Rajdeep Grewal, James M. Comer, & Raj Mehta

An Investigation into the Antecedents of Organizational Participation in Business-to-Business Electronic Markets

Business-to-business electronic markets have a profound influence on the manner in which organizational buyers and sellers interact. As a result, it is important to develop an understanding of the behaviors of firms that participate in these markets. The authors develop a typology for the nature of organizational participation to explain the behaviors of user firms in business-to-business electronic markets. The proposed model hypothesizes that the nature of participation depends on organizational motivation and ability. The authors conceptualize motivational factors in terms of efficiency and legitimacy motivations and theorize that ability results from the influence of organizational learning and information technology capabilities. They test the model using organizational-level survey data from jewelry traders that conduct business in an electronic market. The results indicate that both motivation and ability are important in determining the nature of participation; however, the level of influence of motivation and ability varies with the nature of participation.

Electronic commerce is a growing reality and provides viable alternatives to traditional forms of commerce. The major impact of electronic commerce is expected to occur in the business-to-business sector, which is estimated to be approximately six times larger than the business-to-consumer electronic commerce sector, and to reach $1.3 trillion by 2003 (*BusinessWeek* 2000). Moreover, many large firms recently have announced their ventures into the realm of business-to-business electronic commerce using Internet protocols (communication standards). For example, the recent alliance between the big three auto manufacturers (General Motors, DaimlerChrysler, and Ford) to establish Covisint (an electronic market for automotive parts suppliers), the launch of RetailLink by Wal-Mart, and the Transfer Process Network by General Electric all fall in this category. In addition, in fragmented industries, a host of third-party–operated electronic markets are emerging; more than 750 were in existence at the beginning of the year 2000 (*The*

Economist 2000).[1] Examples include e-STEEL for the steel industry, IMX for home mortgage, and PaperExchange for the paper industry. The economic significance of electronic markets makes it imperative to study them. Our research takes important steps in this direction by studying participant organization behavior in a third-party electronic market.

Despite the interest in third-party electronic markets of practitioners (*BusinessWeek* 1998) and academicians (Kaplan and Sawhney 2000), concerted efforts to understand these markets have been lacking. Previous research emphasizes the effect of new technologies on organizational processes (Glazer 1991; Heide and Weiss 1995) but does not discuss the influences of electronic markets, and the extant case-based research focusing on electronic markets limits itself to the characteristics of the market maker, the firm that manages and administers the market (e.g., Bakos and Brynjolfsson 1993; Hess and Kemerer 1994). The success of electronic markets, however, depends not only on the characteristics of the market maker but also on the value the market provides for the participant organizations. These participant organizations derive value by interacting with other participant organizations in the market. Market makers build such positive network externalities by making it attractive for participant organizations to (1) initially adopt the

[1]The term "third party" is used to describe electronic markets operated by an intermediary that is neither a buyer nor a seller in the market. Cases of markets operated by buyers or sellers exist (e.g., Sabre, initially sponsored by American Airlines), and these markets are referred to as "biased" markets (Malone, Yates, and Benjamin 1994).

market, (2) subsequently elect to stay on, and (3) be satisfied with the market.

Building positive network externalities, however, depends on the nature of organizational participation, that is, whether the adopting organizations actively participate in the market or are mere passive observers. If a firm is a passive observer, for example, its presence in the electronic market is of no value to other firms in the market because it is unlikely to engage in business transactions with these other firms. The primary purpose of this research is to investigate the factors that influence the nature of organizational participation in electronic markets, which is important because (1) electronic markets are becoming viable alternatives to traditional markets and hierarchies (Bakos 1998); (2) the commercial potential of electronic commerce is immense, and across the globe business-to-business electronic markets are the fastest growing electronic commerce phenomenon (*BusinessWeek* 1999); and (3) little, if anything, is known about the factors that influence the nature of organizational participation in electronic markets (Alba et al. 1997). Developing an understanding of the nature of organizational participation also would enable market makers to make their markets more attractive to participant organizations.

We rely on the motivation–ability framework (Merton 1957) to develop our conceptual model and make four important contributions. First, we develop and find empirical support for a typology for the nature of organizational participation. We believe that the nature of firm participation is pivotal in developing an understanding of organizational behaviors in electronic markets. Second, we demarcate the two primary organizational motivations for adopting electronic markets; in addition to the traditional efficiency motive, we survey the literature in institutional theory (DiMaggio and Powell 1983) to develop the legitimacy motive. As well as providing realism for the rational models of organizations, the legitimacy motive, together with the efficiency motive, renders a comprehensive conceptualization of organizational motivations. Third, we move beyond case-based research that typically has been used to study electronic markets and use organizational-level survey data to examine our research hypotheses. Fourth, our study tests the motivation–ability theory in the new context of electronic markets. Testing a theory in diverse contexts helps gauge the strengths of the theory and aids in empirical generalizations (Bass 1995).

Electronic Markets

Time and again, technology has had major influences on marketing practice and scholarship. Recent examples include the influence of integrated information and communication technology (Buzzell 1985). These technologies have revolutionized retailing by the use of scanner data, which also has resulted in improved marketing research models (Blattberg, Glazer, and Little 1994; Curry 1993). In terms of facilitating buyer–seller interactions, electronic data interchange (EDI) helps firms build close relationships and facilitate logistics (Stern and Kaufmann 1985). The EDI systems were generally proprietary to the initiating firm

(Frazier 1983) and required significant investments on the part of both firms in a relationship (O'Callaghan, Kaufmann, and Konsynski 1992). Nonproprietary EDI systems were often industry created and facilitated logistic and operational management of interfirm relationships (McGee and Konsynski 1989). In this string of technological advances, the most recent phenomenon is the emergence of the Internet. Internet technology has immense implications for various branches of marketing, including consumer (Hoffman and Novak 1996; Peterson, Balasubramanian, and Bronnenberg 1997), business (Kaplan and Sawhney 2000; Klein and Quelch 1997), and international (Mehta, Grewal, and Sivadas 1996; Quelch and Klein 1996) marketing.

Internet-based business-to-business electronic markets represent an interorganizational information system that facilitates electronic interactions among multiple buyers and sellers (Bakos 1991; Choudhury, Hartzel, and Konsynski 1998). At a basic level, electronic markets can be viewed as information technology (IT)–facilitated markets (Bakos 1998). In electronic markets, buyers and sellers come together in a marketspace and exchange information related to price, product specifications, and terms of the trade, and a dynamic price-making mechanism (such as the bid-and-ask system) facilitates transactions between the firms (Kaplan and Sawhney 2000). Depending on the configurations of buyers and sellers and the price-making mechanism used, such electronic markets have been referred to as catalog aggregators, auctions, reverse auctions, or exchanges.[2] Unlike EDI, which helps maintain existing interfirm relationships, electronic markets help buyers search for sellers and sellers search for buyers to engage in transactions. Thus, although EDI helps firms achieve strategic objectives by facilitating operational management of buyer–seller relationships, electronic markets are more strategic and assist firms to interact with other firms in a market setting (as opposed to a relational setting).

Usually an electronic market is sponsored or maintained by a market maker. The primary function of market makers is to gather buyers and sellers in a marketspace (Klein and Quelch 1997). Market makers also may perform other supplementary functions, such as providing credit, warranties, and logistics, and sometimes even may help in negotiations among potential business partners. The business models for market makers tend to vary with the functions they perform in addition to providing the marketspace (Kaplan and Sawhney 2000).

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[2]A catalog aggregator negotiates with vendors to offer their products in an online catalog from which business consumers can buy goods of these multiple vendors for a fixed price set by the catalog aggregator (e.g., SciQuest). In auctions, multiple buyers bid competitively for products from an individual supplier (e.g., Adauction), whereas in reverse auctions, buyers post their needs for a product or service and suppliers bid competitively to fulfill that need (e.g., BizBuyer). Exchanges are two-sided marketplaces with multiple buyers and sellers that negotiate prices, usually through a bid-and-ask system (e.g., PaperExchange). The electronic market we study (Polygon) is an exchange, and we use the term "electronic markets" to refer to these exchanges.

