another item stated: "This process does not give a supplier a fair opportunity to bid on business." Suppliers in the open-bid auction show a mean response of 4.1 (sd=1.1) while suppliers in the sealed-bid event show a mean response of 2.7 (sd=1.6). Again, the difference in means is significant at alpha .05. Both of these items reflect the sense of exploitation suppliers associate with auctions. Together, they suggest that suppliers in the open-bid auctions view the auction process as more opportunistic than suppliers in the sealed-bid process.

Additional indicators of opportunism suspicions. Following the auctions, I conducted interviews with the suppliers in the open-bid condition to further assess the difference in opportunism suspicions across the treatment conditions. These interviews are not intended to provide causal evidence but rather to explain the difference. In the open-bid condition, the suppliers' responses show they believe the buyer purposely selected an unfair price competition structure. Three themes emerge: The first is that suppliers believe the buyer is using the open-bid format to *survey the market pricing* without any intention of awarding the business:

All they were going to do was just feel out what the numbers were going to be. Let's say they're looking at someone in Brazil or some Korean firm out there. At this point in the junction, they

weren't going to go with those guys based on what they were. So all these guys were throwing low bids, but it had no meaning as to what was going on. -- Supplier in open-bid auction

The second theme indicates the supplier's belief that the buyer had created *false competition* by including non-viable bidders:

I didn't think the competition I were dealing with in the atmosphere I were quoting really had the wherewithal that I had to supply the parts and do the things I had to do. – Supplier in open-bid auction

The third theme is the supplier's belief that the buyer is *shilling its bids* in order to push the price down artificially.

The irony here is that *none of the supplier perceptions correspond to reality*. As an independent observer, I knew that buyers had every intention of selecting a winner and had invited only viable suppliers to bid on the purchase contract. No shilling occurred; in fact, the buyer and auctioneer went to great pains to avoid such perceptions by clearly communicating the rules of the game. Thus, a significant gap exists between supplier perceptions of the event and reality, which should be cause for concern.

Examination of H2. The second hypothesis considers whether opportunism suspicions increase more for current than new suppliers. The pretest mean of new suppliers is 2.36 (sd=1.30), while their posttest mean is 4.19 (sd=1.38); the difference between the two means is significant ($t_{54}=5.11$, $p<.00$). For current suppliers, their pretest mean is 2.61 (sd=1.03), while their posttest mean is 3.10 (sd=1.03); the difference in these means is also significant ($t_{78}=2.11$, $p<.05$). The ANCOVA has an explained variance of .48. A statistical test indicates that the overall effect between new and current suppliers is not significant ($F=2.19$, ns), and the differences among product categories are not significant ($F=2.60$, ns). Hence, while opportunism suspicions increase, this increase does not differ between new and current suppliers.

Examination of H3. The third hypothesis considers whether the supplier's willingness to make idiosyncratic investments decreases more in open-bid auctions than in sealed-bid auctions. In

the open-bid auctions, the pretest mean is 4.89 (sd=1.34) and the posttest mean is 5.32 (sd=.90); these means do not differ significantly ($t_{64}=1.48$, ns). In the sealed-bid auctions, the pretest mean of the supplier's willingness to make investments is 4.13 (sd=1.67) and the posttest mean is 4.86 (sd=1.23); this difference is significant ($t_{68}=2.10$, $p<.05$). The ANCOVA has an explained variance of .32. A statistical test of the treatment effect of auction type indicates that the effect is not significant ($F= 1.95$, ns), which suggests that the mean increase does not differ across auction type. Nor does any significant ($F= .03$, ns) effect of differences in means exist across the product categories. Collectively, these results suggest in the sealed-bid condition, suppliers increase their willingness to make idiosyncratic investments, while suppliers in the open-bid condition do not change.

Why does willingness to make investments increase in the sealed-bid condition? Posttest interviews provide some speculative answers. In the sealed-bid auctions, suppliers view the process as an improvement over the manual processes of the past. They interpret the electronic bidding process as a signal that the buyer is informed about recent technological developments, which suggests a mutual orientation and potential benefit for both exchange parties. A buyer's technological stance toward mutual benefit increases the supplier's willingness to make dedicated investments.

