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Trust Building in Electronic Commerce: 
THE CRITICAL ROLE OF ELECTRONIC INTERMEDIARIES

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Abstract
As the advent of nearly ubiquitous information infrastructures, such as Internet, promotes the development of electronic commerce applications, new electronic intermediaries are emerging. These electronic intermediaries bring significant changes into the economics of marketing and distribution channels by interposing themselves between suppliers and consumers. The electronic intermediaries provide IT infrastructure, such as user interface, electronic product catalogues and search mechanisms, to enable buyers and sellers to realize commercial transaction over computer networks. The central claim of this paper is that the provision of IT alone is not likely to create trustworthy electronic marketplaces, and that a trust building mechanism must be an important part of electronic intermediary services. The trust building mechanism includes institutional policies and processes that regulate responsibilities and duties of market participants. Terms of trade settlements are also to be specified by electronic intermediaries to legitimate all transactions made over computer networks. The trust building mechanism is necessary to reduce transaction risks involved with electronic commerce. By using an in-depth case study of AUCNET, this paper highlights the importance of the trust building mechanism by electronic intermediaries.

1. Introduction

The growing popularity of electronic commerce has generated significant interests in new market intermediaries who interpose themselves between suppliers and customers in electronic marketplaces. These electronic intermediaries, established either by traditional intermediary firms or by new entrants to the market, are expected to bring significant changes in the economics of marketing channels and the structure of distribution (Sarkar et al., 1996). One of major roles offered by electronic intermediaries is to build an information infrastructure, with which traders can realize commerce over electronic networks (Kalakota and Whinston, 1996).

The use of computer and communication for commercial transactions raises challenges beyond IT (Information Technology) issues. Buyers in electronic commerce execute transactions based on the information without inspecting products. If electronic intermediary services are adopted for markets where qualities of offered products widely vary (such as cut-flowers or used cars), buyers encounter risks of uncertain product qualities. In addition to the quality risks, market participants may experience trade defaults by trading partners unless the deals made over the networks are enforced and legitimized. The provision of IT infrastructure alone will not automatically create open and trustworthy electronic marketplaces for buying and selling firms who have neither pre-established business relationships nor trust with each other.
The central claim of this paper is that the successful implementation of electronic intermediary services requires developing a trust building mechanism. Electronic intermediaries are social institutions, where electronic commerce regularly takes place for restricted range of goods. Commercial transactions involve contractual agreements and the exchange of property rights. If executed over electronic networks, commerce can generate new types of transaction risks. Electronic intermediaries should provide a mechanism to structure, organize and legitimate these activities. By using an in-depth case study of AUCNET, this paper empirically show the importance of the trust building mechanism in electronic intermediary services.

2. Electronic Intermediaries

The advent of national information infrastructures, such as Internet, has led many to predict that electronic markets would enable suppliers and customers to bypass market intermediaries. If suppliers believe intermediaries add significant costs to the value chain, they would try to internalize activities that have been traditionally performed by intermediaries (Benjamin and Wigand, 1995; Wigand and Benjamin, 1996). If parts of savings resulting from this bypass are transferable to customers in the form of price reduction, direct exchanges without middlemen may more than compensate for the costs of searching and matching, and could become a preferred alternative to existing markets.

While it is possible that suppliers and customers leap over intermediaries in some electronic markets, it is equally plausible that electronic commerce promotes the growth of a new generation of intermediaries who exploit economic benefits enabled by computer networks (Sarkar et al., 1996). Intermediaries exist to support exchanges between producers and buyers by aggregating transactions to create economies of scale and scope. They provide suppliers and buyers with explicit and implicit services (such as search, distribution and risk management) that cannot be easily absorbed by suppliers or buyers. In this paper, we assume that the increasing use of electronic networks for commercial transactions would result in the growth of the new generation of intermediaries.

Industry value chains typically link vendors with end consumers through wholesalers and retailers: market intermediaries can mediate transactions for either wholesale markets or retail markets. The tremendous growth of the Internet, and particularly the World Wide Web, has recently increased the number of new intermediaries for retail markets, such as Amazon and CDNow. These intermediaries establish electronic retail malls for a wide variety of products and enable consumers to compare retail products from several vendors and to purchase these retail products electronically. Similarly, market intermediaries can establish electronic marketplaces for wholesalers, who buy commodities in bulk at the wholesale level and distribute the purchased items to retail chains.