Depending on the position of the market maker in the value chain, an electronic market may be either hierarchical (biased) or market-driven (third-party) (Malone, Yates, and Benjamin 1994). In a hierarchical electronic market, the market maker is also a buyer or a seller. An example of such an environment is a seller-sponsored market such as Sabre (initially sponsored by American Airlines). Hierarchical markets are inherently biased toward the sponsor (i.e., the market maker), and as a result the market maker has advantages over competitors that conduct business in that market. Copeland and McKenney's (1988) detailed study of airline reservation systems (Sabre) points to these disadvantages of biased electronic markets, which eventually limit the scope and the survival likelihood of such markets.

A third party (neither a buyer nor a seller) sponsors an unbiased market-driven electronic market; thus, the market maker does not carry out transactions in the market. Examples include PaperExchange for paper and related products and SportsNet, which links more than 3500 dealers of sports cards. It is these third-party markets that have experienced the most success and are forecasted to dominate fragmented industries (*BusinessWeek* 1999; Krantz 1999). In our research, we study buyers, sellers, retailers, pawnbrokers, appraisers, and other intermediaries that trade in jewelry and related products in a third-party, unbiased, market-driven electronic market, Polygon, as we discuss in greater detail subsequently (henceforth, we use "organization" and "firm" to refer to a user firm that participates in an electronic market).

Conceptual Background

In this section, we provide a rationale for a firm's need to participate in electronic markets and then present background on the nature of organizational participation, the motivation and ability variables, and environmental dynamism, the dominant characteristic of electronic markets. Strategic considerations motivate organizations to build capabilities and preempt competition and thereby to serve customers better (Day and Wensley 1988; Slater and Narver 1995). Considering the prominent role of technology in modern society (Blattberg, Glazer, and Little 1994; Buzzell 1985), it comes as no surprise that organizations view technology as a means of building sustainable competitive advantage (Day and Glazer 1994; Glazer and Weiss 1993). We contend that strategic considerations, such as providing better customer service (Parasuraman and Grewal 2000) and competitive hedging and/or preemption (Dickson 1992), gain significance in the organizational decision to participate in electronic markets.

We theorize that the nature of organizational participation in an electronic market depends on a firm's motivation and ability (Figure 1). Literature in diverse fields such as consumer behavior (MacInnis, Moorman, and Jaworski 1991), organizational behavior (O'Reilly and Chatman 1994), and marketing strategy (Boulding and Staelin 1995) emphasizes the criticality of both motivation and ability. However, we broaden the theorizing on motivations to encompass (1) the traditional emphasis on efficiency (Rindfleisch and Heide 1997) and (2) the institutional motivations

of attaining legitimacy, which we refer to as the legitimacy motive (DiMaggio and Powell 1983). Furthermore, we rely on the organizational learning literature (Sinkula 1994) to conceptualize a firm's ability as its (1) learning about the electronic market and (2) IT capabilities. We also study the influence of environmental dynamism that is inherent in electronic markets (Lee and Clark 1997).

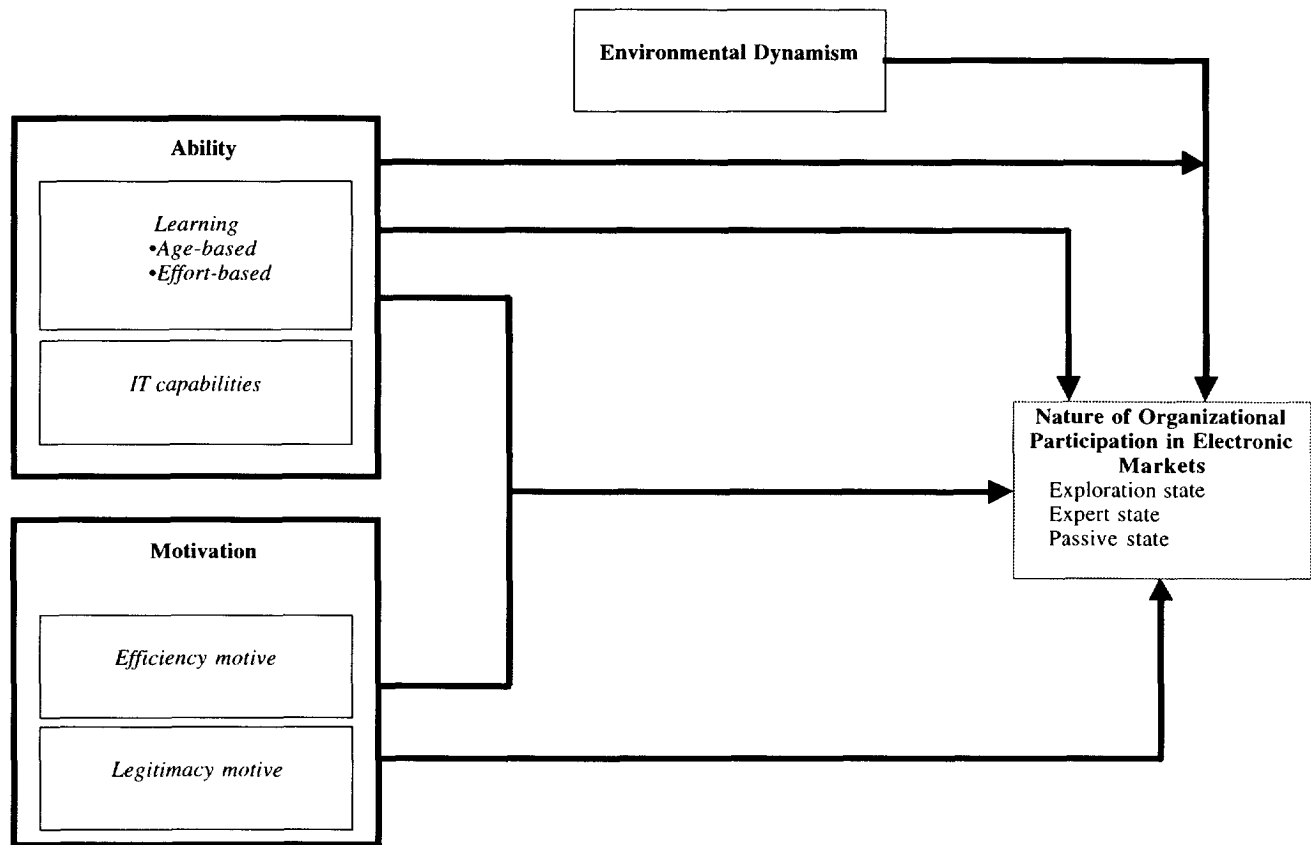## *Nature of Organizational Participation*

Organizations participate in electronic markets in several ways. At one extreme, organizations spend concerted effort and resources to streamline their electronic market operations. At the other extreme, they adopt electronic markets on an experimental basis (Dickson 1992). We develop a distinct-states conceptualization for the nature of organizational participation to illustrate diverse organizational behaviors in electronic markets. In addition to the literature on innovation assimilation (Meyer and Goes 1988) and electronic markets (Choudhury, Hartzel, and Konsynski 1998), we rely on exploratory interviews to develop our typology for the nature of organizational participation. Several times during the research process, we interviewed the chief executive officer (CEO) and marketing manager of the market maker. The CEO noted that customers were "a mixed lot with many different activity levels." Managers of participant firms also suggested that participants tend to have varying levels of activities in the electronic market.

To capture the varying levels of firm activity in electronic markets, we conceptualize the nature of firm participation in terms of the exploration state, the expert state, and the passive state. In the *exploration state*, firms do not know the requirements to conduct operations in an electronic market effectively but are expending substantial efforts to learn the particulars of doing business in the marketplace. Firms in the exploration state are "testing the waters" to understand the new medium better and in the process are using cognitive, physical, and financial resources. These organizations are trying to sense which business practices they need to reengineer, how they can reengineer, and whether it will be in their best interest to reengineer.

