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Sunil Mithas
University of Michigan

Joni Jones
University of Michigan

Will Mitchell
Duke University

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NONCONTRACTIBLE FACTORS AS DETERMINANTS OF ELECTRONIC MARKET ADOPTION

Sunil Mithas

University of Michigan Business School
Ann Arbor, MI USA
smithas@umich.edu

Joni L. Jones

University of Michigan Business School
Ann Arbor, MI USA
jonij@umich.edu

Will Mitchell

Fuqua School of Business
Duke University
Durham, NC 27708
Will.Mitchell@duke.edu

Abstract

Newly emerging electronic marketplaces have significant implications for the choice of governance mechanisms used by firms. This paper builds on transaction cost and routine based perspectives in analyzing buyers' decision to use IT-enabled market mechanisms such as reverse auctions. The study argues that buyers are less likely to adopt reverse auctions for products with higher degrees of noncontractibility. A significant contribution of this study lies in operationalizing and validating the concept of noncontractibility as an explanatory variable for predicting buyer adoption of electronic marketplaces. We argue that the notion of noncontractibility addresses the mixed predictions in previous research concerning the impact of IT on firm boundaries as evident in the electronic market and move to the middle hypotheses.

1 INTRODUCTION

The emergence of Internet-based supply chains and reverse auctions has created potential opportunities for many firms, while at the same time posing difficult questions concerning the nature of supply relationships. Electronic supply chains create value by aggregating buyers and sellers, creating marketplace liquidity (spatial or temporal), and reducing transaction costs (Kaplan and Sawhney 2000). However, buyers face a significant dilemma in switching from existing supply relationships to these marketplaces because adoption of such marketplaces imperils their relationships with existing suppliers and may create problems for purchasing goods with some types of characteristics. Indeed, the actual adoption of electronic procurement mechanisms by buyers has been far below initial expectations. Several marketplaces that began with highly optimistic initial projections have already failed and many are struggling to survive (Jupiter Media Matrix 2001). This study helps explain the discrepancy between the promise and the reality of electronic marketplace adoption.

Adoption of Internet-based reverse auctions provides an effective setting to test competing theoretical predictions about firms' increasing use of market-based mechanisms to carry out key commercial activities. The reverse auction technique is one of the commonly used IT-enabled market mechanisms in which buyers post their purchasing requirements and select suppliers based on the lowest bids offered. In this paper, we examine the importance of noncontractible factors as a limiting factor for adoption of reverse auctions by buyer firms. Noncontractible factors are product or supplier characteristics that buyers can observe but that third parties such as arbitrators or courts cannot easily verify. Some examples of noncontractible factors in a buyer-supplier relationship include quality attributes, innovation and new technology adoption by suppliers, information sharing, supplier

responsiveness (ability and willingness to accommodate buyer's noncontractual requests), and flexibility (Bakos and Brynjolfsson 1993b). By definition, such noncontractible factors are difficult or impossible to specify in advance in a contract.

We focus on two competing hypotheses proposed in previous work: the *electronic market hypothesis* (EMH) and the *move to the middle hypothesis* (MMH). EMH posited that greater use of IT will generally lead to a shift toward *markets* (relative to *hierarchies*) for economic transactions (Malone et al. 1987). The MMH argued that the use of electronic markets would combine with the formation of long-term relationships with a few suppliers. Thus, MMH advocated what was called a move to the middle from two ends of the spectrum, i.e., from both *hierarchies* and *markets* to the middle territory of *long-term relationships* (Clemons et al. 1993). Our hypotheses take the MMH view and extend it further by arguing that continued creation of new resources is the prime motivation for buyers to continue investing in long-term relationships with fewer suppliers, as we discuss later.

2 RESEARCH MODEL AND THEORY

The transaction costs literature argues that firm boundaries are determined by a trade-off between production cost advantages of outside procurement and the transaction or coordination cost advantages of internal production (Coase 1937; Klein et al. 1978; Williamson 1985). The transaction costs arise essentially because of environmental uncertainty, infrequent exchange situations, bounded rationality of economic agents, and their potential for opportunistic behavior (Williamson 1985). Transaction cost issues are particularly relevant when supply relationships involve complex products, relationship specific investments, and substantial uncertainty about technical issues and market trends.

The electronic markets hypothesis (EMH) examined the effect of information technology on transaction costs in supply chain. Malone et al. (1987) suggested that IT reduces coordination costs because it lowers communication and information processing costs, facilitates description of complex products, and reduces investment in specific assets (due to flexible manufacturing technology) in an interfirm relationship. Although this argument recognized that electronic hierarchies might be desirable when product complexity and asset specificity are high, the principal hypothesis was that the overall impact of IT would be toward increased use of market outsourcing. As Malone et al. noted, "electronic hierarchies frequently develop into biased, then unbiased markets when the products themselves are not asset specific and are easily described in standardized terms" (p. 495). Thus, the basic premise of the EMH was that, on the whole, IT would lead to lower transaction costs that in turn would lead to greater reliance on arm's length relationships with many suppliers.