In this paper, we focus on market intermediaries for wholesale firms, rather than for retail consumers. Electronic intermediaries for wholesale transactions differ from those for retail sales. Electronic retail commerce systems generally do not include the function of

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1 Wholesale markets exist in most industries for commodity goods such as used-cars, cut flowers, cotton and so on. In some industries, the wholesalers are required by regulations for distributing goods. In the fresh meat industry of the US, for instance, the Consent Decree of late 1920s prohibits some meat packers from retailing and thus the wholesaling is necessary for market transactions.
discovering the price of goods (Lee and Clark, 1996a), although they have potential to influence retail prices by increasing competition among suppliers (Bakos 1991a, 1997). They usually employ a posted pricing (Smith and Williams, 1992): suppliers post asking prices and consumers decide how many items to buy at the posted price. By contrast, suppliers in wholesale markets often bring fixed quantities of products without price tags. In these markets, suppliers are not price-makers but price-takers. Electronic intermediaries for these wholesale markets need to provide mechanisms to determine the market price of goods through either electronic auctions or electronic negotiations.

In addition, transactions in wholesale markets take place regularly (every day or every week) for a restricted range of goods. Buyers in wholesale markets are not consumers, but are wholesale firms that resell purchased items to retailers. If qualities of products offered to the market widely vary (even products from the same producer differ in qualities time to time, as in the case of livestock or cut flower trading), descriptions of product qualities are essential to buyers who regularly join the market to purchase goods at the wholesale level. This contrasts with electronic retail shopping systems. Consumers in electronic shopping systems purchase goods based on price tags and brand names and products offered to these markets are mostly standardized and mass-produced (products from one supplier are identical).

3. Research Model

In traditional markets, suppliers typically bring their products to a physical trading site (such as auction markets) to sell out their supplies. Buyers wishing to purchase goods also need to be present at the marketplace in order to inspect the offered goods and to participate in a bargaining or a bidding process. Goods sold by negotiations or auctions are then handed over to buyers, who pay for the purchased goods and transport them back to their locations. Thus, product flows and market transactions are typically coupled.

When new intermediary firms introduce on-line trading systems in the value chain, they reengineer the traditional transaction processes by separating product flows from market transactions. Buyers and sellers place bids and offers via computers, instead of coming to a physical market site. Goods are sold through online transactions without physical presence of offered products. In this virtual marketspace, transactions take place based on information (descriptions) and products move from sellers directly to buyers only after on-line transactions are completed (Rayport and Sviokla, 1994). The electronic intermediaries initiate this market process innovation to separate the product movement from transactions by utilizing computers and advanced communication technologies.

Electronic market systems introduced by electronic intermediaries improve market efficiency by reengineering transaction processes: decoupling of market transaction from the product movement can improve the efficiency of search, contract formation and trade settlement. However, the separation of market transactions from product movements creates new transaction risks for market participants. Electronic intermediaries should minimize transaction risks by establishing a trust building mechanism, which consists of institutional rules and policies.

3.1 Increased Market Efficiency
Market transactions consist of search, contract formation and trade settlement (Coase, 1937; Lee and Clark, 1996b). The search reflects gathering information on potential trading counterparts that best fit preferences. Once trading opportunities are discovered, the next step is contract formation, such as agreement on transaction prices. If potential trading parties fail to reach an agreement on transaction terms, negotiations may have to be repeated with many firms before a contract is finally formulated. The trade settlement process clears the transactions through physical exchanges of goods and accompanied payments.

The introduction of electronic intermediary services - separation of product flows from market transactions - can increase the efficiency for search, contract formation and trade settlement (Lee and Clark, 1996b). Electronic intermediaries can offer information regarding available products. This information can be accessed by market participants through their computer terminals at any time, thus significantly reducing search cost of buyers (Bakos, 1991; Kambil and van Heck, 1998). Traders who used to get the information upon their arrival at the traditional market can be informed in advance about prospective trading partners. Furthermore, electronic intermediaries can provide information on recent transactions, including qualities of products recently sold and prices paid. This post-trading information will keep traders well informed of the market price of goods with specific characteristics, thus facilitating selling and buying decisions.

Sellers in wholesale markets establish reserve prices for transactions because they do not have perfect information about the consequences of their actions in markets. The reserve price plays a role as sequentially rational rules under incomplete market information (Stigler, 1964). Suppliers in traditional wholesale markets are often forced to accept prices lower than their reserve prices during the negotiation, especially when the transportation cost of bringing unsold products back to the seller's location is high. If the product movement is separated from the market transactions, sellers can keep their reserve prices relatively firm since unsold products do not incur any return transportation costs (Lee, 1998).

In return, buyers using the electronic intermediary services can enjoy wider choices. Traditional markets (such as auctions for agricultural products) typically consist of several regional markets scattered around the country. Regional markets have limits in the amount of offered products since they need to hold the inventory until the moment of transaction. The electronic intermediaries can enlarge the pool of product offers without expanding physical infrastructure, such as a storage capacity. The establishment of national markets, rather than regional markets, increases the possibility that buyers can find preferred suppliers in terms of prices and product characteristics.