In the *expert state*, firms believe they have been successful in reengineering their business processes to function effectively in the electronic market. Similar to experts, they possess the know-how to perform market-related tasks successfully (Alba and Hutchinson 1987). Expert firms have substantive knowledge about their electronic market and procedural knowledge pertaining to the way of doing business in the market. These firms also understand the cause-and-effect relationships for their activities in the electronic market (i.e., axiomatic knowledge) and are thereby in a position to make high-quality decisions regarding their market operations (Sinkula 1994; Slater and Narver 1995). As the electronic market evolves, the expert firms regularly update their knowledge base about the market to remain current and thereby create episodic knowledge (Sinkula 1994). In a manner, expert firms have made an implicit or explicit pledge to continue conducting business over the electronic medium.

In the *passive state*, organizations carry out virtually no business in the electronic market but continue to maintain a presence. Our exploratory research suggests that the passive

FIGURE 1
Conceptual Framework

Environmental Dynamism

Ability

Learning
•Age-based
•Effort-based

IT capabilities

Motivation

Efficiency motive

Legitimacy motive

Nature of Organizational
Participation in Electronic
Markets
Exploration state
Expert state
Passive state

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state is (1) propagated by firms entering electronic markets on an experimental basis, perhaps to supplement their traditional markets at some time in the future; (2) due to competitive hedging wherein a firm does not believe that electronic markets are viable but considers them to be a future opportunity or threat and therefore wants to observe and learn; (3) perpetuated by low entry barriers, in that entering an electronic market involves buying a computer to access the Internet; and (4) reinforced because maintaining a presence in business-to-business electronic markets is not expensive, requiring a firm simply to pay its monthly subscription fee.[3] Organizations in this state are unwilling to expend the cognitive, physical, or financial resources that are needed to develop human capital and reengineer business practices to conduct business over the electronic medium actively.

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[3]This point with regard to subscription fees probably would be attenuated in markets in which the market maker charges transaction fees. In such a case, a participant firm does not pay until it engages in a transaction, and as a result, passive participants do not incur any financial costs (other than the initial set-up costs) to maintain their presence in an electronic market. Our research studies a subscription fee–based electronic market. In the "Limitations and Further Research" section, we discuss other possible business models for market makers, including those based on transaction fees.

Motivation

The literature on organizational founding suggests that the motives, processes, and structures that firms stress at the time of their inception have a long-lasting and perpetual influence on their behaviors (Baum and Oliver 1992; Schulz 1998). Accordingly, we expect the motives a firm emphasizes when entering an electronic market to influence the firm's operations in the market for a substantial period. We suggest that organizational motivations for entering electronic markets include an economic expectation of enhancing efficiency and a normative objective of attaining legitimacy.[4] We rely on transaction cost economics to develop the efficiency motive (Rindfleisch and Heide 1997), and the lit-

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[4]As we elaborate in the "Methodology" section, the importance of organizational motivations is evident from our preliminary interviews with participant firms. Some organizations entered electronic markets to enhance efficiency and streamline their operations. Others entered because (1) their competitors entered the market, (2) they perceived that entering electronic markets would portray an image of being technologically savvy, (3) they were offered a promotion scheme in which they did not need to pay the membership fee for the first three to six months, or (4) the cost of adopting and maintaining a presence was not significant. The second motivation is what we refer to as the legitimacy motive.

erature on institutional theory provides the bases for the legitimacy motive (Meyer and Rowan 1977).

Efficiency motive. An economist would argue that electronic markets improve transaction effectiveness and efficiency (Rindfleisch and Heide 1997). Improving efficiency is likely to be driven by the organizational strategic consideration of serving customers better (Day and Nedungadi 1994; Day and Wensley 1988). As Dickson (1992) observes, to serve their customers effectively and efficiently, firms often are motivated to experiment with new ways and innovations. Malone, Yates, and Benjamin (1994) suggest that electronic commerce leads to greater use of markets, rather than hierarchies, because these markets have relatively lower transaction costs. Research in the management of information systems and the economics of electronic markets supports this assertion (Bakos and Brynjolfsson 1993; Gurbaxani and Whang 1991; Hess and Kemerer 1994).

Reducing the cost of doing business is consistent with an organization's attempt to improve efficiency. Recent theoretical developments in transaction cost economics (TCE), which emphasize minimizing transaction costs, explicitly recognize this efficiency orientation and conceptualize TCE as a constrained-efficiency framework (Roberts and Greenwood 1997; Williamson 1992). This perspective regards organizations as efficiency seeking (Nelson and Winter 1982) under cognitive constraints (e.g., bounded rationality; Williamson 1987) and/or institutional restraints (Scott 1987).

Efficiency considerations are usually internal to an organization, but often attempts to enhance efficiency are externally oriented (Oliver 1990). The efficiency motive of reducing the costs of transacting with vendors, for example, might prompt an organization to use automated systems. In addition, the efficiency motive can be used to gauge the emphasis an organization puts on reducing costs and enhancing productivity (internal consideration) when entering an electronic market (external orientation). Over time, this emphasis on efficiency should become embedded in the organizational culture and influence the formal and informal functioning of firms (Deshpandé and Webster 1989). This goal-directed orientation also should increase organizational commitment toward IT and organizational effectiveness in electronic markets (Ginzberg 1981; Newman and Sabherwal 1996).

Legitimacy motive. Institutional theory suggests that organizations must justify their actions and perform in accordance with existing societal norms and institutional expectations (DiMaggio and Powell 1983; Scott 1987). Adhering to societal norms enhances an organization's legitimacy and increases the likelihood of organizational survival. One way for organizations to attain legitimacy is to carry out activities that are deemed suitable by institutional constituents, including the government, consumer bodies, trade associations, and the public.

Electronic markets by their very nature are technologically intensive, and organizations dealing in these environments are likely to be perceived as having technological savvy. Being perceived as technologically knowledgeable is a definite advantage (Glazer and Weiss 1993). Thus, a possible organizational motive to enter electronic markets is to portray an image of technological sophistication. In other words, organizational stakeholders view technologically sophisticated firms more favorably in comparison with technologically naive firms; therefore, the organizational legitimacy of technologically sophisticated firms is higher because they provide a better fit with the modern-day organizational profile.

Organizations also mimic behaviors of a successful benchmarked group (Deephouse 1996; DiMaggio and Powell 1983). Institutional theorists argue that imitation is an uncertainty reduction mechanism in the sense that when a firm successfully adopts a structural change, other organizations mimic the change while attributing their success to the nature of the structural transformation (Haunschild and Miner 1997; Haverman 1993). Firms usually mimic the structures and the processes of other firms that are perceived to be legitimate (Haunschild 1993; Suchman 1995). Diverse research streams, including those on strategic alliances (Pangarkar and Klein 1998) and outsourcing (Lacity and Hirschheim 1993), have studied this mimicking behavior under the rubric of the bandwagon effect. The bandwagon effect suggests that sometimes organizations engage in activities simply because other firms do and provides a possible reason for the prominence of strategic alliances in some industries and their absence from others (Osborn and Hagedoorn 1997). In this study, organizational attempts to appear technologically sophisticated and mimic the behavior of successful organizations are classified as the legitimacy motives.

Ability

Knowledge acquisition and utilization processes help firms build capabilities and sustain strategic competence (Fiol and Lyles 1985). Knowledge developmental processes also provide organizations with resources, assets, and skills to compete effectively (Sinkula 1994; Slater and Narver 1995). Our research studies (1) organizational learning, a major source for building a knowledge base, and (2) a firm's IT capabilities, an avenue for extracting rents from the knowledge base (March 1991). By virtue of the newness and novelty associated with electronic markets, organizations have either not developed business models for this medium or tested existing business models in the medium. Learning therefore becomes pivotal for developing and adopting business models. Organizational capabilities reflect the extent of knowledge utilization in a firm and are critical for building sustainable competitive advantage (Day 1994). In electronic markets, a dominant organizational resource is a firm's IT capabilities (Guha et al. 1997).

