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ABSTRACT: Despite the significant opportunities to transform the way that organizations conduct trading activities, few studies have investigated the impetus for organizational strategic moves toward business-to-business (B2B) electronic marketplaces. Drawing on transaction cost theory and institutional theory, this paper identifies two groups of factors—efficiency- and legitimacy-oriented factors, respectively—that can influence organizational buyers' initial adoption of, and the level of participation in, B2B e-marketplaces. The effects of these factors on initial adoption of and participation level in B2B e-marketplaces are empirically tested with data collected, respectively, from 98 potential adopter and 85 current adopter organizations. The results of a partial least squares analysis of the data indicate that the two groups of factors exhibit different patterns in explaining initial adoption in the preadoption period and participation level in the postadoption period. Specifically, all three of the efficiency-oriented factors investigated in this study—product characteristics, demand uncertainty, and market volatility—and their subconstructs exhibit a significant influence on adoption intent or participation level, or both. The results demonstrate that two legitimacy-oriented factors—mimetic pressures and normative pressures—and their subconstructs have

a significant impact on adoption intent, but not on participation level. Our findings also indicate that clearly different patterns exist between the two groups of factors in explaining adoption intent and participation level.

THE GROWING POPULARITY OF THE INTERNET has opened up a new era of business-to-business (B2B) electronic commerce, notably through B2B e-marketplaces in which buyers and sellers are brought together to trade online [72]. B2B e-marketplaces have the potential to offer enormous benefits to both organizational buyers and sellers. Buyers benefit mainly from significant reduction in procurement costs. The major benefit for sellers is to broaden their customer base and to reach out to new profitable customers [35, 38, 72]. As such, it was widely recognized that B2B e-marketplaces could revolutionize the way in which organizations conduct trading activities with their business partners. With the large potential of B2B e-marketplaces, a considerable number of B2B e-marketplaces were launched in the dot-com boom period of the late 1990s. Forrester Research estimated that more than 1,000 B2B e-marketplaces worldwide started their operation in 2000 [73]. Further, many optimistic projections were made about the future of B2B e-marketplaces. For instance, it was predicted that more than 4,000 B2B e-marketplaces would be in operation by 2004 [68].

However, the phenomenal explosion of B2B e-marketplaces and optimistic projections in the much-hyped period were made with precautions. Some experts indicated that about two B2B e-marketplaces would be sufficient in each industry [34]. Only a few B2B e-marketplaces were expected to reach a critical mass of both buyers and sellers in each industry, and the buyers and sellers would want to stay with such B2B e-marketplaces [35]. Based on this line of reasoning, it was predicted that only about 200 to 300 B2B e-marketplaces would survive the dot-com bust [3]. These cautionary predictions appear to have come true, given that many of the e-marketplaces established in the dot-com era have terminated their operations without ever turning a profit [11, 52].

Although a large number of B2B e-marketplaces have ceased to exist, many others have successfully been established as viable arenas for organizational trading activities in industries such as cars, metals, and chemicals [47, 68]. For example, Alibaba, which offers industry-specific e-marketplaces for a variety of industries, has successfully become the world's largest B2B e-marketplace [10]. Similarly, Global Healthcare Exchange (GHX), a B2B e-marketplace in the health-care industry, is thriving with 2,675 participating members (2,500 health-care providers and 175 vendors of medical supplies); GHX processed $3.5 billion in purchase orders in the first three quarters of 2004 [4]. It was suggested that many B2B e-marketplaces driven by technological design considerations have struggled, while others built with careful

attention to the complex nature of organizational trading activities have been success-ful notwithstanding the economic downturn at the end of the dot-com boom [68]. The impressive success of many B2B e-marketplaces that survived has led major market analyst firms, including Gartner Research and Meta Group, to predict the renaissance of B2B e-marketplaces [68].

Various types of B2B e-marketplaces have been established to date. Of the numerous approaches used to classify them, it is worth mentioning the following two to describe the scope of the current study. The first is mainly based on who operates a B2B e-mar-ketplace (private versus nonprivate), and the second on the number of industries served by a B2B e-marketplace (vertical versus horizontal). Private marketplaces are owned and operated by an individual company to connect itself directly to its buyers/suppliers (e.g., Wal-Mart, Dell, Volkswagen). The two types of nonprivate marketplaces include public and consortium-based marketplaces. Public marketplaces are created and oper-ated by an independent third-party intermediary (e.g., Alibaba or ChemConnect), and consortium-based marketplaces by a group of dominant players in an industry (e.g., Elemica, Covisint, WorldWide Retail Exchange) [38, 65, 68]. Vertical marketplaces are industry specific (e.g., Covisint, Global Healthcare Exchange, or Trade-Ranger), whereas horizontal marketplaces serve more than one industry (e.g., Global Trade Village or Worldbid.com) [30, 38]. The present study focuses particularly on nonpri-vate (i.e., public and consortium-based) e-marketplaces that are industry specific (i.e., vertical). According to a B2B e-marketplace directory (www.emarketservices.com), about 510 B2B e-marketplaces that can be characterized as nonprivate and vertical were in operation as of January 2007.

Despite the enormous potential of B2B e-marketplaces to transform organizational trading activities, limited scholarly attention has been devoted to developing and empirically validating a research model that investigates the factors that influence organizations to participate in them. Prior research has focused primarily on devel-oping propositions based on either a conceptual analysis (e.g., [45]) or reporting the findings of case studies (e.g., [16, 17, 24]). One notable exception is a large-scale field study by Grewal et al. [29], who found that both efficiency- and legitimacy-oriented motives strongly influence organizational use of B2B e-marketplaces. Yet the study is limited in its ability to offer specific salient factors rooted in each of the two mo-tives. Identification of such factors will lead to understanding of the sources of the two motives that is both theoretically and managerially useful.

The main purpose of this study is twofold. First, drawing on research propositions developed in the earlier studies (e.g., [16, 17, 45]) and the theoretical foundations of *transaction cost* and *institutional theories,* this paper identifies two groups of salient factors rooted in efficiency- and legitimacy-oriented perspectives [29], and assesses empirically their effects on organizational buyers' adoption and use of B2B e-marketplaces. Specifically, product characteristics, demand uncertainty, and market volatility are identified as the salient factors rooted in the efficiency-oriented perspec-tive, and mimetic, coercive, and normative pressures as those rooted in the legitimacy perspective. Second, this study examines differential effects of the two groups of factors in the pre- and postadoption periods. We particularly propose that legitimacy-

oriented factors exert stronger effects on *adoption intent* among potential adopters than on *participation level* among current adopters of B2B e-marketplaces. In contrast, efficiency-oriented factors are expected to exert stronger effects on participation level among current adopters than on adoption intent among potential adopters. The main research questions to be addressed can also be stated as follows:

1. What specific factors, rooted in efficiency- and legitimacy-oriented perspectives, motivate organizational buyers to adopt B2B e-marketplaces and to increase their level of participation in them?
2. Do the two groups of factors, rooted in efficiency- and legitimacy-oriented perspectives, have differential roles in explaining adoption intent and participation level? Specifically, is adoption intent affected more by legitimacy-oriented factors? In contrast, is the level of participation affected more by efficiency-oriented factors?