### 3.2 New Transaction Risks

Two important assumptions about human behaviors in transaction cost analysis are opportunism and bounded rationality (Williamson, 1979, 1981). Buyers and sellers enter into contracts with each other subject to potential opportunistic behaviors of trading counterparts: trading parties can conceal or distort information to their benefit and to the detriment of their trading partners. Since individuals have limited information-processing

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2 In addition to these two behavioral assumptions, Williamson presented three characteristics of transactions - uncertainty, frequency of transactions and asset specificity - to distinguish the economic governing mechanism between markets and hierarchies.
capacity, traders are unable to foresee and prepare for all undesirable contingencies that might be caused by opportunistic behaviors of their trading counterparts.

Separation of product flows from market transactions through on-line trading is likely to increase the transaction risks and uncertainties for traders. Unlike traditional markets where all products are brought to a market site for evaluation, buyers using electronic intermediaries have to make purchasing decisions based on information from their terminals without physically inspecting the products, thus encountering risks of incomplete and distorted information by sellers. If qualities of products offered to markets widely vary (even characteristics of products from the same supplier can vary time to time), the use of electronic networks for market transaction can further magnify the information asymmetry phenomenon. If the electronic intermediaries fail to ensure that the information about products properly reflects the original products or if they are not equipped with means to protect buyers from misrepresentation, buyers are not likely to adopt the new on-line trading services.

Sellers who take their orders to a new, less active, and less liquid market face two economic penalties: uncertain execution and liquidity penalty (Clemons and Weber, 1996). In the absence of significant order flow, it is uncertain when their selling intentions will be realized. Attempts to sell in a thin market may also result in lower market prices, hurting prospective sellers. Sellers in wholesale markets receive prices determined by market demands. When there already exists a traditional market with active order flows, sellers will be reluctant to switch to a new and unproved market system, in which their supplies might be inappropriately valued due to inactive trading. Until the new electronic intermediary service achieves a critical mass large enough to induce buyers to switch to a new market form, sellers are likely to encounter transaction risks due to economic penalties of inferior execution.

Furthermore, the decoupling of product movements from market transactions increases the possibility of opportunism by trading partners. Unlike traditional markets, where products are handed over to buyers simultaneously with accompanied payments, there is a time gap between the contract formation and its execution (product delivery and payment) in electronic market systems. If a seller (buyer) locates a more favorable bid (offer) between on-line transaction and the delivery of goods, he or she may be motivated to nullify the deal. Separation of payment from shipment/delivery also increases risks for both parties. If electronic intermediaries fail to regulate the responsibilities of parties and the terms of settlements, and fail to legitimate exchanges made within their facilities, traders joining their intermediary services will face risks of trade defaults.

3.3 Trust Building Mechanism

Large firms in auto and grocery industries in the US have been using the EDI-based electronic alliance (or electronic hierarchy) to decouple logistics from transactions in an attempt to improve channel performance (Riggins and Mukhopadhyay, 1994; Mukhopadhyay et al., 1995). These electronic alliance systems, where selling and buying firms adopt EDI-type standards for electronic commerce, also enable firms to realize commercial trades over

3 In financial market literature, this phenomenon is called "liquidity trap" or "central market defense," and represents a crucial economic dynamic for new market designs, including electronic trading systems, because of the importance of the liquidity in financial exchanges (Clemons and Weber 1996).
computer networks (Bakos, 1991b; Malone et al., 1987). Electronic alliances exist in bilateral settings where a relationship between a supplier and a customer has already been established. Transactions using EDI are typically executed based on pre-established business contracts that regulate details of the on-line trading between firms and resolve risks and uncertainties involved with electronic commerce.

In contrast, electronic markets introduced by intermediaries intend to serve for multilateral business settings where a large number of buying and selling firms, who may have no pre-established business relationships with each other, execute on-line transactions. Cost-effective IT infrastructure, such as a standard interface, electronic product catalogues, telecommunications networks and powerful search mechanisms, is essential for the new intermediary to implement electronic commerce among these firms. It is a too simplistic view, however, that electronic networks will automatically create open and trusting inter-firm relations for instant or ad hoc transactions between multiple firms who have neither previous business contacts nor trust with each other.