Learning. Huber (1991, p. 90) describes knowledge acquisition as "the process by which knowledge is obtained," and this learning by an organization is a function of its age and effort (Garvin 1993). In organizations, experience is a prime source of learning and captures the incessant trial-and-error process by which organizations acquire information (Sinkula 1994). This acquisition of information leads to richer and proprietary knowledge bases. Eventually, the distribution, interpretation, and utilization of knowledge bases result in sustainable competitive advantages.

We examine two important learning constructs. The first is *age-based* or *experiential learning*, which we define as

the learning an organization obtains from the extent of its experience and operationalize as the age of a firm's electronic market operations. Experiential learning has been shown to predict organizational survival, even after size and resource-enhancing linkages are controlled for (Brittain 1989), and the literature on operations management documents the positive effect of age on performance (Mody 1989). Although age is an important indicator of learning, it does not capture the effort spent in learning. To overcome this weakness, our second learning construct taps directly into the effort a firm devotes to developing skills to manage an electronic market. We refer to this construct as *effort-based learning* and conceptualize it as the effort, in terms of organizational resources and human capital, used to develop knowledge about an electronic market (Simon 1991).

IT capabilities. Firm capability hinges on the efficient development and use of resources (Sinkula 1994). Information use has been the focus of marketing research since the American Marketing Association/Marketing Science Institute–sponsored workshop on knowledge development (Myers, Massy, and Greyser 1980). This research stream indicates that knowledge development enhances the value of firms' resources and organizational capabilities (Moorman, Zaltman, and Deshpandé 1992). In electronic markets, a participant's IT capability is an important organizational resource, should play a vital role in building sustainable competitive advantages, and should increase the firm's capacity to manage electronic markets (Auer and Reponen 1997; Mata, Fuerst, and Barney 1995).

Organization information processing research suggests that it is not organizational capabilities per se but the fit between organizational information processing needs and capacity that is critical (Galbraith 1973; Tushman and Nadler 1978). Information serves as a means of reducing uncertainty and thereby attaining the desired objective. In turn, information requirements depend on uncertainty, and by extension the desired information processing capacity depends on the information processing needs.

Environmental Dynamism

Environmental dynamism is a dominant characteristic of electronic markets (Klein and Quelch 1997). Rapidly increasing subscription bases, along with ever-changing technologies, characterize electronic markets (Lee and Clark 1997). Environmental dynamism captures these changes in demand and technology (Weiss and Heide 1993), induces uncertainty (Achrol and Stern 1988), and influences organizational structures and processes (Achrol 1991).

Hypotheses

Because we have conceptualized the nature of organizational participation in terms of three distinct states (exploration, expert, and passive), we need to use one of the states as a base state and compare it with the other states. That is, because a firm can be in only one state, the three states compete against one another in some fashion. In formulating our hypotheses, we use the exploration state as the base state because initially almost every firm should be in this state.

Efficiency Motive and IT Capabilities

According to the motivation–ability framework, both firm motivation (efficiency motive) and ability (IT capabilities) should be present to affect organization participation (Merton 1957). Research shows that information systems projects often fail when either motivation or ability is lacking (see Ewusi-Mensah and Przasnyski 1991; Reich and Benbasat 1990). We therefore expect both motivation and ability to influence the nature of organizational participation. Emphasis on the efficiency motive and IT capabilities should enhance the likelihood of a firm being in the expert state and lower the likelihood of the firm being in the passive state.

> H_1: The greater the emphasis on the efficiency motive and IT capabilities, (a) the higher is the likelihood of a firm being in the expert state and (b) the lower is the likelihood of a firm being in the passive state.

Organization information processing research suggests that the influence of IT capabilities is likely to be nonlinear (Daft and Lengel 1986). As Day (1994) observes, the market dictates the extent and nature of capabilities that an organization develops, and the information processing needs determine the extent of information processing capacity required (Day and Glazer 1994). As organizational information processing capacity increases, the need to develop more of this capability declines (March 1991). In other words, to a specific level, IT capabilities should help a firm reach the expert state and reduce the chances of the firm being in the passive state, but eventually the influence of IT capabilities should level off. We therefore hypothesize that as the level of IT capabilities increases, the likelihood of a firm being in the expert state increases, but at a declining rate. We also propose that as the level of IT capabilities increases, the likelihood of a firm being in the passive state decreases, but at a declining rate.

> H_2: As the level of IT capabilities increases, IT capabilities (a) positively affect the likelihood of a firm being in the expert state, but at a declining rate, and (b) negatively affect the likelihood of a firm being in the passive state, but at a declining rate.

Legitimacy Motive

Legitimacy motives represent organizational attempts to adopt electronic markets either to portray a specific image to stakeholders or to mimic benchmarked organizations. Legitimacy is construed as "a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially construed system of norms, values, beliefs, and definitions" (Suchman 1995, p. 574). It seems that if enhancing organizational legitimacy is the motive for joining an electronic market, an organization achieves its objective just by entering the market. In other words, by virtue of a firm's entry into an electronic market, it is in a position to assert to its stakeholders that it is technologically advanced and ready for the challenges of the information age. Organizations that embrace electronic markets to mimic a successful benchmark firm believe that the benchmarked organization succeeded primarily because of its participation in electronic markets. In summary, some organizations ceremoniously adopt electronic markets as a

mere pretense to attain legitimacy (DiMaggio and Powell 1983; Scott 1987).

For firms that emphasize the legitimacy motive, attempts to acquire knowledge or build capabilities are likely to be minimal. Reaching the expert stature without knowledge development is unlikely (Alba and Hutchinson 1987). In other words, simply entering electronic markets may not be sufficient to attain the expert state, which requires a firm to learn new routines, rules, and strategies. Attaining legitimacy in the eyes of stakeholders and adopting electronic markets on an experimental basis are likely to motivate a firm to maintain presence in the electronic market, even if the presence does not yield direct economic gains. Therefore, emphasis on legitimacy motives should lower the likelihood of a firm being in the expert state and increase the likelihood of the firm being in the passive state.

> H_3: The more an organization subscribes to legitimacy motives for entering an electronic market, (a) the lower is the likelihood of a firm being in the expert state and (b) the higher is the likelihood of a firm being in the passive state.

Learning

Research on organizational learning suggests that age-based learning helps capability development (Sinkula 1994). However, such learning has been shown to have limitations related to unintentional and unsystematic learning. As Levinthal and March (1993, p. 96) observe, "Experience is a poor teacher, being typically quite meager relative to the complex and changing nature of the world in which learning is taking place." Frequently, employees are the sensors that gather information and draw inferences. The cognitive constraints of rationality that inhibit human activity are also likely to impede age-based learning (Dickson 1992). Experience also tends to be ambiguous, with multiple and conflicting interpretations, making it difficult to decipher the "complex worlds" (Levinthal and March 1993, p. 97). Research on experience curves attests to this supposition and demonstrates that learning increases with age, but at a decreasing rate (Bass 1995). We expect age-based learning to increase the likelihood of a firm being in the expert state, but the rate of increase should lessen with age. Firms that are not effective learners, however, should sooner or later move to the passive state, and the probability that these firms will move into the passive state should vary positively with the age of their electronic market operations.

> H_4: As the level of age-based learning increases, age-based learning (a) positively affects the likelihood of a firm being in the expert state, but at a declining rate, and (b) negatively affects the likelihood of a firm being in the passive state at an increasing rate.

In addition to age-based learning, the effort that an organization spends in developing its knowledge bases is an important aspect of organizational learning. However, effort does not imply automatic success; organizations often spend considerable efforts in new ventures and fail (Golder and Tellis 1993). In such cases, firms fail to develop the skills and knowledge bases needed to manage the new ventures (Tushman and Anderson 1997). If effort-based learning is successful, it helps firms build their skill levels and move on to the expert state. In contrast, if effort fails to develop

knowledge, the commitment to a failing course of action is likely to be minimal, and the level of effort should decline. Therefore, the probability of the firm moving to the passive state should increase.

> H_5: As the emphasis on effort-based learning increases, (a) the likelihood of a firm being in the expert state increases and (b) the likelihood of a firm being in the passive state increases.