Hypothesis Development

WHILE A NUMBER OF THEORETICAL LENSES EXIST that can potentially explain organizational adoption and use of B2B e-marketplaces, this study focuses particularly on the theoretical perspective on organizational motivation. Drawing on the motivation perspective, we propose that the key reasons for an organization's adoption and use of B2B e-marketplaces are usually based on two primary motives—efficiency or legitimacy [29, 58]. The efficiency-oriented perspective suggests that organizations adopt B2B e-marketplaces based on the rationalistic expectation of enhancing the economic efficiency of their transactional processes. On the other hand, organizations that embrace the legitimacy-oriented perspective as their primary motive for adopting B2B e-marketplaces place greater emphasis on social norms and institutional expectations existing in the external environment. For example, organizations adopt and use a B2B e-marketplace mainly because they expect considerable savings in procurement costs (efficiency perspective), or because other players (e.g., competitors, suppliers, customers) in their industry have already adopted the e-marketplace (legitimacy perspective). We use two well-grounded theories—transaction cost theory and institutional theory—to identify specific factors rooted in the efficiency- and legitimacy-oriented perspectives, respectively, within the context of B2B e-marketplace adoption [58].

Given the significance of the distinction between pre- and postadoption periods to be described later, this study examines separately the effects of the efficiency- and legitimacy-based factors on *adoption intent* among potential adopters and on *participation level* among current adopters of B2B e-marketplaces. Consistent with Chwelos et al. [18] and Teo et al. [66], adoption intent was chosen as the dependent variable for potential adopters. To examine current adopters, drawing upon the literature on the processes of organizational assimilation of innovations [19, 26], a multilevel participation model was developed to capture their different levels of adoption. Specifically, a three-level participation model employed by Grewal et al. [29] was adapted to this study and used as the dependent variable for adopters in the postadoption period. The

participation level of an organization is classified as (1) the *exploration* stage, when the organization has been registered in a B2B marketplace but has not yet begun to conduct trading activities via the marketplace; (2) the *trial* stage, when it has conducted several transactions via a B2B e-marketplace, but is still evaluating the pros and cons of this means of doing business; and (3) the *commitment* stage, when the organization has made a full commitment because trading via a B2B e-marketplace has become an important part of its operations. In accordance with earlier studies [26], we assume a linear progression through the three participation stages in the postadoption period.

The remainder of this section identifies two groups of factors, rooted in efficiency- and legitimacy-oriented perspectives, that may influence adoption intent of and participation level in B2B e-marketplaces and uses these factors to develop testable research hypotheses. H1, H2, and H3 are developed with key research factors drawn from the efficiency-oriented perspective, and H4, H5, and H6 with those drawn from the legitimacy-oriented perspective. Subsequently, we propose that the effects of these groups of the factors will differ between pre- and postadoption periods as reflected in H7 and H8. Figure 1 presents our research model.

Efficiency-Oriented Perspectives

A major benefit of B2B e-marketplaces is to improve transaction effectiveness and efficiency, which often motivates organizations to adopt and transact in a B2B e-marketplace [29]. Theoretical developments in transaction cost theory were particularly useful to systematically analyze the economic benefit of e-marketplaces in prior work (e.g., [6, 7, 45]). Transaction cost theory [71] suggests that, all else being equal, organizations strive to minimize their total costs, comprising both transaction and production costs, by selecting the best organizational governance structure (e.g., market, hierarchy, or hybrid) for the particular situations they encounter. For example, built on the main premise of transaction cost theory, Malone et al. [45] indicated that an organization would pick from alternative information technology (IT)–enabled governance structures the one that best fit its economic efficiency rationales. They identified two distinct types of IT-enabled governance structures—electronic markets (e.g., nonprivate B2B e-marketplaces) and electronic hierarchies (e.g., electronic data exchange [EDI]).

The literature on IT-enabled governance structures identifies certain factors related to transaction costs that signal the circumstances under which organizations should benefit most from a particular type of IT-enabled governance structure. Conceptual analysis by Malone et al. [45] proposed *product characteristics,* such as asset specificity of products and product complexity, as one that could influence organizations' strategic choices between electronic markets and electronic hierarchies. Based on a case study of the aircraft parts industry, Choudhury and his colleagues [16, 17] proposed additional variables that could potentially influence organizational decisions regarding IT-enabled governance structures—namely, uncertainty attributable to the nature of the demand *(demand uncertainty)* and to the market environment of the products that organizations need to acquire *(market volatility).* This study also incorporates these
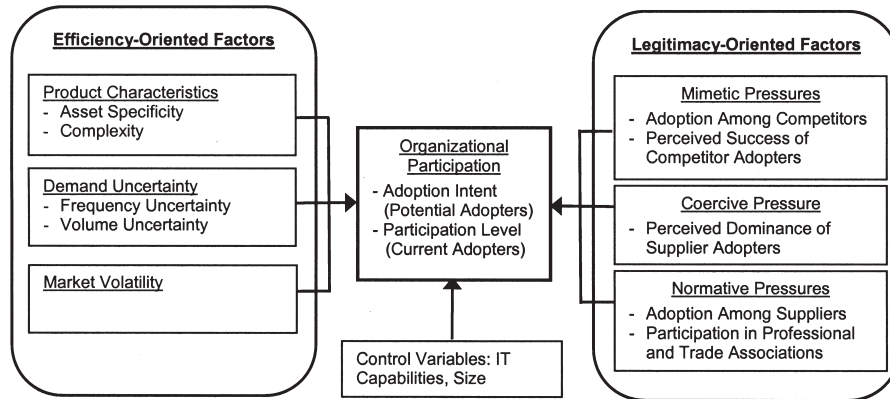
Figure 1. Research Framework

variables because adoption of B2B e-marketplaces can be viewed as an IT governance choice of electronic marketplaces over electronic hierarchies.

Product Characteristics

The nature of the products traded should be taken into consideration in understanding organizations' strategic moves toward B2B e-marketplaces [45]. The conceptual analysis by Malone et al. [45] suggests that two characteristics of products—*asset specificity* and *complexity*—influence organizational adoption of B2B e-marketplaces. Asset specificity refers to the extent to which a product used by a firm cannot be easily utilized by other firms, and complexity refers to the amount of information necessary to describe the attributes of a product [45]. Malone et al. indicated that asset specificity and complexity are not always correlated to each other and, therefore, logically should be considered independent.