Examination of H4. The fourth hypothesis considers whether the decrease in willingness to make idiosyncratic investments is greater for current than new suppliers. For current suppliers, the pretest mean is 4.03 (sd=1.64), and their posttest mean is 4.96 (sd=1.18); the difference is significant ($t_{78}=2.91$, $p<.00$). The pretest mean of new suppliers is 5.18 (sd=1.18) and their posttest mean is 5.26 (sd=.95); the difference is not significant ($t_{54}=.30$, ns). The ANCOVA has an explained variance of .21. A statistical test of the treatment effect of supplier type is not significant ($F= 1.16$, ns) and the differences across product categories are also not significant ($F= 1.19$, ns).

These results indicate that current suppliers increase their willingness to make idiosyncratic investments to match the level of new suppliers such that no significant difference exists in willingness across supplier type, post-auction.

Examination of H5. The fifth hypothesis examines whether the difference in cost savings is greater in open-bid than sealed-bid auctions. Since this information is extremely sensitive to the host firm, I do not reveal the absolute magnitude here. Instead, I provide standardized indicators to give the reader a sense of the relative magnitude of the savings across auction type. The unit of analysis for testing this hypothesis is the lowest bid of each lot. This number is then divided by the historical price and subtracted from unity to generate a cost savings percentage from the auction. Since the supplier bids are not normally distributed, I use the logarithms of the cost savings percentage offered in each lot are used to make the data less non-normal. This logarithm is then averaged with the savings of the other lots within the same auction type to produce a mean savings for the auction type. Hence, 21 lots produced varying cost savings percentages in the open-bid auctions, and these are averaged together to produce the average cost savings in the open-bid auctions (X_O); similarly a mean is computed for the sealed-bid condition (X_S). I index the mean of these two numbers (X_{OS}) to 100. The mean sealed-bid auction savings can then be reflected as 92, and the open-bid auction savings reflected as 108. The ANCOVA has an explained variance of .16. A test of the treatment effect indicates that it is insignificant ($F=1.29$, ns). However a statistical test of the effect across product categories is significant ($F=13.28$, $p<.00$). Collectively, these results indicate that although the savings across auction types does not differ, significant variation exists across product categories.

I also examine the differences in savings offered by new and current suppliers. In this case, the unit of analysis is the individual supplier's bid. I average the percentage cost savings offered by new suppliers and the percentage offered by current suppliers; they differ by less than one

percentage point. The ANCOVA has an explained variance of .18. A statistical test of the treatment effect indicates that it is insignificant ($F=.53$, ns); however, the effect of product categories is significant ($F=5.75$, $p<.001$). These results indicate that differences in savings occur due to differences across product categories and do not vary systematically across auction types.

DISCUSSION

The results of the quasi-experiment indicate that, online reverse auctions increase both new and current suppliers' beliefs that the buyer acts opportunistically toward the supplier, particularly in open-bid auctions. Paradoxically, the supplier responds to online auctions by increasing its willingness to make dedicated investments when the buyer uses a sealed-bid auction format. The results also show that current suppliers increase their willingness to make idiosyncratic investments toward the buyer. Although online reverse auctions can yield cost-savings, this savings is category-specific and not systematically related to an open or sealed-bid format. Together, these results indicate that online reverse auctions can exert complex relational effects on the supply base.

THE SUPPLIER'S OPPORTUNISM SUSPICIONS

The results clearly show that suppliers' suspicions of opportunism increase after an open-bid auction. Suppliers view the open-bid process as exploitative and unfair. After the event, suppliers voiced their resolution to avoid such events and condemned the process:

In the future, I would never play this game again. We'll play it, but what will happen is we'll be even more adamant as far as to what our prices are. It wasn't a very professional way to handle the business.

-- Supplier

The supplier's inference of the buyer's opportunism is critical because it affects the suppliers' view of exchange governance and their subsequent actions. In the future, suppliers might demand more explicit contractual assurances or contingency agreements in order to safeguard their returns. In order to maintain the lower pricing scheme, they may be forced to reduce quality, value-added services, or overall responsiveness to the buyer, all features that might also be withdrawn to retaliate

against the buyer. Hence, the supplier's suspicion of opportunism may motivate it to respond in kind (Axelrod 1984).