Environmental Dynamism

Dynamic environments are characterized by high variability in demand and unpredictability regarding the actions of competitors (Achrol and Stern 1988). Research suggests that environmental dynamism makes it difficult for organizations to assimilate and anticipate environmental conditions and has an adverse influence on performance (March 1991). These challenges make it hard for firms to identify and develop the skills needed to succeed. As a result, learning is likely to be a longer and a more deliberate process. We therefore expect environmental dynamism to reduce a firm's likelihood of being in the expert state. Environmental dynamism is also likely to frustrate firms and therefore increase the likelihood that the firms give up in dynamic markets, thereby enhancing the probability of the firms being in the passive state.

> H_6: The higher the environmental dynamism in an electronic market, (a) the lower is the likelihood of a firm being in the expert state and (b) the higher is the likelihood of a firm being in the passive state.

Firm-specific factors typically moderate the influence of environmental variables (Dess and Beard 1984). In electronic markets, IT capability is one such firm-specific variable that should help organizations manage environmental dynamism; it is an organizational resource and reflects a firm's ability to exploit accumulated information. Organization information processing theory (Daft and Lengel 1986) also suggests that IT capabilities help manage environmental dynamism and therefore should moderate its effect.

> H_7: Information technology capabilities will moderate (a) the negative influence of environmental dynamism on the likelihood of a firm being in the expert state and (b) the positive influence of environmental dynamism on the probability of a firm being in the passive state.

Methodology

Research Context

In our research, we study the nature of participation of firms that adopt Polygon, a market-driven electronic market for jewelry and related products (www.polygon.net). Polygon Network Inc. was founded in 1983, primarily to provide an electronic market for jewelry pawnbrokers, appraisers, manufacturers, wholesalers, retailers, buyers, and sellers. It is a subscription-based service for which members pay a monthly access fee, which enables them to buy and/or sell such jewelry items as cut diamonds, watches, and rings, as well as acquire other benefits such as gemological and related technical information. Polygon migrated in the late 1980s to an exchange format and facilitated interfirm transactions by having user firms call the Colorado server to

retrieve their e-mail and information from the buyer–seller bulletin board. In 1995, Polygon acquired the domain name polygon.net and began its migration to Web-based operations. Although the transition to the Web has eased access for user firms, the nature of the information exchange has remained the same. Polygon represents an "open bazaar" in which buyers and sellers meet in an electronic environment and that makes it efficient for firms to exchange information related to price, product specifications, and terms of trade. Although Polygon does not enable participating firms to make payments electronically, it provides ratings for all participating firms based on their payment history.[5]

Independent Measures

Following standard psychometric procedures (Churchill 1979), we created a pool of items for each of the constructs (all items were measured on a five-point semantic differential scale, where 1 = "disagree" and 5 = "agree"), with the exception of age-based learning. We extensively field tested the items by means of personal interviews with Polygon subscribers.

The efficiency motivation construct gauged the degree to which a firm stressed cost reduction and output enhancement when joining Polygon. We used four items that measured organizational emphasis on (1) increasing efficiency, (2) reducing costs of doing business, (3) streamlining operations, and (4) reducing the costs of transacting with exchange partners. The first two items for the legitimacy motivation construct measured the extent to which the firm mimicked competitors and other jewelers, respectively; the third item emphasized legitimacy attainment as a motive; and the final item gauged the extent to which the organization wanted to portray the image of being high tech. We measured a subscriber's IT capabilities by adapting six items from King and Teo's (1996) study of facilitators and inhibitors for the strategic use of IT. To assess effort-based

[5]Polygon has debated moving to a transaction-fee model. It has concluded that its neutrality is important for the success of the market. The company also believes that by taking a cut of transactions, it may become more interested in making the transaction and compromise its neutrality. Therefore, as a conscious decision, Polygon has decided to stay away from a transaction-based fee structure.

learning, we used a two-item measure. The first item gauged the time and effort expended by employees to learn about Polygon. The second item measured the overall organizational effort. Finally, we adopted Klein, Frazier, and Roth's (1990) environmental dynamism scale.

We used the age of an organization's Polygon operations to assess age-based learning (Brittain 1989). Another instrument for age-based learning could be the number of years in business, not the tenure of involvement with an electronic market. We believe that the tenure of involvement is a more suitable instrument for at least two reasons. First, electronic markets are quite different from traditional forms of commerce, and therefore learning about them is likely to be critical. Second, years in business induces other effects, such as creating inertia (Chandrashekaran et al. 1999), thereby making it difficult to decipher the effect of learning about the electronic market. Bricks-and-mortar retailers, for example, were slower to establish their electronic retail outlets than were new start-ups. However, years in business is an important variable, and further research should examine the dynamics propagated by it.

Dependent Measure: The Nature of Organizational Participation

We used a polychotomous dependent variable to measure the nature of organizational participation. While developing this measure, we assessed the finest possible classification for the nature of organizational participation. This measurement serves two purposes: (1) It helps us rule out the possibility of a fourth state, and (2) it provides flexibility because it is easier to aggregate data than to disaggregate them. The dependent measure asked respondents to choose one of six categories that best described their present Polygon operations. Table 1 details the specific statements for each category. We used two statements to measure the exploration state, one to categorizes the expert state, and three to measure the passive state.

Pretest

To obtain a preliminary assessment of the internal validity of our measurement instrument, we mailed 300 questionnaires to Polygon subscribers and received 34 complete and usable responses. We used item-to-total correlation to assess the validity of the measurement instruments. These correlation

TABLE 1
Measures for the Nature of Organizational Participation

State	Measures
Exploration State	We have recently initiated the Polygon service and are beginning to learn how to do business through them.
	We have learned a lot about the way to do business on the Polygon, but there is still much more to learn. Our comfort level with doing business on Polygon is improving with every passing day.
Expert State	We are comfortable with our Polygon operations and are aware of the ins and outs of these operations. Our dealings on the Polygon are a regular part of our business, and we think that there is not much new to learn.
Passive State	We carry virtually no business through Polygon but still are listed as a member of Polygon Network and will continue to be listed with Polygon.
	We are seriously considering terminating our Polygon operations.
	We have terminated our relationship with Polygon.

coefficients were greater than .78 for all items, and therefore we retained all items. In the final study, we mailed the questionnaire to the remaining 1846 Polygon members and followed the same procedure as in the pretest.

Sample and Nonresponse Bias

We mailed the questionnaire to all 2146 Polygon subscribers in our sample frame and received 306 responses. The survey consisted of the scale items under investigation and a cover letter stating the purpose of the study and that Polygon Network Inc. endorsed the study. The cover letter noted that the purpose of the study was to research organizations at the frontier of adopting the Internet and carrying out electronic commerce. Polygon Network Inc. supplied the name of the key respondent for each firm, and typically the key respondent interacted with the Polygon Network Inc. on a regular basis.

We used the χ^2 statistic to compare the sample (both pretest and final study combined) characteristics with those of the population (all Polygon subscribers) (Table 2). The results showed no significant differences between the characteristics of the sample and the population ($\chi^2 = .875$, degrees of freedom [d.f.] $= 3$, $p > .83$). We compared the responses to our independent variables for the early respondents with those for the late respondents and the pretest respondents with those for the respondents in the final study and found no statistical differences (Armstrong and Overton 1977).

Measure Validation

We carried out measure validation in two phases. First, we personally interviewed three Polygon members and the CEO and marketing manager of Polygon Network Inc. to determine what it meant to do business in this electronic market. On the basis of our discussions, we sought to refine our conceptual model and develop a sample list of items. Then we conducted a second round of interviews to verify our conceptual model and refine our measures. Second, we used confirmatory factor analysis (CFA) to establish the convergent validity for the efficiency motive, legitimacy motive, effort-based learning, IT capabilities, and environmental dynamism scales (Table 3).