   Consistent with Malone et al. [45], we expect a negative impact of such product characteristics on organizational buyers' adoption and use of B2B e-marketplaces mainly due to the following reasons. First, products that are high in complexity generally require the provision of a large amount of descriptions to be traded [45]; however, online catalogs provided in e-marketplaces often do not allow enough space for certain products to be described in such large detail (e.g., 250 characters in an online catalog application by Ariba) [70]. Second, products that are high in asset specificity (e.g., specialized machinery) require closer coordination between buyers and sellers because such products should be highly customized for the buyer [45]. However, information sharing between buyers and sellers via e-marketplaces is relatively limited compared with that conducted via a direct electronic linkage. To this end, it is expected that organizations are not likely to adopt and use a B2B e-marketplace for products that are high in both asset specificity and complexity. Little research has been conducted to validate these predictions empirically with data collected from large-scale field studies. Therefore, it appears worth examining the following hypothesis regarding

the effects of the characteristics of products transacted via a B2B e-marketplace and its corollaries with respect to the effects of asset specificity and complexity:

> *Hypothesis 1: The characteristics of products as a whole, in terms of their asset specificity and complexity, that are transacted via a B2B e-marketplace will negatively influence the adoption intent of, and the level of participation in, the B2B e-marketplace among organizational buyers.*

> *Hypothesis 1(a): Asset specificity of products as a whole that are transacted via a B2B e-marketplace will negatively influence the adoption intent of, and the level of participation in, the B2B e-marketplace among organizational buyers.*

> *Hypothesis 1(b): Complexity of products as a whole that are transacted via a B2B e-marketplace will negatively influence the adoption intent of, and the level of participation in, the B2B e-marketplace among organizational buyers.*

Demand Uncertainty

Transaction cost theory proposes *uncertainty,* along with asset specificity, as a key antecedent of an organization's choices of governance structures [57]. Based on this theoretical argument, uncertainty is regarded as an important variable that influences organizational decision about IT-enabled governance structures, such as electronic markets and electronic hierarchies. Choudhury [16] identified two specific types of uncertainty that mainly influence organizational adoption of B2B e-marketplaces: (1) uncertainty attributable to the nature of the demand ("product demand uncertainty"), and (2) uncertainty attributable to the market environment of the products ("market volatility") that organizations need to acquire. Product demand uncertainty is attributed to two qualities: the extent to which the frequency of purchases of a product is predictable ("frequency uncertainty of demand"), and the extent to which the volume of purchases of a product is predictable ("volume uncertainty of demand").[1]

We would expect demand uncertainty to have a negative impact on an organization's adoption and use of a B2B e-marketplace due to the following reasons.[2] First, faced with a high level of demand uncertainty, buyers and suppliers may choose to cope with the uncertainty jointly by developing seamless integration of cross-organizational business processes through electronic hierarchies. For this reason, B2B e-marketplaces could be a less viable option for products with a high level of demand uncertainty. Second, when high levels of uncertainty exist regarding the timing of future purchases of products (frequency uncertainty of demand) and the amount of future purchases of products (volume uncertainty of demand), organizations might not easily quantify the benefits of engaging in purchasing via an e-marketplace. Organizations need to make financial commitments to participate in B2B e-marketplaces, including periodic subscription fees for participation and fees for the software necessary to be connected to the e-marketplace [38]. The return on those investments will be higher when organizations regularly and frequently trade large volumes of products via the e-marketplace. However, as the levels of uncertainty about the volume and frequency

of product demand increase, organizations cannot easily justify such investments.[3] We also conjecture that the establishment of a strategic investment rationale is even more critical in the post-dot-com era when IT investments are closely scrutinized for higher, less risky returns on investments [12]. Based on this line of reasoning, we propose the following hypothesis regarding the effects of demand uncertainty and its corollaries with respect to the effects of frequency uncertainty and volume uncertainty:

> *Hypothesis 2: Uncertainty in demand for products as a whole that are transacted via a B2B e-marketplace will negatively influence the adoption intent of, and the level of participation in, the B2B e-marketplace among organizational buyers.*

> *Hypothesis 2(a): Uncertainty in the frequency of demand for products as a whole that are transacted via a B2B e-marketplace will negatively influence the adoption intent of, and the level of participation in, the B2B e-marketplace among organizational buyers.*

> *Hypothesis 2(b): Uncertainty in the volume of demand for products as a whole that are transacted via a B2B e-marketplace will negatively influence the adoption intent of, and the level of participation in, the B2B e-marketplace among organizational buyers.*

Market Volatility

In addition to demand uncertainty for products traded, the uncertainty attributable to the market environment in which products are traded (i.e., *market volatility*) is another important type of uncertainty that can influence an organization's strategic move toward B2B e-marketplaces. The market for a product is characterized as volatile when the environment changes rapidly in terms of the prices and players, such as the buyers and sellers [8, 16]. Just as in the case of demand uncertainty, two plausible alternatives can be proposed concerning how organizations could cope with high levels of market volatility: one is that the organizations can form tighter relationships with their current trading partners to prepare for their transactional needs; the other is that they can actively pursue new trading partnerships when a new transactional need arises.

We propose favorable effects of market volatility on organizational adoption of B2B e-marketplaces by following the latter option due mainly to the following reasons. First, the findings of prior empirical studies have generally supported the latter scenario, specifically because this uncertainty works against the forging of close long-term relationships between buyers and sellers (e.g., [62]). Therefore, we expect that when organizations are faced with high levels of market volatility, B2B e-marketplaces may be an attractive option because the e-marketplaces reduce the search costs associated with obtaining information on sellers and their product offerings [7]. Second, an important function of B2B e-marketplaces is to offer up-to-date industry-related news services [32, 74] and such information services will be particularly useful to organizations in a highly volatile industry in which the market environment rapidly changes. We therefore propose the following hypothesis regarding the effects of market volatility:

Hypothesis 3: Market volatility for products as a whole that are transacted via a B2B e-marketplace will positively influence the adoption intent of, and the level of participation in, the B2B e-marketplace among organizational buyers.

Legitimacy-Oriented Perspectives

The literature suggests that organizations often adopt B2B e-marketplaces to avoid the fear of being left out of their industry, or to foster their image and reputation within their industry [52, 56, 65]. We use institutional theory to systematically understand the nature of such organizational motives to adopt B2B e-marketplaces. According to institutional theory, organizations' decision making can best be understood with the lens of the concept of organizational legitimacy, which refers to the acceptance of an organization within its external environment [21, 58]. Legitimacy is conferred on an organization by external constituents when the values and actions of the organization are congruent with those of its constituents, such as their key suppliers, consumers, regulatory agencies, and other organizations that produce similar services or products [23]. Organizational isomorphism, which suggests that organizations are likely to adopt processes, structures, and strategies that others have already adopted, is considered to be one of the most fundamental mechanisms through which organizations achieve organizational legitimacy [21]. Isomorphism is often used as a mechanism for reducing uncertainty by organizations considering the adoption of new innovations. With respect to isomorphic processes, previous studies identified three specific types of external institutional pressures facing an organization—mimetic, coercive, and normative pressures [23].