In fact, suppliers in the automotive industry are already beginning to organize themselves against online reverse auctions (*Automotive News*, 3/11/02), claiming that buyers abuse the auctions and calling for the creation of a formal code of conduct to discourage what they perceive to be opportunism. These suppliers contend that online reverse auctions have far outnumbered the actual contracts awarded, that buyers are using these auctions to see how low suppliers are willing to bid and then wringing additional price concessions from current suppliers. This scenario illustrates how the *mere perception* of opportunism around these online reverse auctions can poison relationships between buyers and suppliers.

The results also indicate that opportunism suspicions are heightened for *both* new and current suppliers, contrary to my predictions. For current suppliers, online reverse auctions may inhibit their ability to sell intangible aspects to the buyer. In fact, over 50% of the suppliers in the post-event interviews saw this inability to express their full capabilities as a disadvantage to electronic bidding mechanisms. It is surprising that new suppliers *also* display heightened suspicions. They may view electronic bidding as a poor medium for sales, or perhaps they consider such suspicions a "cost of doing business" with a powerful supplier. While the evidence and possibilities are intriguing, future research must determine the appropriate explanation.

THE SUPPLIER'S WILLINGNESS TO MAKE IDIOSYNCRATIC INVESTMENTS

One surprising result of this research is suppliers' increased willingness in the sealed-bid condition to make idiosyncratic investments in transactional exchanges. Suppliers evidently view the buyer's choice of an online sealed-bid auction as an attempt to improve the transaction, which is taken as a signal of mutual orientation and encourages suppliers to make dedicated investments, increasing the likelihood that suppliers can recoup the value of their investments in the long run.

The data also suggest that online reverse auctions may provide a useful “wake-up call” to current suppliers, who are as willing to make idiosyncratic investments in the buyer as new suppliers are. Current suppliers might also be signaling their commitment to the buyer in the long run.

THE BUYER'S COST SAVINGS

Another result of this research is that cost savings do not differ systematically across the online reverse auction type or supplier type, but may be affected by different characteristics and conditions of the auction event. Perhaps suppliers have not yet developed a long-term strategy to handle such auctions. Since this research involves only six online reverse auctions, I cannot investigate more fully how differences in the number of bidders, lots, size of the purchase contract, or other characteristics might have been systematically related to the level of savings for each event. To use online reverse auctions for direct sourcing activities is a complex decision, the success of which depends on a variety of conditions yet to be identified and understood.

Collectively, the results paint an intriguing picture of supplier reactions and financial implications in transactional exchanges. The prevailing theory would predict that economic actors are short-sighted, self-interested profit maximizers who respond to the signals and behaviors of their exchange partners. In reality, firms are not as short sighted and non-strategic as we might think, but rather make complex decisions regarding their exchanges. Perhaps this strategy is rational for firms who must make both short-term and long-term choices.

LIMITATIONS

The research exhibits some limitations. It is very specific in scope, considering only two types of one-sided online reverse auctions in transactional exchanges. The observed effects may not generalize to alternative online reverse auction formats, to procurement of indirect materials, or to close partnerships. And the supplier training may have decreased the amount of variation that was

observed in the bids. It is also not clear whether the observed effects will last, since measurements were taken after only one online reverse auction. The extent to which I witness any noticeable changes in supplier attitudes and perceptions is remarkable, given that these constructs are typically quite stable over time. The online reverse auction thus exerts a fairly significant impact on suppliers in the short-term. Since this was a field experiment, I had limited discretion as to its design and level of control. And this research is not a pure test of the theoretical literature on auction theory. On the other hand, this research has the advantage over laboratory experiments of examining experienced professionals with larger, real sums of money at stake.

IMPLICATIONS FOR MANAGEMENT

The results clearly demonstrate that open bid, online reverse auctions can raise supplier suspicions of buyer opportunism. Buyers should therefore be selective in their use of these auctions, perhaps limiting them to purchases involving less important supplier relationships, such as the purchase of indirect materials. And since the purchase of indirect materials can constitute anywhere from 40-60% of a firm's total purchasing volume, a sizable opportunity remains for auctions to exert a significant impact on sourcing costs.

Online reverse auctions could also be used as a screening mechanism for long-term sourcing arrangements, which would capitalize on the current supplier's willingness to make the necessary investments, to assure the buyer that it is receiving competitive pricing, and to mitigate opportunism suspicions in the long run. In fact, some firms already use online reverse auctions in this way. Emily Andren of the Gartner Group writes in her September 2001 report that, "Initially, most reverse auctions were used for spot buying, but companies are increasingly using them to select suppliers for long-term contracts."