![Figure 1. Research Model](image)

Take credit card firms as an example. Credit card firms, which mediate financial transactions between merchants and consumers, provide not just technologies but also institutional rules to protect both merchants and consumers from transaction risks. Their extensive institutional policies, which are developed to regulate duties and responsibilities of merchants and customers, enable a credit card holder to dine at a restaurant in a foreign country. Similarly, the institutional policy is a necessary component to establish trustworthy electronic intermediaries. The provision of IT infrastructure alone will produce electronic markets with relatively high transaction risks for market participants. Electronic intermediaries, through some trust building policies, should overcome the transaction risks resulting from on-line transactions and establish trustful marketplaces.

The trust building mechanism includes institutional policies and processes that standardize, regulate and legitimate all transactions made through the market intermediaries. These rules and policies are designed to protect market participants from undesirable trade conflicts by guaranteeing the quality of the traded products, delivery and payment. With a well-established policies, individual traders do not have to ensure that the contract is carried out because electronic intermediaries regulate in great detail all the transaction activities, including the responsibilities of each party and the terms of settlements.

We suggest that the trust building mechanism of electronic intermediaries address at least two issues: product evaluation and legitimization of electronic transactions. Since buyers purchase products based only on electronic descriptions, a rigorous process for product evaluations is important to protect buyers from misinformation. The process to resolve the
disputes over misinformation and the duties of traders should be standardized. The legitimization of transactions assures that the electronic contract will be carried out. It enforces the execution of electronic contracts, such as delivery of purchased products and accompanied payment, by specifying responsibilities of market participants and associated punishments for those who violate contractual agreements. If market participants default transactions made over the network, they may be denied access to the network and should be required to pay for the infringement.

3.4 Market Differentiation

Economists have been interested in differentiated markets as most markets are characterized by differentiated products (Bakos, 1997). One of the theoretical models for the differentiated market is a spatial differentiation model (Hotelling, 1929), where attributes of products offered by sellers are treated as choices of location in a multidimensional space. Buyer preferences determine the location of their ideal product or product mix, and some type of distance metric in the product attribute space is used as a proxy for buyers’ utility loss: the cost of failure to purchase ideal products or product mix. The spatial differentiation model is later extended to Salop’s model (1979), in which sellers’ product offerings and buyers’ preferences are located along a unit circle and the distance between a buyer’s ideal location and seller’s product location in the circle is represented by the buyer’s utility loss or fit cost.

The prevalence of differentiated markets is a result of the heterogeneity of buyer preferences and the profit opportunities these markets offer to sellers. Electronic marketplaces in differentiated markets need to provide both price and product information, to enable the comparison of different product offerings. Although the information of product offerings is provided by electronic intermediaries, the utility loss or fit cost of buyers would increase if buyers have suspicion that the information offered by electronic marketplaces may not represent the real products appropriately. This implies that, when quality of offered products is uncertain, the probability of the utility loss increases in the spatial differentiation model.

The spatial differentiation model indicates that electronic intermediaries need to create trust of their systems for market participants. In order to build a trustful electronic market, electronic intermediaries should address product evaluation processes. Because buyers purchase products based only on electronic descriptions, a rigorous process for product evaluations is important to protect buyers from misinformation. Electronic intermediaries would not allow products with lower quality to be offered in order to avoid disputes over quality of products sold in their markets. Buyers would prefer relatively higher quality products to reduce quality uncertainties in their transactions. That is, the lower the product quality, the higher the possibility of utility loss according to the spatial differentiation model. These would make transactions focused on products with higher qualities, differentiating the electronic markets from traditional markets. If this is the case, average transaction prices in electronic intermediary markets would be higher than those of non-electronic marketplaces. Our research model is shown in Figure 1. By investigating AUCNET, one of the most successful electronic intermediaries in the world, we empirically verify this research model.
4. AUCNET

4.1 Wholesale Used-car Market in Japan

Japanese consumers generally purchase second-hand cars from licensed used-car dealers. A complex web of title registration and regulation makes direct trading of used cars between individuals difficult. Avoiding risks of hidden defects and securing financial loan also encourage Japanese consumers to deal with reliable used-car dealers. New car dealers typically sell trade-ins to used-car dealers rather than reselling them to consumers. Besides trade-ins, these new car dealers often register a block of new cars as "used" cars and sell them to used-car dealers in an attempt to meet sales quotas at the end of a selling period.

Retail used-car demand is becoming increasingly differentiated in Japan, and used-car dealerships are specialized in late model cars, sports cars, four-wheel-drive cars, or even a particular make and model of car. Direct sales between used-car dealers are limited: dealers are not inclined to rely on their competitors' inventory, particularly those selling to the same market segment. However, relationships often develop between dealers selling non-competing lines. A specialized dealer would sell a trade-in that does not match his chosen selling profile to another dealer specializing in that type of car, rather than diluting his image by selling it to a customer. The other dealer would then reciprocate with trade-ins that do not match his chosen market segment. But most urban dealers, if the car desired by the consumer is not in inventory, typically go to an auto auction site to locate additional product inventory.