Mimetic Pressures

One of the isomorphic processes is conformity to *mimetic pressures,* which implies that over time organizations become more similar to other organizations in their environment [23]. The following serves as the two specific types of mimetic pressures [33]. First, often referred to as a bandwagon effect [1], once enough organizations in their environment have taken the same action, mimetic isomorphism causes organizations to imitate these actions without a great deal of thought [46]. Second, organizations often closely monitor actions taken by others to identify successful practices applied by them and imitate their actions to achieve the similar benefits. In other words, faced with high levels of uncertainty about the outcomes of a strategic action, organizations may be able to achieve legitimacy by following the collective actions of early adopters, or the "best practices" adopted by other similar organizations [23]. This mimicking behavior enables organizations to minimize the costs associated with searching for alternatives, which is borne by first movers [20].

Although there is a cumulative body of literature regarding mimetic isomorphism in other disciplines, less attention has been devoted to assessing the role of mimetic pressures within the information system (IS) discipline. The exceptions are the studies by Teo et al. [66] and Ang and Cummings [2]. Teo et al. [66] found a significant

impact of mimetic pressures on organizations' adoption of financial EDI technology. Similarly, Ang and Cummings [2] found that peer practices strongly influenced IS outsourcing decisions in the banking industry. However, although they were not explicitly built on institutional theory, several IS studies have recognized the important role of mimetic pressures. For example, the Kodak effect, which refers to the influence on other organizations of Kodak's pioneering IS outsourcing deal with IBM, has been examined in the IS literature (e.g., [36, 44]). Consistent with Haveman [33] and Teo et al. [66], we focus on two specific types of mimetic pressures, *the extent of adoption by competitors* within an industry and *the perceived success of competitor adopters.* In fact, many B2B e-marketplaces appear to utilize such mimetic pressures to attract more participation. For example, B2B e-marketplaces actively advertise a list of current participants and testimonials from their current participants [63] so that potential adopting organizations (or current adopters with low participation levels) can feel mimetic pressures. Consequently, we propose the following hypothesis regarding the effects of mimetic pressures and its corollaries with respect to the effects of associated subconstructs:

> *Hypothesis 4: Mimetic pressures will positively influence the adoption intent of, and the level of participation in, a B2B e-marketplace among organizational buyers.*

> *Hypothesis 4(a): The extent of adoption by competitors will positively influence the adoption intent of, and the level of participation in, a B2B e-marketplace among organizational buyers.*

> *Hypothesis 4(b): Perceptions of success among competitor adopters will positively influence the adoption intent of, and the level of participation in, a B2B e-marketplace among organizational buyers.*

Coercive Pressures

Coercive pressures refer to the fact that organizations are subject to "both formal and informal pressures exerted on organizations by other organizations upon which they are dependent and by cultural expectations in the society within which organizations function" [23, p. 50]. An organization's stakeholders may exert formal and informal pressures to solicit compliance. Such stakeholders include trading partners, such as customers and suppliers in exchange relationships, investors, government regulatory agencies, and parent corporations [64]. These pressures may take several forms, such as force, threats, persuasion, and invitations, to join in collusion [23]. Such direct pressures are expected to play an important role when a large firm opens its own private e-marketplace, which is not within the scope of the current study, and to invite its trading partners to the e-marketplace. On the other hand, it is also suggested that, although no attempt at direct influence is undertaken, certain strategic actions taken by dominant organizations in an industry may indirectly pressure others in the industry. The literature on B2B e-marketplace adoption has emphasized the role of such indirect

pressures in successful deployment of nonprivate B2B e-marketplaces, suggesting that, when dominant players in an industry participate in a B2B e-marketplace, others in the same industry feel pressure to join the e-marketplace [9, 24].

The effects of coercive pressures have been examined in several earlier studies within the context of organizational adoption of IT innovations. Coercive pressures from stakeholders strongly influence the adoption of electronic business technologies [64]. Many studies on the adoption of interorganizational information systems (IOS) have observed that pressures from trading partners are among the most important factors in explaining EDI adoption [18, 66]. For example, Teo et al. [66] found a strong positive association between organizations' intent to adopt EDI and the perceived dominance of their customers and suppliers who had already adopted EDI. Although not yet empirically investigated with large-scale field data, anecdotal evidence suggests the importance of coercive pressures manifested by the participation of an industry's dominant players in the successful development of B2B e-marketplaces. Consortium-based B2B e-marketplaces (e.g., Covisint in the automobile industry, Exostar in the aerospace and defense industry, GHX in the health-care industry), in which several large players form a consortium to develop a B2B marketplace for their industry, have been prospering [4, 68]. A recent case study of the mining industry has also found that the dominant status of the mining companies, which formed a consortium to open a B2B e-marketplace, named Quadrem, pressured other companies to join the e-marketplace [65]. Based on this observation and on the theoretical reasoning described above, we propose the following hypothesis regarding the effects of the *perceived dominance of supplier adopters* who are participating in a B2B e-marketplace.

> *Hypothesis 5: Perceived dominance of supplier adopters will positively influence the adoption intent of, and the level of participation in, a B2B e-marketplace among organizational buyers.*

Normative Pressures

The final type of the isomorphic processes is organizations' conformity to *normative pressures,* which implies that strategic processes taken by organizations are subject to the values and norms shared among the members of their social networks [61]. Organizations will likely adjust their behavior based on their beliefs about what members in their social networks view as appropriate [21]. A variety of sources may exert normative pressures. Such sources include trade associations, professional associations, accreditation agencies, and channel members [28]. Through direct and indirect interactions with others, organizational decision makers can learn about the desirable and undesirable consequences of certain organizational actions. This is analogous to the notion of "informational social influence" proposed in the interpersonal relationship context [22], which suggests that the value of an innovation is communicated through an individual's interactions with other actors in his or her social network.

Given that B2B e-marketplaces are designed primarily to support trading activities between buyers and sellers, trading partners' actions with regard to an e-marketplace

are expected to play a crucial role in an organization's decision to move toward the e-marketplace. Buyers will not be motivated to use an e-marketplace with an insufficient number of suppliers; on the other hand, sellers will not be motivated to use an e-marketplace without buyers—what is often addressed as the "chicken and egg" problem [41]. The theoretical reasoning rooted in the critical mass perspective [48] and the network externality perspective [25] also suggests that the value of an organization's participation in an e-marketplace would vary largely based on the number of trading partners who have already adopted the e-marketplace. Although no empirical work has been carried out to examine the association within the context of B2B e-marketplaces, previous studies about other types of IOS, such as EDI, have supported this assertion [66]. It is also found that many B2B e-marketplaces actively advertise the number of participants, the number of products listed, and the transaction volumes [63]. When exposed to this advertisement from a B2B e-marketplace, nonadopters (or current adopters with low participation levels) may feel normative pressures to transact through the B2B e-marketplace. Hence, we posit that, from the perspective of organizational buyers, *the extent of adoption by suppliers* will be a strong determinant in their decisions to adopt and to use B2B e-marketplaces.