We retained all items for the efficiency motive, effort-based learning, and dynamism scales. The item deleted from the legitimacy motive scale emphasized mimicking competitors. Two items were deleted from King and Teo's (1996) scale. The four remaining items measured a firm's (1) IT planning capabilities, (2) strength of technical support staff, (3) understanding of benefits from the application of IT, and

TABLE 2
Sample Classification

Type of Business (%)	Sample Characteristics	Population Characteristics (Supplied by Polygon)
Retailers	59.1%	60.0%
Wholesalers	23.2%	20.0%
Pawnbrokers	9.5%	10.0%
Miscellaneous (e.g., manufacturers, designers, appraisers)	8.2%	10.0%

(4) knowledge about IT. Our CFA results show that all factor loadings were greater than the recommended .4 cut-off and were statistically significant (Nunnally and Bernstein 1994). The χ^2 statistic was not significant, which implies that the sample and estimated covariance matrix were alike. The goodness-of-fit index, adjusted goodness-of-fit index, nonnormed fit index, and comparative fit index were greater than the recommended .9; the parsimony normed fit index was greater than the recommended .6; and the root mean square error of approximation, as recommended, was less than .08 and not statistically different from .05 (Hair et al. 1995). To assess the validity of our measure for age-based learning, we used its correlation with (1) the number of transactions made per week on the Polygon and (2) the annual dollars transacted through Polygon. As we expected, these correlation coefficients were positive and statistically significant ($r = .296, p < .01, n = 171; r = .191, p < .02, n = 171$, respectively)

To establish the internal consistency of our measurement model, we examined the reliabilities and average variance extracted (Fornell and Larcker 1981). All the reliabilities were greater than the recommended .7 (Nunnally and Bernstein 1994). The average variance extracted for each measure was greater than the recommended .5, with the exception of the scale for legitimacy motivation, which extracted 46% of variance (Bagozzi and Yi 1988). Additional research could refine our measure of the legitimacy motive. We used two methods to assess discriminant validity. First, the 95% confidence bands around the ϕs did not contain 1 (Anderson and Gerbing 1988). Second, we compared the average variance extracted with the ϕs (Fornell and Larcker 1981). The average variance extracted was greater than the respective ϕs for all measures. Table 4 displays the descriptive statistics.

We used a series of t-tests to examine the differences across the three states for (1) the number of transactions per week, (2) the percentage of business transacted through Polygon, and (3) the time since the adoption of Polygon. We expected the number of weekly transactions to be higher for both the exploration and the expert state in comparison with the passive state, which was the pattern of results we obtained. For the exploration versus passive comparison, we obtained $b = 2.30, p < .01$, and for the expert versus passive comparison, we obtained $b = 2.59$, $p < .01$. A comparison of the exploration and expert states gave us $b = -.29, p > .78$ (although this test was not significant, in absolute terms, the number of weekly transactions was higher for the expert state). Thus, in terms of number of weekly transactions, the exploration and expert states were statistically equal to each other but higher than the passive state.

As with the number of transactions, the percentage of business that firms undertook through Polygon in the passive state (2.58%) was statistically lower than that of firms in either the exploration (18.31%; $b = 15.73, p < .01$) or the expert (19.95%; $b = 17.37, p < .01$) state. Again, although firms in the expert state transacted more business over Polygon than did firms in the exploration state, statistically the two values were equal ($b = -1.65, p > .70$).

Typically, firms enter the exploration state and then move to either the expert or the passive state. In terms of average time since the adoption of Polygon, our results supported this assertion. Specifically, the age of Polygon operations of firms in the exploration state was statistically lower

than that of firms in either the expert (b = -9.03, p < .07) or the passive (b = -11.50, p < .05) state. In addition, there was no statistical difference between firms in the expert state and those in the passive state (b = -2.46, p > .77).

Taken together, the results suggest that the three states differ from one another in expected manners. The exploration state differed from the expert state in terms of time since adoption of Polygon, and both of these differed from the passive state in terms of the number of weekly transactions and the percentage of business transacted over Polygon.

Estimation Model

Because we have a discrete dependent variable with three states (i.e., exploration, expert, and passive), we used a multinomial logit (MNL) model to test our hypotheses. Specifically, we estimated the following model:

TABLE 3
Measurement Model Results

Constructs and Items	Factor Loading (t-Value)
Efficiency: We decided to subscribe to Polygon because	
We thought it would increase our efficiency.	.66 (11.0)
We expected it to reduce our costs associated with running our business.	.85 (15.4)
We thought it would streamline our operations.	.79 (13.9)
We believed that it would reduce the cost associated with transacting business with our exchange partners.	.73 (12.3)
Legitimacy: We decided to subscribe to Polygon because[a]	
It would provide legitimacy to our organization.	.76 (11.3)
It portrays us as a high-tech organization.	.74 (11.0)
The best in the business at the time were doing so.	.50 (7.4)
Effort-Based Learning: We are interested in your experiences with using the Polygon system. To what extent do you agree with the following statements?	
Our personnel have spent a lot of time and effort learning specific techniques used in the Polygon.	.52 (5.8)
Our organization has expended a lot of time and effort to develop our Polygon operations.	.90 (7.0)
IT Capabilities: The following questions pertain to information technology (IT) capabilities for your organization. Your firm currently[b]	
Has strong IT planning capabilities.	.83 (14.7)
Has strong technical support staff.	.82 (14.5)
Has an understanding of possible benefits of IT applications.	.63 (10.2)
Has adequate knowledge about information technology.	.68 (11.4)
Environmental Dynamism: Please focus on the BUYING/SELLING environment through the Polygon. To what extent do you agree with the following statements?	
We are often puzzled by actions of retailers and wholesalers.	.78 (11.5)
We are often astonished by actions of our competitors.	.71 (10.6)
We are often surprised by our customers' actions.	.62 (9.2)
χ^2 (d.f., p-value)	96.48 (94, .41)
Root mean square error of approximation (p-value)	.010 (.99)
Goodness-of-fit index	.96
Adjusted goodness-of-fit index	.94
Nonnormed fit index	.99
Parsimony normed fit index	.73
Comparative fit index	.99

[a]One item was deleted after confirmatory analysis. It read, "Our competitors joined Polygon."
[b]Two items, "Is experienced with IT" and "Gives high importance to strategic use of IT," were deleted.

TABLE 4
Descriptive Statistics, Reliabilities, Average Variance Extracted, and Intercorrelations Among the Refined Measures

Construct	Mean	Standard Deviation	Reliability	Average Variance Extracted	LEGIT	IT_CAP	AGE	EFFORT	ENV_DYN
EFF	3.400	.867	.85	.58	.343*	.026	.069	-.166*	.092
LEGIT	2.768	.868	.71	.46		.034	.043	-.288*	.084
IT_CAP	3.568	.798	.83	.56			.095	-.088	-.205*
AGE	4.223	6.465	—	—				-.006	.084
EFFORT	3.342	.801	.69	.54					.023
ENV_DYN	3.106	.718	.75	.50					

*p < .01.

(1) ORG_PAR = $\beta_0 + \beta_1 \times$ EFF $+ \beta_2 \times$ LEGIT

$\qquad + \beta_3 \times$ AGE $+ \beta_4 \times$ AGE$^2 + \beta_5 \times$ EFFORT

$\qquad + \beta_6 \times$ IT_CAP $+ \beta_7 \times$ IT_CAP^2

$\qquad + \beta_8 \times$ ENV_DYN $+ \beta_9 \times$ EFF $\times$ IT_CAP

$\qquad + \beta_{10} \times$ ENV_DYN $\times$ IT_CAP $+ \varepsilon$,

where ORG_PAR is the polychotomous dependent variable with the exploration state as the base, EFF stands for efficiency motive, LEGIT represents the legitimacy motive, AGE denotes age-based learning, EFFORT represents effort-based learning, IT_CAP depicts IT capabilities, and ENV_DYN designates environmental dynamism. The maximum likeli-

hood estimate for this model yields two sets of estimates, one for the expert state and the other for the passive state.