The aggregate volume of cars sold at auto auctions has been increasing at about 20% annually over the past decade. In 1997, over 4.6 million cars were brought to 144 auction sites and more than 2.6 million vehicles worth ¥1,844 billion (US$ 14.2 billion) were sold in the auction markets. In traditional auto auctions, buyers and sellers are assembled at a central auction site. Cars are brought onto the auction floor one at a time. Most buyers personally inspect the cars prior to the auction. Cars are sold by English auctions: the auctioneer starts with a low price and continues to increase the bid price until the highest bid is registered. Most large auto auctions use a POS (point of sales) system, in which buyers press a POS button to register their bid, instead of raising their hands.

4.2 Evolution of AUCNET

AUCNET was built by the late Masataka Fujisaki, an entrepreneurial used-car dealer (Warbelow and Kokuryo, 1989). Fujisaki started in used auto business in 1967, building Flex Auto in Tokyo. In 1985, he founded AUCNET with a goal to establish an auto auction business utilizing computers and advanced communication technology to be used by second-hand auto dealers to buy and to sell inventory in the wholesale market. He foresaw that the redesign of the auto auction process using an on-line auction system would significantly improve the market efficiency of used-car trading.

The AUCNET system is a centralized, on-line wholesale market in which cars are sold using video images, character-based data, and a standardized inspector rating. Only subscribed dealers, who pay a flat monthly fee of ¥49,500 (US$495) for the equipment and the satellite network operation, are allowed to sell or to buy used-cars through AUCNET. The operation flow of the AUCNET is shown in Figure 2. For the seller, the first step in the process is to apply for the consignment to sell cars through AUCNET. The consignment costs a seller
¥7,500 (US$75) for each car. Once the consignment application is received, AUCNET dispatches one of its 102 mechanics (either full-time employees or contracted inspectors) to inspect the offered vehicle. The inspector takes several photos (exterior and interior shots) of the vehicle and assesses the condition of and damage to the car. The evaluation result is summarized in a single number, between 1 and 10. The consignor (seller) has to pay ¥2,500 (US$25) for each inspection.

Figure 2. Operation Flow of AUCNET

The inspection results (images and text data) are then entered into the central computer for the auction catalogue editing. The electronic auction is held four times a week (Saturday through Tuesday). The auction catalogue, which shows information on all cars to be sold and the time block (auction schedule) they would be sold in, is transmitted to all members prior to the electronic auction. If a dealer is interested in a specific car listed in the catalogue, he can preview its images and text-based information, including detailed inspection results, from his computer terminal.

During the electronic auction, buyers and sellers remain at their respective businesses. To attend the electronic auction, buyers use buttons on top of joysticks in their PCs that are connected to the central computer of AUCNET (see Figure 3). Buyers bid by pressing the button on the top of joysticks, which will increase the current bid by ¥3000 (US $30). As the bid price approaches the reserve price, the system informs the bidders that the car would actually be sold if bid is raised slightly more. Finally, when the time between bids reaches a certain threshold, the system selects the last high bid as the winner, and the auctioneer announces that the car is sold (voice signal) with text signal of "SOLD" flashed on the screen. It typically takes about 20 to 25 seconds on average to auction off one car.

Figure 3. AUCNET Equipment

A car sold by AUCNET remains at the seller's location until the electronic transaction is completed. Sellers then have a transport company deliver purchased cars directly to buyer locations. Successful buyers and sellers receive a report detailing the transaction within two days. Buyers have to pay funds to AUCNET on receiving the report. Sellers are paid from AUCNET once they send the document (title of the car) to AUCNET. Both seller and buyer
have to pay ¥7,000 (US$70) for each successful transaction. AUCNET occasionally provides dealers with a negotiation arrangement, in which unsuccessful bidders ask (on the phone) AUCNET to open negotiations with sellers whose cars remain unsold.

AUCNET started its service in May 1985 with 560 dealer members. It listed 33,458 vehicles in 1986 with 14,944 cars sold. Since then, AUCNET's throughput (listed cars) has increased at an annual compound growth rate of 25.7%. Figure 4 shows the AUCNET's performance over the past six years. In 1997 AUCNET listed 305,586 vehicles, of which 48% (145,982 vehicles) were sold through electronic auctions. The membership network among dealers has continued to expand at a rate of about 100 per quarter, reaching 5,700 of 25,000, so about 23% of dealers at the end of 1997.