Another type of normative pressure originates from *participation in trade and professional associations* [66]. Normative rules about organizational behavior are defined and promulgated through active participation in a wide array of events such as conferences, workshops, and educational programs organized by trade and professional associations [23]. Individuals participating in those events, or subscribing to the professional publications of these associations, would learn the acceptable norms of practices and affect the behavior of their organization accordingly. As an example, the Automotive Industry Action Group has played an active role in the diffusion of several IT-related initiatives, such as EDI. Empirical evidence exists about the strong influence of normative pressures from trade and professional associations on financial EDI adoption [66]. Likewise, normative pressures from the trade and professional associations, which promote transactions through a B2B e-marketplace, will likely foster the adoption and use of the e-marketplace by organizations. Such normative pressures will be high, especially when an industry association creates a B2B e-marketplace; for example, the Grocery Manufacturer's Association opened an e-marketplace, Transora, to facilitate transactions in the consumer goods and grocery industry [54]. We therefore propose that trade and professional associations, in addition to suppliers, would be important sources of normative pressures. Accordingly, we propose the following hypothesis regarding the effects of normative pressures and its corollaries with respect to the effects of associated subconstructs:

Hypothesis 6: Normative pressures will positively influence the adoption intent of, and the level of participation in, a B2B e-marketplace among organizational buyers.

Hypothesis 6(a): The extent of adoption by suppliers will positively influence the adoption intent of, and the level of participation in, a B2B e-marketplace among organizational buyers.

Hypothesis 6(b): Participation in professional and trade associations will positively influence the adoption intent of, and the level of participation in, a B2B e-marketplace among organizational buyers.

Differential Effects of Potential Factors in the Pre- and Postadoption Periods

Those factors strongly influential in explaining the initial adoption of an innovation may be less influential in explaining its continued use, and vice versa [19, 42]. According to Klonglan and Coward [40], sociological variables are superior to economic variables in explaining initial adoption, but economic variables best explain continued use. Likewise, Triandis [67] suggested that when a behavior is relatively new, the influence of social norms and affect outweigh economic variables. The findings of Karahanna et al. [37] generally support these assertions. They found that subjective norms (i.e., the views of other important parties regarding the behavior in question) are more influential on behavioral intention of initial adoption of a new operating system than they are on behavioral intention of continued use.

With the exception of Cooper and Zmud [19] and Laudon [42], relatively little empirical analysis has been conducted to compare the antecedents of organizational adoption and continued use of an IT innovation. Cooper and Zmud [19] found that factors rooted in rational task–technology fit exert strong influence on material requirement planning (MRP) adoption, but not on its infusion. They postulated that only sociopolitical and learning-related variables are significant in explaining MRP infusion in organizations. Within the context of IOS, the findings of studies on EDI adoption [18] and on EDI usage [62] reveal that trading partner pressures heavily and positively influence EDI adoption, but not EDI usage.

Based on these findings, we posit that differential effects of the two sets of factors (efficiency- and legitimacy-oriented) will underlie the adoption and use of B2B e-marketplaces. Prior studies also suggest that isomorphic processes play a particularly important role in circumstances in which higher levels of uncertainty are associated with the outcomes of organizational actions [23]. Compared with the postadoption period in which organizations have actually engaged in trading via a B2B e-marketplace, organizations in the preadoption period will face higher levels of uncertainty concerning the pros and cons of such means of trading. Hence, we expect that legitimacy-oriented factors have a greater influence on adoption intent than do efficiency-oriented factors. However, the level of uncertainty associated with transactions through a B2B e-marketplace will decrease once organizations engage in trading via the B2B e-marketplace. Put simply, organizations with trading experiences via a B2B e-marketplace can gauge better the pros and cons of trading via the e-marketplace. In this sense, it is reasonable to propose that efficiency-oriented factors play a larger role in explaining participation level in the postadoption period than do legitimacy-oriented factors. Accordingly, we formulate the following hypotheses with respect to differential effects of the two groups of factors in the pre- and postadoption periods:

Hypothesis 7: Legitimacy-oriented factors will have a stronger influence on adoption intent in the preadoption period than efficiency-oriented factors.

Hypothesis 8: Efficiency-oriented factors will have a stronger influence on participation level in the postadoption period than legitimacy-oriented factors.

We controlled for the effects of two other variables. The control variables include IT capabilities of an organization [18, 29] and organization size [43, 59]. Both of these control variables are expected to positively influence adoption intent, as well as positively influence participation level. However, we do not explicitly propose and test hypotheses related to the effects of the control variables because our focus in this study lies on the theoretical variables described earlier. Table 1 lists the research hypotheses developed above along with supporting examples.

Research Method

Development of Measures

To test the hypotheses, data were collected from a survey questionnaire administered to members of the Purchasing Management Association of Canada (PMAC) between November 2003 and January 2004. Two versions of the questionnaire were prepared: one for adopters during their postadoption period and the other for nonadopters in the preadoption period. The respondents were asked to choose an appropriate version of the questionnaire depending on whether their firms had adopted a B2B e-marketplace established for the industry in which they operate. Furthermore, respondents who chose the adopter version of the questionnaire were asked to indicate the name of the e-marketplace they had adopted and the level of participation in the e-marketplace, using the descriptions of the three levels of the participation—exploration, trial, and commitment stages (see Appendix A). Wherever possible, existing measures that were proven to be reliable and valid were adapted from earlier studies; otherwise, new measures were developed (see Table 2). All latent constructs were measured with multiple items on seven-point Likert scales, anchored with "strongly disagree" to "strongly agree," except for market volatility, which was measured using a semantic scale.

Four of the main constructs (i.e., product characteristics, demand uncertainty, mimetic pressures, and normative pressures) were operationalized as formative, emergent constructs formed from several subconstructs, similar to Chwelos et al. [18] and Teo et al. [66]. Asset specificity and complexity of products were assessed with three-item measures developed by closely following the descriptions of the constructs found in Malone et al. [45]. The two types of demand uncertainty—frequency uncertainty and volume uncertainty—were operationalized mainly based on the extant conceptual definitions of the constructs found in Choudhury [16] and Walker and Weber [69]. Market volatility was measured with a multi-item scale adapted from Bello and Gilliland [8]. When answering the questions designed to measure the efficiency-oriented constructs, respondents were asked to consider products as a whole that their organizations could purchase from a B2B e-marketplace.[4] The measures