Results

Overall Model Test

In Table 5, we display the results from our MNL model with the exploration state as the base. The likelihood ratio test for the overall fit of the model indicates that the independent variables explain statistically significant variance in the dependent measure ($\chi^2 = 58.06$, d.f. $= 20$, $p < .01$). In addition to establishing descriptive validity for the structure of the model, it is also important to evaluate the predictive validity of the

TABLE 5
Estimation Results from the Multinomial Logit Model

Independent Variable	Coefficient (Expert State)[a]	Coefficient (Passive State)[a]
Constant (β_0)	15.674*** (6.530)	10.528** (5.872)
EFF (β_1)	-3.612*** (1.267)	-1.858** (.967)
LEGIT (β_2)	-.355* (.221)	-.203 (.208)
AGE (β_3)	.473*** (.191)	.074 (.074)
AGE × AGE (β_4)	-.024** (.013)	.001 (.002)
EFFORT(β_5)	.389* (.239)	.293* (.213)
IT_CAP (β_6)	-4.508** (2.252)	-3.836** (2.040)
IT_CAP × IT_CAP (β_7)	-.108 (.253)	.247* (.182)
ENV_DYN (β_8)	-2.294** (1.371)	-.794 (1.048)
EFF × IT_CAP (β_9)	.879*** (.330)	.294 (.244)
ENV_DYN × IT_CAP (β_{10})	.757** (.379)	.371 (.292)
Log-likelihood	-234.400	
Restricted (slope = 0) log-likelihood	-263.425	
χ^2	58.06*** (d.f. = 20, $p < .01$)	

Predictive Validity (n = 248)

Maximum chance criteria[b]	.456
Proportional chance criteria[b]	.358
Proportion correctly classified (model)	.540

[a]Standard errors are in parentheses (one-tailed tests).
[b]We extended Morrison's (1969) proportional chance criteria and maximum chance criteria from a two-category discriminant problem to a three-category problem. If α, β, and γ are the proportion of respondents in each of the three categories, maximum chance criteria would be the maximum of these three proportions, and proportional chance criteria would be $\alpha^2 + \beta^2 + \gamma^2$.
*$p < .10$.
**$p < .05$.
***$p < .01$.

model. We used estimates from the MNL model to carry out a discriminant exercise and tabulate the proportion of correct predictions (Table 5). The proportion of correct classifications for the model is 54.0%, which is greater than the two benchmarks recommended by Morrison (1969): maximum chance criterion (45.6%) and proportional chance criterion (35.8%).

Because we have interaction terms in our model, we interpret the main effects as contingent on the appropriate interaction term (Jaccard, Turrisi, and Wan 1990). The main effect of efficiency, for example, represents the impact of efficiency when IT capabilities equal zero. Mathematically then, $y = \beta_0 + \beta_1 \times EFF + \beta_9 \times EFF \times IT\_CAP$, and when $IT\_CAP = 0$, $y = \beta_0 + \beta_1 \times EFF$. Therefore, in a way, β_1 by itself is meaningless, because the influence of efficiency varies with IT capabilities. To aid in interpreting these coefficients, we carried out Wald tests for the significance of the efficiency motive and environmental dynamism at various levels of IT capabilities and for the significance of IT capabilities at various levels of the efficiency motive and environmental dynamism (Table 6).

Antecedents of the Expert State

The first hypothesis suggests that both IT capabilities and an efficiency motive would be needed for a firm to be in the expert state. We find support for this assertion ($\beta_9 = .879$, $p < .01$). To provide a better understanding of this interaction effect, we examined the efficiency motive at three levels of IT capabilities. As Table 6 shows, the influence of the efficiency motive on the likelihood of a firm being in the expert state increases from -1.178 ($p < .01$) at low levels of IT capabilities to .266 ($p > .46$) at high levels of IT capabilities. H_2 posits that, as IT capabilities increase, the positive effect of IT capabilities on the likelihood of a firm being in

the expert state will decline. We do not find support for this hypothesis ($\beta_7 = -.108$, $p > .33$). Our hypothesis on the legitimacy motive, which proposes that an emphasis on the legitimacy motive will decrease the likelihood of a firm being in the expert state, is marginally supported (H_3: $\beta_2 = -.355$, $p < .10$). H_4 suggests that age-based learning tends to increase the likelihood of a firm being in the expert state and that this positive effect diminishes as the level of age-based learning increases. Our data support this hypothesis, with significance of both the linear ($\beta_3 = .473$, $p < .01$) and square ($\beta_4 = -.024$, $p < .05$) terms for age-based learning. As Figure 2 shows, the influence of age-based learning increases at a decreasing rate. H_5 posits a positive relationship between effort-based learning and the likelihood of a firm being in the expert state. We find marginal support for this hypothesis ($\beta_5 = .389$, $p < .10$). We hypothesized in H_6 that environmental dynamism would have a negative effect on the probability of a firm being in the expert state and in H_7 that IT capabilities would moderate this negative effect. Our results support both these hypotheses (H_6: $\beta_8 = -2.294$, $p < .05$; H_7: $\beta_{10} = .757$, $p < .05$). As Table 6 shows, the effect of environmental dynamism varies from a low of $-.197$ ($p > .62$) at low levels of IT capabilities to a high of 1.012 ($p < .05$) at high levels of IT capabilities.

Antecedents of the Passive State

H_1 posits that emphasis on both IT capabilities and efficiency motives should decrease the likelihood of a firm being in the passive state. Our results do not support this hypothesis ($\beta_9 = .294$, $p > .12$). The main effect for the efficiency motive ($\beta_1 = -1.858$, $p < .05$) shows that such an emphasis reduces the likelihood of a firm moving to the pas-

TABLE 6
Results for Interaction Effects[a]

Hypothesis	Low[b]	Medium[b]	High[b]
Effect on the Expert State			
Coefficient of efficiency as a function of IT capabilities.	-1.178† (.407)	$-.477$** (.245)	.226 (.305)
Coefficient of environmental dynamism as a function of IT capabilities.	$-.197$ (.395)	.408* (.260)	1.012*** (.402)
Effect on the Passive State			
Coefficient of efficiency as a function of IT capabilities.	-1.043† (.339)	$-.808$† (.219)	$-.573$*** (.240)
Coefficient of environmental dynamism as a function of IT capabilities.	.232 (.318)	.529*** (.239)	.824*** (.348)

[a]Standard errors are in parentheses (two-tailed tests).
[b]We define high as μ (mean) $+ \sigma$ (standard deviation), medium as μ, and low as $\mu - \sigma$. We now illustrate one case of the Wald test. Consider the influence of efficiency at a high level of IT capabilities. The mean for IT capabilities is 3.568, and the standard deviation is .798, which implies that high IT capabilities equal 4.366 (see Table 4). The effect of efficiency on a firm in the expert state is given as ORG $-$ PAR $= \beta_1 + \beta_9 IT\_CAP$, and at a high level of IT capabilities this effect equals ORG $-$ PAR $= \beta_1 + \beta_9 \times 4.366$. Because $\beta_1 = -3.612$ and $\beta_9 = .879$ (see Table 5), ORG_PAR $= .226$ (Table 6). Similarly, we can calculate the standard error as $\beta_1{}^2 + \beta_9{}^2 4.366^2 + 2 \times 4.366 \times \beta_1\beta_9 Cov(\beta_1, \beta_9)$.
*$p < .12$.
**$p < .10$.
***$p < .05$.
†$p < .01$.

sive state. H_2 proposes that the IT capabilities will negatively influence the probability of a firm being in the passive state and that this negative influence will decrease as the level of IT capabilities increases. Our results support this hypothesis because both the linear ($\beta_6 = -3.836, p < .05$) and square ($\beta_7 = .247, p < .10$) terms are significant. H_3 suggests that the legitimacy motive will have a negative effect on the probability of a firm being in the passive state. Our data do not support this hypothesis ($\beta_2 = -.203, p > .17$). We expected the negative effect of age-based learning on the likelihood of a firm being in the passive state to increase with the level of age-based learning. Our results do not support this hypothesis, because neither the linear ($\beta_3 = .074, p > .16$) nor the square ($\beta_4 = .001, p > .31$) terms are significant. We hypothesized in H_5 that effort-based learning would move a firm away from the exploration state, and we find support for this hypothesis ($\beta_5 = .293, p < .10$).[6] Environmental dynamism was hypothesized to influence the probability of a firm being in the passive state positively, and we expected this positive effect to be moderated by IT capabilities. We do not find support for either the main effect hypothesis (H_6: $\beta_8 = -.794, p > .22$) or the moderating role of IT capabilities (H_7: $\beta_{10} = .371, p > .11$).