Clemons et al. (1993) agreed with EMH about an IT-induced increase in outsourcing. However, they argued that such a contraction would not be through the arm's length outsourcing mode implicit in the Malone et al. framework. Instead, they hypothesized that buyers will move toward long-term relationships with a smaller set of suppliers principally to (1) leverage economies of scale due to investments in IT required to coordinate supply relationships, (2) provide incentives to suppliers, and (3) economize on search costs to cope with greater product differentiation. The authors referred to such a combination of greater outsourcing combined with a reduced supplier base as the move to the middle hypothesis (MMH).

Bakos and Brynjolfsson (1993a, 1993b) drew from the theory of incomplete contracts (Grossman and Hart 1986) to argue in support of the MMH. They argued that tightly-coupled buyer and supplier operations supported by IT require increased investments by suppliers in noncontractible resources, such as responsiveness and information sharing skills. However, in order to induce suppliers to make such noncontractible investments, a buyer can credibly commit not to appropriate the *ex post* surplus from such investments only if the buyer limits its own options and reduces its bargaining power. In other words, suppliers are more likely to invest in noncontractible aspects of relationships if buyers restrict their options *ex ante* by committing to a small supply base.

The need for long-term relationships becomes particularly striking when buyers and suppliers must create new goods, rather than simply exchange existing goods. Employing a transaction value maximization perspective (instead of cost minimization), Zajac and Olsen (1993) argued that governance structures influence the incentives of the parties to invest in value creation activities for goods that require substantial noncontractible elements such as innovation, quality, and responsiveness. Suppliers are less willing to invest in a new technology or design for a buyer if the buyer employs arm's length market governance with many suppliers. In such cases, suppliers will fear that a buyer will share a new design with their competitors to get the best rates.

It is useful to recognize that the MMH was proposed at a time when the use of electronic data interchange (EDI) systems was growing and it is possible that the predictions of MMH were influenced by the characteristics and limitations of EDI. The capital-intensive and customer-dedicated nature of EDI required significant investments by suppliers, which often were unwilling to

invest in largely customer-specific investments. With the advent of the Internet, however, less capital-intensive technology may provide greater latitude in the choice between hierarchical or market governance depending on strategy and preferences of an organization. It is in this context that Internet-enabled electronic marketplaces provide an opportunity to resolve the apparently competing predictions of EMH and MMH.

Previous empirical research in interorganizational IT systems largely explored the questions relating to the adoption or impact of interorganizational systems. More recently, Dai and Kauffman (2001) assessed business models for Internet-enabled electronic markets based on several mini cases. Despite calls for systematic empirical examination of the EMH and MMH, particularly their conflicting predictions about the impact of IT (Bakos and Brynjolfsson 1993a; Malone et al. 1987), few large-sample studies have explored this issue. Given the theoretical interest and strategic importance of reverse auctions in the context of electronic markets, we undertook this study to compare the predictive power of competing theories in explaining buyer firms' adoption of electronic markets.

We draw on previous work to identify noncontractible product and supplier characteristics that are relevant for the adoption of reverse auctions for component purchases in the automotive industry. As we noted earlier, we focus on six noncontractible characteristics: quality, innovation and technology adoption, information exchanges, responsiveness, trust, and flexibility (Bakos and Brynjolfsson 1993b; Grossman and Hart 1986) that are relevant in the automotive setting. These attributes generalize to many other settings, although other noncontractible parameters may also arise in other contexts. With the exception of quality, which eventually manifests itself as an attribute of a product, the other five noncontractible parameters (innovation and technology adoption, information sharing, responsiveness, trust, and flexibility) are attributes of a relationship, and do not necessarily involve transaction-specific assets. Thus, focusing on the noncontractible parameters allows us to explore issues that complement the traditional transaction cost perspective.