Table 1. Research Hypotheses and Supporting Examples

Hypotheses	Supporting examples
H1: The characteristics of products as a whole, in terms of their asset specificity and complexity, that are transacted via a B2B e-marketplace will negatively influence the adoption intent of, and the level of participation in, the B2B e-marketplace among organizational buyers.	
H1a: Asset specificity of products as a whole that are transacted via a B2B e-marketplace will negatively influence the adoption intent of, and the level of participation in, the B2B e-marketplace among organizational buyers.	A firm finds that most products listed in a B2B e-marketplace need to be highly customized for buyers before delivery (i.e., high in asset specificity). The firm generally purchases such products from suppliers who they have kept a long-term relationship because transactions will "involve a long process of development and adjustments for the supplier to meet the needs" [45, p. 486]. Hence, the B2B e-marketplace is not attractive for the firm.
H1b: Complexity of products as a whole that are transacted via a B2B e-marketplace will negatively influence the adoption intent of, and the level of participation in, the B2B e-marketplace among organizational buyers.	A firm finds that most products listed in a B2B e-marketplace are highly complex with a lot of attributes, which requires a large amount of descriptions. However, the products are not often described in such large detail because online catalogs in the e-marketplace have a space limit in terms of the number of characters [70]. To this end, the firm is not comfortable with purchasing products via the e-marketplace.
H2: Uncertainty in demand for products as a whole that are transacted via a B2B e-marketplace will negatively influence the adoption intent of, and the level of participation in, the B2B e-marketplace among organizational buyers.	
H2a: Uncertainty in the frequency of demand for products as a whole that are transacted via a B2B e-marketplace will negatively influence the adoption intent of, and the level of participation in, the B2B e-marketplace among organizational buyers.	A firm finds it difficult to justify financial commitments to participate in a B2B e-marketplace, such as periodic subscription fees for participation and fees for the software necessary to be connected to the e-marketplace [38], because how often it will purchase products via the e-marketplace is unpredictable. Thus, the B2B e-marketplace is not attractive for the firm.
H2b: Uncertainty in the volume of demand for products as a whole that are transacted via a B2B e-marketplace will negatively influence the adoption intent of, and the level of participation in, the B2B e-marketplace among organizational buyers.	A firm finds it difficult to justify financial commitments to participate in a B2B e-marketplace because it cannot predict the volume of products to be purchased through the e-marketplace. Thus, the firm is reluctant to adopt the B2B e-marketplace to purchase products through it.

(continues)

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Table 1. Continued

Hypotheses	Supporting examples
H3: Market volatility for products as a whole that are transacted via a B2B e-marketplace will positively influence the adoption intent of, and the level of participation in, the B2B e-marketplace among organizational buyers.	The market environment for products that a firm purchases is characterized as very volatile, in terms of sellers, product technologies, prices, and so on, and therefore up-to-date industry news is of high value to the firm. The firm finds it useful to join a B2B e-marketplace because the e-marketplace offer content services (e.g., up-to-date industry news) to its participants [32, 74].
H4: Mimetic pressures will positively influence the adoption intent of, and the level of participation in, a B2B e-marketplace among organizational buyers.	A firm finds that many of its competitors have already joined a B2B e-marketplace. The firm feels the fear of lagging behind its competitors and decides to join an e-marketplace and transact through it [65].
H4a: The extent of adoption by competitors will positively influence the adoption intent of, and the level of participation in, a B2B e-marketplace among organizational buyers.	
H4b: Perceptions of success among competitor adopters will positively influence the adoption intent of, and the level of participation in, a B2B e-marketplace among organizational buyers.	A firm is exposed to customer testimonials advertised by B2B e-marketplaces and finds that its competitors have achieved large benefits from the participation in e-marketplaces [63]. The firm decides to follow the "best practices" by joining an e-marketplace and transacting though it [66].
H5: Perceived dominance of supplier adopters will positively influence the adoption intent of, and the level of participation in, a B2B e-marketplace among organizational buyers.	A firm finds that a group of dominant suppliers in its industry has opened a B2B e-marketplace. To improve its relationship with the suppliers and to foster its image within the industry [65], the firm decides to join the e-marketplace and transact through it.

H6: Normative pressures will positively influence the adoption intent of, and the level of participation in, a B2B e-marketplace among organizational buyers.

A firm has been reluctant to join a B2B e-marketplace because e-marketplaces in its industry did not have a large number of participating sellers (i.e., the "chicken and egg" problem) [41]. The firm now finds that a large number of sellers participate in a B2B e-marketplace and thus decides to join the e-marketplace and transact through it.

H6a: The extent of adoption by suppliers will positively influence the adoption intent of, and the level of participation in, a B2B e-marketplace among organizational buyers.

An industry association actively promotes trading products via B2B e-marketplaces in several ways (e.g., workshops, newsletters, etc.). Through the participation in the industry association, a firm feels pressures to join a B2B e-marketplace and transact through it [54].

H6b: Participation in professional and trade associations will positively influence the adoption intent of, and the level of participation in, a B2B e-marketplace among organizational buyers.

H7: Legitimacy-oriented factors will have a stronger influence on adoption intent in the preadoption period than efficiency-oriented factors.

Although an organizational buyer expected efficiency benefits (e.g., reductions in procurement costs and sourcing cycle times) from transactions via a B2B e-marketplace, the firm was reluctant to adopt the e-marketplace because no sufficient number of sellers had joined the e-marketplace [41]. However, the e-marketplace recently attracted many players in the industry, including major suppliers and competitors, and the firm has thus joined the e-marketplace.

H8: Efficiency-oriented factors will have a stronger influence on participation level in the postadoption period than legitimacy-oriented factors.

After initially joining an e-marketplace, the firm is now able to better assess the amount of efficiency benefits from transactions via the e-marketplace. Therefore, its decision on the level of participation in the e-marketplace is mainly based on the amount of efficiency benefits.

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Table 2. Measurement Approach and Sources

Constructs	Type	Subconstructs	Type	Source	Items
Product characteristics	F	Asset specificity	R	Developed for this study	3
		Complexity	R	Developed for this study	3
Demand uncertainty	F	Frequency uncertainty	R	Developed for this study	3
		Volume uncertainty	R	Developed for this study	3
Market volatility	R			Bello and Gilliland [8]	3
Mimetic pressures	F	Adoption among competitors	R	Teo et al. [66]	3
		Perceived success of competitor adopters	R	Teo et al. [66]	3
Coercive pressure (perceived dominance of supplier adopters)	R			Teo et al. [66]	4
Normative pressures	F	Adoption among suppliers	R	Teo et al. [66]	2
		Participation in professional and trade associations	R	Teo et al. [66]	2
IT capabilities	R			King and Teo [39]	4
Organization size	F			Chwelos et al. [18]	2
Adoption intent	R			Chwelos et al. [18]	3
Participation level	n/a[1]			Grewal et al. [29]	1

Notes: F = formative; R = reflective. [1] Single-item measure. n/a = not applicable.

for the legitimacy-oriented constructs were directly adapted from Teo et al. [66] with some minor modifications, so that they were suitable for the context of this study. IT capabilities of an organization were assessed with four-item measures adapted from King and Teo [39]. Organization size was measured with two formative items:[5] (1) the previous year's total revenue and (2) the number of employees within each organization. Several academics and members of the staff at PMAC reviewed the first draft of the questionnaire to ascertain the clarity of the instructions and the content validity. Pilot tests were conducted with a pilot sample ($n = 148$) randomly selected from the membership of the PMAC. Respondents of the pilot test were asked to provide feedback and suggestions for improvement when instructions or questions were not clear, but also to answer all the questions by following the instructions that were given. A total of 37 respondents (32 nonadopters and five adopters) returned the completed questionnaires; 12 survey packages were returned as undeliverable. Based on the feedback of the pilot test, the survey instrument was deemed acceptable. Details of the scales are provided in Appendix A.