Discussion

Our findings suggest that participating firms must emphasize the right motives and should have the requisite capabilities to participate actively in electronic markets. An emphasis on the efficiency motive and IT capabilities is critical for firms to attain the expert state and avoid the passive state. There is, however, a critical difference between the results for the expert state and those for the passive state. For the expert state, the interaction term between the efficiency motive and IT capabilities is significant, whereas this interaction term is not significant for the passive state. In other words, the influences of the efficiency motive and IT capability on the likelihood of a firm being in the passive state are independent of each other, whereas in the case of the expert state, the two variables act as catalysts in attenuating each other's influence. The finding that IT capabilities help firms manage the dynamism inherent in electronic markets further strengthens the criticality of this organizational ability. However, our results do not support the hypothesized nonlinear effect of IT capabilities, perhaps because of the context of our study. The jewelry business is not traditionally high tech; consequently, our sample may have firms that have not reached saturation in terms of IT skills. A replica-

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[6]For effort-based learning, we expect the probability that a firm will move to the expert state or the passive state to increase; thus, an important question is which of these rates is going to be higher. The literature on effort-based learning is not clear on the extent to which such learning will be successful in skill development; moreover, learning has not been studied in the context of electronic markets. However, research on the success of new ventures suggests a success rate near 50% (Golder and Tellis 1993). As an ex post exploration, we sought to compare the coefficients of effort-based learning for expert and passive states. Consistent with research on the success of new ventures, we found these coefficients to be statistically equal ($b = .096, p > .55$).

FIGURE 2
Influence of Age-Based Learning
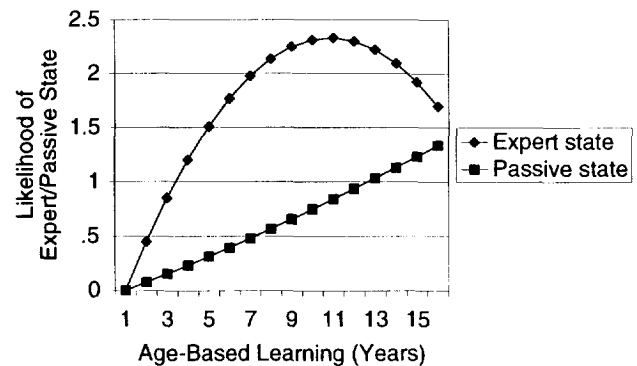
tion of our study in a high-tech industry or with a multi-industry sample may provide for a more thorough testing of the nonlinear effect of IT capabilities.

In terms of motivation, developing a proper mindset by stressing efficiency motives and de-emphasizing legitimacy motives is critical for firms to attain the expert state. To become experts, firms also must emphasize organizational learning (age- and effort-based). However, the positive influence of age-based learning tends to decline with age. Although effort-based learning is critical for attaining the expert state, it also tends to increase the likelihood of a firm becoming a passive participant. Overall, we find marginal support for our assertion that effort-based learning will move firms out of the exploration state.

Managerial Implications

Firms that intend to participate in electronic markets should be aware that their nature of participation is dependent not only on their IT capabilities but also on their motivation. Entering the market simply to jump on the bandwagon or establish an image of being technologically proficient does not seem to enhance activity levels in the market. Moreover, to become experts, firms should strive to achieve efficiency and work to build their IT capabilities. Allocating time and effort to learn and understand the environment also can yield substantial benefits. Firms that enter electronic markets on an experimental basis or with the desire to mimic others will most likely become passive participants. If a firm joins an electronic market to experiment, it must expend resources to achieve the objectives of its experiment.

Market makers are more likely to succeed if they provide positive network externalities for participating firms. A market maker must understand the reasons for a user firm's participation and thereby be able to provide the right incentives for these firms to adopt the market. Understanding the goals of their participating firms enables market makers to design programs that facilitate goal achievement and enhance member retention. Polygon, for example, could identify active firms and encourage them to develop their IT capabilities, as well as facilitate their learning about the environment. Passive participants might be encouraged to retain their membership for reasons that reinforce their objectives. However,

convincing the passive participants to expend resources to become experts may be in the best interest of a market maker in the long run. A market maker's strategic orientation also influences the type of companies that join the market. If a market maker wants to create a market primarily with expert firms, for example, its strategic orientation and tactical actions should identify IT-capable firms whose objectives are to make the market their major sales channel.

Research Implications

Our primary contribution to theory lies in developing and substantiating the existence of a typology for the nature of organizational participation. The typology helps qualify the network externality argument for the efficacy of electronic markets. This argument emphasizes that the attractiveness of a market to a user firm depends on the number of other firms (potential business partners) in the market. We find, however, that in the case of electronic markets, network externality does not depend on the total number of firms participating in the market but rather on the number of expert (and to a lesser extent, exploration) firms in the market. Thus, the passive participants must be discounted.

We also develop the construct of legitimacy motives, which, together with efficiency motives, provides a holistic theorization of organizational motivations. In addition, we contribute to the generalizability of previous case-based research on electronic markets (e.g., Hess and Kemerer 1994) by using organizational-level survey data to test our model and a representative electronic market. Similar to most electronic markets, Polygon facilitates negotiations on product specifications and terms of exchange. Polygon strives to foster a community atmosphere and is contemplating providing ratings of participating firms that would be based on their participation history. Thus, on the basis of the characteristics and scope of Polygon, we contend that our results are generalizable to other similar electronic markets.

Limitations and Further Research

Consistent with most survey research, our results are constrained by issues related to common method variance, though we tried to minimize it in two ways: (1) We assessed nonresponse bias by comparing sample characteristics with those of the population, and (2) we used secondary data to operationalize age-based learning. To our knowledge, this is the first attempt to examine organizational participation in electronic markets empirically; as a result, readers should be cautious in generalizing these results. Replications, especially in markets in which market

makers adopt business models different from those of Polygon, are needed. Additional research, for example, might study firm participation in electronic markets in which a transaction fee is the primary revenue source for the market maker (e.g., e-STEEL). In electronic markets that rely on transaction fees, participation firms that do not engage in transactions do not incur any costs (other than the initial setup costs). In such cases, we believe that participating firms are even more likely to move into the passive state, and the challenges for market makers to induce active participation would be even greater. Other business models of market makers (e.g., those based on transaction or subscription fees), other characteristics of market makers (e.g., the ownership structure—consortia-led versus third-party), strategy of the market maker (e.g., exclusive markets in which entry is contingent on some qualification versus open markets), and the structure of the industry (e.g., degree of fragmentation) also should be studied.

Further research on business-to-business electronic markets should proceed in at least two directions. First, research should study user firms in electronic markets further. Researchers need to understand the role of user firm capabilities, such as market orientation and strategic adaptability, and how these important strategic variables might change in the context of electronic markets. Researchers should examine the consequences of the nature of organizational participation, such as its influence on building interfirm relationships and firm performance. In addition, researchers should develop an understanding of the drivers of firm performance and typologies of firm strategies in electronic markets. Finally, all electronic markets are international, and understanding the role of country-specific institutional environments and the implications of omnipresent global competition among user firms is critical in developing a full appreciation of the impact of electronic markets.

Second, we investigate only one electronic market and therefore cannot contribute with regard to the role of market makers in other contexts. Further research should work toward developing a taxonomy of business-to-business electronic markets, competition among electronic markets, role of market makers and their influence on the type and characteristics of user firms, the scope and context of electronic markets (e.g., generic versus industry-specific electronic markets), and international issues such as the country of origin of market makers, among others. For example, an interesting research avenue would be to investigate the factors behind the emergence and initial success of consortia-led electronic markets.

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