![Figure 4. AUCNET Performance](image)

5. Discussions

5.1 Increased Market Efficiency

AUCNET has created an electronic intermediary service that increases the efficiency of the search, negotiation, contract formation and settlement of used-car transactions. AUCNET's strength over traditional auto auctions is its ability to facilitate the search for cars by buying dealers. Attending physical auto auctions is a time consuming process for most buying dealers. Because there is no precise schedule for when certain cars would be sold, a dealer may need to attend a traditional auction the entire day to bid on a few cars. Since used-car dealers usually engaged in sales activities themselves, they would lose sales opportunities while attending traditional auctions. In AUCNET, used-car dealers can limit their time involved in the auction process to only the cars they are interested in buying because AUCNET auction catalogue (including auction schedule) is distributed in advance. When a car desired by a client is not in his/her stock, a dealer can download the data and images of offered cars through the electronic network, show the information to the client, and include the car in his/her bidding list upon the client's request.

Furthermore, AUCNET provides member dealers with valuable post-transaction information. At any time, dealers can access the database that displays information on the most recent five transactions of the same model, including their quality characteristics and prices paid by buyers (minimum price, maximum price and average price). This post-trading information
keeps market participants well informed of the market price of goods with specific characteristics of interest to used-car dealers.

Selling dealers who brought their cars to the traditional auto auctions were often forced to accept prices lower than their reserve prices because the transportation cost of bringing unsold products back home was high. The separation of transportation from the auction process enables sellers to keep their reserve prices relatively firm (Lee, 1998). This is reflected in AUCNET's slightly lower contract rates relative to traditional auto auctions. In 1997, 55% of cars registered in traditional auto auctions were sold, while AUCNET sold 48% of cars listed.

In return, AUCNET provides buyers with more choices. Most traditional auto auctions in Japan are located in metropolitan areas where it is becoming increasingly difficult and costly to secure parking spaces for used-cars for sale. Thus, traditional auctions have limits in the number of used-car sales. AUCNET created the largest auto auction without a single parking space, listing over 300,000 vehicles in 1997. AUCNET can easily accommodate an increasing sales volume, with expected annual growth rate of 15% projected over the next five years. This contrasts with traditional auto auctions whose parking capacity limits the number of offered cars. As a result, buyers in AUCNET enjoy greater vehicle choices than are available in regional auto auctions.

5.2. Trust Building Mechanism

Technological competency accounts for much of AUCNET's success. The electronic auction technique adopted by AUCNET required a high-level expertise in data communications technology because multi-media data (images, voice, text data and bidding signals) transmitted via different communications means (satellite and terrestrial lines) were to be integrated on a real-time basis. AUCNET was also capable of developing and maintaining subscriber equipment that met the specific requirements of each customer. Furthermore, AUCNET succeeded in keeping the cost of all these technologies low enough so that used-car dealers could afford them.

Although IT infrastructure was a necessary factor for AUCNET's success, the firm's ability to translate technical feasibility into institutional realities was real challenge in creating this new market. Separation of car transportation from the auction process using computer and communication technologies was revolutionary to most dealers who used to come to auction sites for trading cars. To overcome resistance and suspicion over the new market process, AUCNET emphasized its trust building mechanism in addition to cost-effective electronic networks. AUCNET's trust building mechanism includes standards for product evaluation and rules for legitimizing electronic contracts.

Product Evaluation: Before the advent of AUCNET, Slide Auction had been implemented by traditional auto auctions and had ended in a failure. The Slide Auction, which also intended to decouple the transportation of cars from physical auction processes, held auctions by using 35 mm color slides shown to buyers present in auction sites for bidding. One reason that the Slide Auction failed was the buyers did not trust that slides adequately represented the product: buyers were unable to judge the quality of cars offered through slides. In traditional auto auction markets, all vehicles are brought to a market site for evaluation and buying dealers personally inspect cars in the market location. In contrast, AUCNET does not
allow a buying dealer to "kick the wheels" to formulate personal assessments of used-car qualities. Buyers in AUCNET have to make purchasing decisions based upon information alone without physically inspecting cars, thus facing risks of incomplete and distorted information by sellers. Transaction of secondhand vehicles is a classic example of a market with “asymmetric information”: there is always a great possibility that sellers may not reveal hidden defects of cars. Thus, AUCNET focused from the start on standardizing the product representation and inspection process to establish trust for information of cars listed in its electronic auction system.

Used-car sellers must have their vehicles inspected by AUCNET mechanics. The inspection results are summarized in a single number between 1 and 10 (10 indicates a new car, and a car rated 5 or 6 could be resold to the consumer without additional work). Most buyers use this number as the key decision variable when buying a car, even though more detailed results of the inspection are available. To reduce the transaction risks of buyers further, AUCNET targets relatively high quality cars for its services. A car whose inspection rate is lower than 4 cannot be sold on AUCNET.