Sample and Data Collection Procedure

A total of 3,138 potential respondents was obtained from a national membership list of the PMAC. Of the 3,138 potential respondents, a sample frame of 148 randomly chosen members was used for the pilot study, and the remaining 2,990 members constituted a sample frame for the main study. We mailed them a survey questionnaire package that included a cover letter endorsed by the president of the PMAC to encourage their participation in the survey and the two versions of the questionnaire (one for potential adopters and the other for current adopters). An online version of the questionnaire was also available so that respondents had an option to participate in the study either by mailing a completed survey questionnaire or by completing and submitting the online version of the questionnaire. In an effort to increase the response rate, a follow-up postcard was mailed about one week after the initial package was sent, followed a week later by a replacement survey package. Although the most up-to-date membership list was used in selecting the sample frame, 137 survey packages were returned as undeliverable.

A total of 625 respondents returned the questionnaires either by mail (487; 78 percent) or online (138; 22 percent), yielding a response rate of 22 percent. Of the 625 responses returned, 540 were nonadopter versions (86 percent) and 85 were current adopter versions (14 percent). Of the 540 nonadopter organizations, 92 came from *potential* adopter organizations, which were defined as organizations that were aware of B2B e-marketplaces operating in their industry, but which had not adopted the e-marketplaces [37]. Only potential adopter organizations were asked to answer all the questions in the nonadopter version questionnaire and were included in our sample for data analysis. After discarding unusable responses, we obtained 92 and 80 responses from potential adopters and current adopters, respectively. Because no changes were made in the questionnaires after the pilot testing, the responses from the pilot testing (six from potential adopters and five from current adopters) were added to the main

study sample. Hence, 98 responses were used for the potential adopters and 85 for current adopters in the subsequent analysis.

An array of industries and a fair distribution of responding organizations, in terms of size, were in the potential adopter and adopter samples (see Table 3). The adopter firms had been using B2B e-marketplaces for an average of 3.84 years. Of the 85 adopter firms, eight firms were in the exploration stage, 36 in the trial stage, and 41 in the commitment stage. Most of the respondents reported their job titles as relating to purchasing functions, such as purchasing managers, buyers, and procurement managers. Nonresponse bias was assessed for the nonadopter and adopter samples separately, using the procedure recommended by Armstrong and Overton [5]. No significant differences between the first third and the last third of the respondents were found on the key research variables, nor on other variables such as the size of the firms and the number of years they have been participating in a B2B e-marketplace.

Data Analysis

THE PARTIAL LEAST SQUARES (PLS) approach to structural equation modeling was used to validate the measures and test our research model, using PLS-Graph version 3.0. Given the ability to model both formative and reflective latent constructs under small- and medium-sized samples [14], the PLS approach is considered to be more appropriate than covariance-based modeling approaches such as LISREL. Following a data analysis strategy used in earlier studies (e.g., [18, 66]), product characteristics, demand uncertainty, market volatility, mimetic pressures, and normative pressures were treated as formative, emergent constructs formed from their associated first-order reflective subconstructs.[6] As such, higher-order factor structures were constructed to model subconstructs and their association with underlying constructs [15].

Measurement Validation

We first evaluated the instrument for several psychometric properties. Individual item reliabilities were examined based on item loadings between an indicator and its posited underlying factor. An indicator intended to measure perceived dominance of supplier adopters in the adopter sample did not load well on this construct. Its loading was lower than the suggested acceptable value of 0.5 or 0.6 [14], and the item was consequently dropped from the construct in the adopter sample. The item was also dropped in the nonadopter sample for the sake of consistency of the measures between the two samples, to provide direct comparisons of the results in the subsequent structural model analysis. All retained item loadings were greater than the suggested acceptable value (see Table 4), and all constructs had an average variance extracted (AVE) of at least 0.50, adequately demonstrating convergent validity. The square root of the AVE (diagonal elements) was found to be larger than the correlations (off-diagonal elements) between the constructs (see Tables 5 and 6). Furthermore, no cross-loading issues were found at the individual item level (see Appendices B and C), demonstrating the discriminant validity of the scales. Internal consistency of the constructs was

Table 3. Profile of Organizations in the Samples

	Potential adopters (N = 98)		Current adopters (N = 85)	
	Frequency	Percentage	Frequency	Percentage
Industry groups				
Aerospace/aviation	6	6.1	5	5.9
Automotive	11	11.2	9	10.6
Chemicals	2	2.0	5	5.9
Consumer products	2	2.0	6	7.1
Forest products	5	5.1	2	2.4
Information technology/ electronics	10	10.2	4	4.7
Industrial products	8	8.2	8	9.4
Minerals/metals	5	5.1	7	8.2
Energy (oil, gas, and utility)	19	19.4	9	10.6
Wholesale/retail	2	2.0	6	7.1
Transportation	5	5.1	6	7.1
Others	21	21.4	16	18.8
Unknown	2	2.0	2	2.4
Annual sales revenue (in Canadian dollars)				
Less than $1 million	1	1.0	2	2.4
$1 million–$5 million	4	4.1	5	5.9
$5 million–$10 million	6	6.1	3	3.5
$10 million–$50 million	12	12.2	12	14.1
$50 million–$200 million	25	25.5	10	11.8
$200 million–$500 million	15	15.3	13	15.3
$500 million–$1 billion	9	9.2	8	9.4
$1 billion–$5 billion	12	12.2	18	21.2
More than $5 billion	4	4.1	11	12.9
Unknown	10	10.2	3	3.5
Number of employees				
Less than 500	43	43.9	27	31.8
500–999	17	17.3	8	9.4
1,000–4,999	24	24.5	32	37.6
5,000–10,000	4	4.1	5	5.9
More than 10,000	8	8.2	12	14.1
Unknown	2	2.0	1	1.2
Years with B2B e-marketplace				
Less than 3 years			26	30.6
3–6 years			47	55.3
More than 6 years			5	5.9
Unknown			7	8.2
Participation level				
Exploration			8	9.4
Trial			36	42.4
Commitment			41	48.2