Another implication is that the supply base may not be able to provide constant price reductions over the long-term. Over time, suppliers may have to leave the industry because of their

inability to compete, or they may consolidate in order to reach the scale economies to support lower prices. Both possibilities reduce the number of alternative suppliers for the buyer and shifts power to suppliers. Buyers should therefore think carefully about using online reverse auctions repeatedly in the long-term.

DIRECTIONS FOR FUTURE RESEARCH

Future research might consider whether online reverse auction formats that reveal less information, perhaps only the lowest market bid or a rank ordering of the bids, might produce very different effects than this research indicates. More work is needed on the circumstances that create cost savings. Do specific supplier characteristics, conditions in the supply base, or buyer sourcing strategies yield significant savings? What role do the numbers of bidders, lots, and rounds of bidding, and the size of purchase contract play in motivating how suppliers bid in various types of online reverse auctions? Future research should consider these questions across many more auctions.

The results also raise the question of how online reverse auctions affect supplier behavior over time. Do buyers observe a reduction in quality and service? What other effects exist on supplier motivation and attitudes toward the buyer? Experimental evidence from common value auctions suggests that “market learning” may occur as bankruptcies drive out the aggressive bidders and as more aggressive bidders earn lower than average profits. Garvin and Kagel (1994) observe that over time bidders begin to *self-select* out of future auctions. They also respond to repeated losses by *bidding less*. Further inquiry must determine whether this result generalizes to the marketplace.

Finally, this research is the first field experiment in the marketing literature on interorganizational relations. Although such quasi-experiments are plentiful in other areas of marketing (advertising), interorganizational researchers have not used them. The firms’ need to

leverage Internet technologies offer a prime opportunity for researchers to find and test unique predictions, to conduct longitudinal tests and quasi-experiments that will better enhance our understanding of the role and value of emerging technologies in marketing strategy.

TABLE 1
OVERVIEW OF ONLINE REVERSE AUCTION EVENTS

<u>Auction</u>	<u>Product</u>	<u># Bidders</u>	<u># Lots</u>
Sealed	Transportation	72	81
	Non-production services	8	2
	Semiconductors	7	3
Open	Plastics	12	10
	Electrical parts	35	5
	Metal parts	20	6
	Totals	154	105

APPENDIX I
SCALE ITEMS

α is Cronbach's Coefficient Alpha

The Supplier's Suspicions of Opportunism ($\alpha=.79$) Mean=2.94 sd=1.40, min=1 max=7

How likely is it that [the buyer firm] would do the following:

Make false accusations.

Provide false information.

Be unwilling to accept responsibility.

Expect your firm to pay for more than their fair share of the costs to correct a problem.

1=very unlikely; 7=very likely

The Supplier's Willingness to Make Idiosyncratic Investments ($\alpha=.87$) Mean=4.50 sd=1.68, min=1 max=7

In working with [the buyer firm], your firm may have opportunity to make investments in time, energy and/or money specifically to accommodate them. These investments would be lost if your firm switched to another customer.

Just for [the buyer firm], I would be willing to provide dedicated...

Training for buyers

Production procedures

Capital equipment and tools

Plant capacity

1=strongly disagree, 7=strongly agree

The correlation between the constructs above is .12 ($p<.17$)

Willingness to Collaborate ($\alpha=.81$) Mean=5.08 sd=1.48, min=1 max=7

How willing is your firm to do the following for the buyer? (1=very unwilling; 7=very willing)

Participate in product design efforts

Work together to exploit unique opportunities

Work on joint projects tailored to their needs

Look for synergistic ways of doing business

Satisfaction with the Relationship ($\alpha=.87$) Mean=4.40 sd=1.46, min=1 max=7

Our relationship with them has more than fulfilled our expectations.

I am satisfied with the outcomes of our relationship.

Our relationship with them has been a successful one.

1=strongly disagree, 7=strongly agree; "them" refers to the specific buyer.

Supplier's Perceived Dependence on the Buyer ($\alpha=.90$) Mean=3.34 sd=1.73, min=1 max=7

If our relationship were discontinued with them, I would have difficulty making up sales volume.

It would be difficult for us to replace them.

I am quite dependent on them.

1=strongly disagree, 7=strongly agree; "them" refers to the specific buyer.

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