AUCNET has also introduced a standard procedure to resolve disputes over the condition of a car sold by its system. Once cars are delivered, buyers have five days to register complaints with AUCNET. The complaints typically involve a buyer's allegation regarding missing parts in the car or other mechanical defects. AUCNET then has the car assessed by a third party, usually a manufacturer's dealer, and obtains a judgment of the car's condition and estimate to repair it. The consignment contract requires that AUCNET members abide by AUCNET's decisions in such matters. If either party is not satisfied by the arbitration, however, AUCNET allows them to appeal to a "claims committee," which consists of peer dealers and makes a final decision over the claims. The rigorous inspection and standardized process have significantly reduced buyers' transaction risks resulting from the misinformation of cars.

**Legitimization of Electronic Contracts**: Policing and enforcement of transactions are important parts of the AUCNET's trust building mechanism. Used-car dealers executing transactions through AUCNET are subject to institutional rules that legitimize electronic contracts made within AUCNET and protect member dealers from trade defaults. The execution of electronic contracts is enforced through the agreement to specify responsibilities of parties and the terms of settlements. Anyone who violates the rules is left out of the market process and is fined. Because the opportunity to trade on AUCNET is of great value, the withholding of permission to access AUCNET is a sanction sufficiently severe to ensure compliance for most member dealers.

After a car is sold through electronic auction, the winning bidder is required to press the second button on the base of his/her joystick to indicate confirmation of the bid. If the successful bidder fails to do this, any further bids he or she would make in the auction would be blocked. Because the shipment of cars is separated from the payment, AUCNET regulates the execution of electronic contracts in great details to reduce financial risks of involved parties. A successful seller who has sold a car in AUCNET should send the vehicle to buyers

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4 Akerlof (1970) presents transactions in second-hand cars as an example of a market with asymmetric information. It would be very costly for a buyer of the second-hand car to determine accurately its true quality. There is no guarantee that the seller of the car would uncover his/her knowledge on its history and quality during the transaction, particularly if the vehicle is a "lemon" that the seller is eager to sell.
on the same day or the next day. If the seller fails to do so (e.g. if the seller happens to find a more favorable buyer and wishes to nullify the deal made), he or she will be fined ¥100,000 (US$1,000) for violating the contract, which goes to a would-be buyer. In return, sellers are guaranteed payment by AUCNET. Thus, AUCNET pays for the car even before it receives funds from buyers to reduce financial risks for sellers.

A buyer who has purchased a car from AUCNET has five days to pay funds to AUCNET. If the payment is delayed, the buyer is charged a penalty for the prolonged payment. If the buyer nullifies the electronic deal, he or she is fined ¥50,000 (US$500), which goes to the would-be seller, and has to bear all the cost caused by the canceled deal, such as transportation cost for returning the car back to the would-be seller. These rigid rules to structure and legitimize the electronic contracts help traders build up trust with AUCNET (the new electronic intermediary), enabling dealers to execute transactions with trading counterparts with whom they do not have pre-established business relationships.

5.3. Market Differentiation

Our research model hypothesizes that AUCNET’s rigorous trust building processes, combined with buying dealers’ preferences for relatively newer cars, would make AUCNET transactions focused on higher quality cars. To test this research hypothesis, data are obtained from both AUCNET and traditional auction markets. The source data include over one million transaction records of used-cars which were sold in auto auction markets from June 1996 to June 1997. The source data are provided by PROTO Corp., a used-car magazine company, which periodically collect transaction results from many auction sites around Japan. Each record contains information for each specific transaction result, such as transaction date, transaction site (auction market), transaction price, characteristics of the sold car (make, model, color, mileage, engine displacement, age, options), and so on.

In Japan, auto auction markets are divided into two groups depending on locations of auction sites: east-region auctions and west-region auctions. We use the transaction results of east-region auction sites to which AUCNET belongs. The total number of transaction records in the east-region markets accounts for 434,198. Out of these transactions, 10,619 records were from AUCNET while the remaining 423,579 records came from traditional auction markets.

An important question is whether there is any significance difference in qualities of vehicles sold in the two markets. Table 1 contrasts transaction records of AUCNET with those of traditional auction markets. Cars sold in AUCNET have average age of 4.2 years and average mileage of 36,800 km, while cars sold in traditional auction markets are 4.6 year old and have run 48,900 km on average. This mean value analysis between the two groups demonstrates that vehicles traded in AUCNET have better qualities (newer with less mileage) than those sold in traditional markets.