3 RESEARCH PROPOSITION AND HYPOTHESES

Our core argument is that although IT may allow describing even complex products with relative ease, that may not necessarily lead to greater use of arm's length contracts (such as through use of reverse auctions) following a traditional transaction cost argument. Noncontractible product or supplier characteristics are likely to be a significant determinant of electronic market adoption controlling for product complexity and asset specificity. By predicting a "move to market," EMH focuses only on the processes involving exchange of resources once they have been created. EMH places less emphasis on the resource-creation aspect of interorganizational partnerships, particularly the generation and accumulation of firm-specific routines and capabilities needed for new product creation. We posit that a fuller analysis of the impact of information technology on firm boundaries and governance mechanisms must consider these resource creation and noncontractible aspects of a product or relationship, which may significantly moderate the predictions of EMH. The role of noncontractibility becomes increasingly more important as the service sector grows in the modern economy and to the extent that IT and flexible manufacturing technologies are progressively causing a decline in asset specificity even in the manufacturing sector (Milgrom and Roberts 1990). Thus, there is a need to focus on the effects of intangible and largely noncontractible aspects of underlying transactions that may not co-vary with asset specific investments. This leads to the following proposition.

Proposition 1: Buyers are less likely to adopt reverse auctions in electronic marketplaces for products having noncontractible attributes.

We develop several specific hypotheses based on proposition 1, which specify particular noncontractible attributes.

Hypothesis 1a: The greater the importance of quality, the less the likelihood of reverse auction adoption in electronic marketplaces.

Hypothesis 1b: The greater the importance of innovation and technology upgrading, the less the likelihood of reverse auction adoption in electronic marketplaces.

Hypothesis 1c: The greater the importance of information sharing with suppliers, the less the likelihood of reverse auction adoption in electronic marketplaces.

Hypothesis 1d: The greater the importance of supplier responsiveness, the less the likelihood of reverse auction adoption in electronic marketplaces.

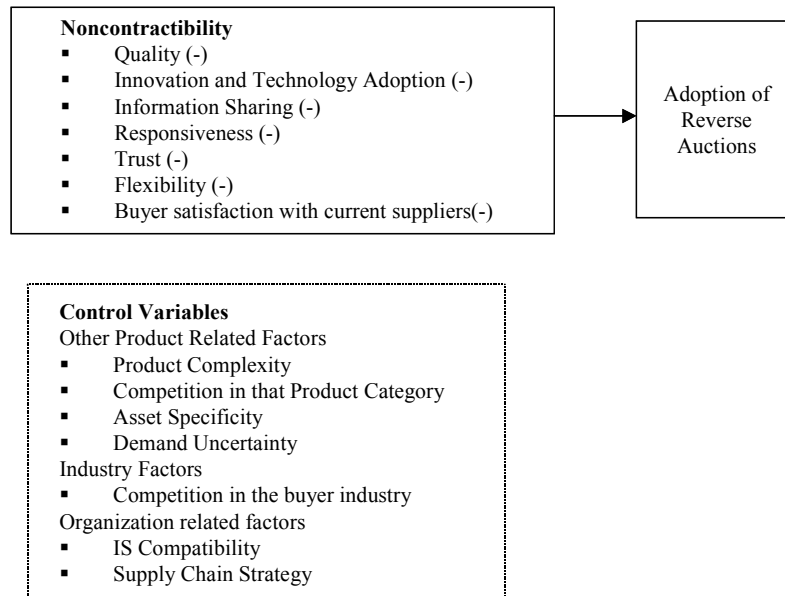


Figure 1. Research Model for Reverse Auctions Adoption

Hypothesis 1e: The greater the importance of trust between buyer and seller, the less the likelihood of reverse auction adoption in electronic marketplaces.

Hypothesis 1f: The greater the importance of flexibility between buyer and seller, the less the likelihood of reverse auction adoption in electronic marketplaces.

Hypothesis 2: The greater a buyer's satisfaction with the current level of noncontractible investments by a supplier, the less the likelihood of reverse auction adoption for that product.

Other product-, industry-, and organization-level factors such as level of competition in the industry and characteristics of the buying organization may also influence electronic market adoption. We control for these variables in our study. Figure 1 shows our research model.

4 RESEARCH SETTING AND DATA COLLECTION

The automotive industry allows us to use several perspectives to examine the adoption of reverse auctions in the context of electronic markets because of the tremendous variation in the type of components and firm characteristics the industry encompasses. The data for this study is being collected through a questionnaire that we developed in three phases. During first phase, several faculty members, doctoral students, industry executives, and survey methods consultants reviewed the questionnaire for content, wording, and understandability. We also talked with purchasing executives and reverse auctions vendors to ensure the face validity of the items. In the second phase, we refined the initial questionnaire, based on feedback received from our interactions with industry executives and automotive industry researchers during a major industry conference in August 2001. In the third phase, we formally pretested the refined version of the instrument from the second phase with a random sample of 30 suppliers selected from an auto industry database. After incorporating changes based on the responses in the pretest, we finally administered our instrument to about 1,400 suppliers in the automotive industry, in two waves.

5 PRELIMINARY ANALYSIS

We expect to complete detailed analysis of the data by end of October 2002. We intend to present a detailed analysis and discussion of our results at the conference.

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