The phenomenon of this market differentiation can be explained using the spatial differentiation model. In the Salop’s “circular city model,” the distance between ideal products and current products along the circle represents utility loss or fit cost for the buyer. Suppose that a used-car is offered in a traditional auction market and then in AUCNET sequentially. If the vehicle is a brand new one, assessment of the utility loss by a buyer would be the same in both markets because the quality uncertainty for the new car is very low. However, if the used-car happens to be old and have a mileage of over 50,000 km, the utility
loss felt by the buyer would be higher in AUCNET than in the traditional market. Thus, if other things remain the same, the buyer would prefer relatively newer used-cars to old and lower quality ones in AUCNET.

Table 1. Quality and Price Difference Between the Two Markets

<table>
<thead>
<tr>
<th></th>
<th>AUCNET (N=10,619)</th>
<th>Traditional Markets (N=423,579)</th>
<th>t-test significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>STD</td>
<td>Mean</td>
</tr>
<tr>
<td>Mileage ('000 Km)</td>
<td>36.8</td>
<td>21.6</td>
<td>48.9</td>
</tr>
<tr>
<td>Age (year)</td>
<td>4.2</td>
<td>0.8</td>
<td>4.6</td>
</tr>
<tr>
<td>Price ('000 yen)</td>
<td>2,120</td>
<td>1,719</td>
<td>781</td>
</tr>
</tbody>
</table>

According to Table 1, used-car prices in AUCNET are more than twice than those of traditional auction markets. The difference in mileage and age is not large enough to explain this price gap between the two markets: age of AUCNET vehicles is 9% younger and mileage is 25% less than secondhand cars traded in non-electronic markets. Thus, we can postulate that cars sold in AUCNET are in general more expensive models than those sold in traditional markets: expensive model used-cars generally offer lower risks than cheaper models. Nevertheless, the variance in key quality variables (age and mileage) presents evidence that vehicles traded in AUCNET have better qualities than those sold in traditional markets. As a result, the average price of cars in AUCNET is much higher than that of vehicles sold in non-electronic markets. The quality and price comparison in Table 1 reveals that the AUCNET market is differentiated from traditional auto auction markets: the electronic intermediary markets specialize in high quality and expensive models.

6. Conclusions

The advent of the Internet has recently generated significant interest in the development of electronic commerce applications. The Internet has the potential to evolve into an interconnected marketplace, facilitating the exchange of a wide variety of products and services. The development of this electronic marketplace is expected to bring significant changes in the economics of marketing and distribution channels by creating a new generation of market intermediaries. These new electronic intermediaries interpose themselves between suppliers and consumers by taking advantage of new types of economies of scale, scope and knowledge, enabled by the Internet.

Building a cost-effective information infrastructure, which facilitates search for preferable trading partners and reduces transaction costs through on-line trading, is an important component of the electronic intermediary service. Equally important for successful intermediary is the establishment of trust for market participants. Traders in the electronic marketplace should be able to safely execute transactions with firms for which they have no pre-established business relations (or trust). Trust building mechanism should be designed to reduce transaction risks of the electronic commerce within intermediary services.
This paper has investigated AUCNET to highlight the importance of the trust building for electronic intermediaries in wholesale markets. The AUCNET case suggests that the product evaluation be an important part of intermediary services if electronic intermediary services are introduced to wholesale markets, where qualities of traded products vary depending on suppliers. In addition, electronic intermediaries need to enforce market participants to comply with institutional rules that are designed to protect traders against trade defaults. The experience of AUCNET also suggests that trust building processes, especially product evaluation mechanisms, leads to markets different from traditional markets in terms of product qualities.

This study provides several interesting research issues worth for pursuing. Our findings are based on a single industry, and thus are preliminary. There exist several other electronic intermediary services around the world, whose functions are similar to those of AUCNET. Examples include TELCOT for cotton trading in the US, CALM (Computer Aided Livestock Marketing) for live stock trading in Australia, Tele-Flowers for cut flower trading in the Netherlands, and so on. These electronic markets support on-line transactions of commodity products at wholesale level. Furthermore, products traded in these markets have wide range of quality, thus creating quality risks when transactions are executed through electronic intermediary services. It would be interesting to check whether our findings in AUCNET can be applied to these electronic intermediary services.

The trust issue can be critical not only in the electronic wholesale trading but also in the electronic retailing. Recently, many firms offer a wide range of products to consumers over their Internet shopping malls. In these electronic retailing markets, the trust issues remain unresolved. Internet shopping malls have lower entry barrier or exit barrier than physical retail shops, thus increasing transaction risks for consumers. Electronic intermediaries are then responsible for convincing consumers that product information appropriately reflects real product quality and for establishing trust among market participants. Thus, it is possible to extend our findings to electronic retail markets. We invite several academic scholars for these interesting research issues.

References


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