Table 4. Descriptive Statistics and Item Loadings

Construct items	Potential adopters				Current adopters				
	Mean	Standard deviation	Loading (weight)	t-value	Mean	Standard deviation	Loading (weight)	t-value	Mean difference
IN1	4.45	1.57	0.92	62.19					n/a
IN2	4.81	1.64	0.87	30.05					n/a
IN3	3.43	1.45	0.85	20.62					n/a
PL					2.39	0.67	1.00	n/a	n/a
AS1	4.59	1.80	0.92	44.12	4.08	2.02	0.88	26.40	*
AS2	4.40	1.83	0.93	60.01	3.59	1.92	0.93	69.28	***
AS3	3.92	1.72	0.80	13.55	3.54	1.86	0.74	9.53	n.s.
PC1	4.89	1.50	0.95	134.01	4.35	1.66	0.94	62.75	**
PC2	4.91	1.49	0.95	101.90	4.55	1.64	0.96	93.99	n.s.
PC3	4.34	1.46	0.85	17.81	3.91	1.71	0.90	45.92	*
FU1	2.32	1.48	0.87	11.38	2.45	1.44	0.65	3.30	n.s.
FU2	2.91	1.49	0.85	8.58	3.48	1.62	0.52	2.11	***
FU3	3.43	1.66	0.79	10.76	3.49	1.62	0.88	5.99	n.s.
VU1	4.18	1.73	0.71	4.58	3.78	1.63	0.74	8.51	***
VU2	4.63	1.56	0.76	5.22	4.66	1.58	0.87	12.51	n.s.
VU3	4.17	1.57	0.88	11.99	4.36	1.65	0.86	12.25	n.s.
VL1	3.58	1.47	0.90	3.51	3.48	1.46	0.92	7.68	n.s.
VL2	3.60	1.38	0.73	2.94	3.42	1.30	0.94	8.41	n.s.
VL3	3.82	1.44	0.88	3.58	3.73	1.47	0.76	5.23	n.s.
CA1	2.98	1.55	0.93	59.34	4.75	1.54	0.92	13.41	****
CA2	3.61	1.56	0.87	21.04	5.00	1.57	0.88	13.30	****
CA3	3.06	1.65	0.91	37.43	4.95	1.79	0.88	12.80	****

CS1	2.43	1.38	0.88	27.70	4.38	1.54	0.75	9.59	****
CS2	2.86	1.50	0.91	33.65	4.36	1.47	0.78	8.96	****
CS3	2.79	1.63	0.88	36.35	4.56	1.71	0.92	13.60	****
SD1	4.60	1.78	0.81	4.93	4.80	1.63	0.60	2.04	n.s.
SD2	4.17	1.72	0.78	3.94	4.58	1.73	0.93	3.15	n.s.
SD4	4.87	1.65	0.88	5.48	5.05	1.56	0.86	3.70	n.s.
SA1	3.56	1.60	0.94	73.51	4.49	1.47	0.92	12.81	****
SA2	3.90	1.71	0.94	72.16	5.05	1.57	0.92	13.56	****
PR1	2.68	1.48	0.84	15.58	3.86	1.57	0.86	11.84	****
PR2	3.67	1.67	0.87	30.51	4.46	1.54	0.87	12.65	****
IC1	5.35	1.57	0.80	5.42	5.45	1.60	0.95	11.62	n.s.
IC2	5.55	1.37	0.95	6.14	5.71	1.57	0.97	9.22	n.s.
IC3	5.61	1.31	0.98	6.50	5.75	1.55	0.96	9.17	n.s.
IC4	5.53	1.39	0.90	7.32	5.62	1.60	0.95	8.65	n.s.
SZ1	5.56	1.73	(0.56)	0.96	6.08	2.19	(−0.61)	−0.57	*
SZ2	2.78	0.81	(0.52)	0.84	3.00	0.99	(1.46)	1.44	n.s.

Notes: IN = adoption intent; PL = participation level; AS = asset specificity of products; PC = complexity of products; FU = frequency uncertainty of demand; VU = volume uncertainty of demand; VL = market volatility; CA = adoption among competitors; CS = perceived success of adopted competitors; SD = perceived dominance of supplier adopters; SA = adoption among suppliers; PR = participation in professional and trade associations; IC = IT capabilities; SZ = firm size. Weights are reported for SZ1 and SZ2, formative indicators for organization size. Log transformation was made for the number of employees for the subsequent analysis. The significance of difference is determined based on *t*-tests for comparing means of two independent samples. n.s. = not significant; n/a = not applicable. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$; **** $p < 0.001$.

Table 5. Composite Reliability, AVE, Construct Correlation for Potential Adopters

	Mean	Standard deviation	Composite reliability	IN	AS	PC	FU	VU	VL	CA	CS	SD	SA	PR	IC	SZ
IN	4.23	1.37	0.912	0.881												
AS	4.30	1.53	0.914	0.076	0.884											
PC	4.71	1.36	0.943	0.065	0.527	0.920										
FU	2.88	1.28	0.874	−0.205	−0.012	0.048	0.835									
VU	4.33	1.27	0.828	−0.023	0.019	0.111	0.296	0.786								
VL	3.67	1.30	0.877	0.058	0.142	0.138	0.004	0.351	0.840							
CA	3.22	1.44	0.929	0.257	0.126	0.090	0.083	−0.139	−0.129	0.903						
CS	2.69	1.34	0.921	0.246	0.015	−0.048	0.045	−0.186	0.099	0.585	0.891					
SD	4.55	1.43	0.866	0.229	0.237	0.250	0.051	−0.142	−0.114	0.203	0.174	0.826				
SA	3.73	1.55	0.937	0.259	−0.001	0.173	0.045	−0.135	−0.144	0.341	0.466	0.320	0.939			
PR	3.18	1.35	0.843	0.276	0.061	0.040	0.111	−0.085	−0.137	0.312	0.418	0.386	0.490	0.884		
IC	5.51	1.34	0.951	−0.075	−0.008	−0.103	−0.046	0.029	−0.087	−0.021	0.004	−0.030	−0.064	0.134	0.910	
SZ	4.17	1.19	n/a	−0.207	0.074	0.020	−0.038	−0.118	−0.007	0.073	−0.002	−0.010	−0.195	0.026	0.295	0.928

Notes: Diagonal elements display the square root of AVE. IN = adoption intent; AS = asset specificity of products; PC = complexity of products; FU = frequency uncertainty of demand; VU = volume uncertainty of demand; VL = market volatility; CA = adoption among competitors; CS = perceived success of adopted competitors; SD = perceived dominance of supplier adopters; SA = adoption among suppliers; PR = participation in professional and trade associations; IC = IT capabilities; SZ = firm size. n/a = not applicable.

Table 6. Composite Reliability, AVE, Construct Correlation for Current Adopters

	Mean	Standard deviation	Composite reliability	US	AS	PC	FU	VU	VL	CA	CS	SD	SA	PR	IC	SZ
PL	2.39	0.66	n/a	1												
AS	3.74	1.64	0.886	−0.023	0.850											
PC	4.27	1.55	0.951	−0.158	0.413	0.931										
FU	3.14	1.14	0.731	−0.121	0.094	0.149	0.698									
VU	4.27	1.33	0.866	−0.153	0.108	0.249	0.433	0.827								
VL	3.55	1.23	0.907	0.223	0.204	0.167	0.157	0.212	0.875							
CA	4.90	1.47	0.924	0.085	0.053	−0.101	−0.462	−0.173	0.064	0.895						
CS	4.44	1.29	0.857	0.158	0.089	0.163	−0.318	0.165	0.371	0.592	0.817					
SD	4.81	1.34	0.846	0.073	0.156	0.014	−0.260	−0.033	0.201	0.310	0.269	0.809				
SA	4.77	1.37	0.916	0.092	−0.039	0.080	−0.271	−0.072	0.197	0.687	0.544	0.390	0.919			
PR	4.16	1.34	0.852	0.278	0.165	0.054	−0.131	0.044	0.184	0.182	0.331	0.247	0.375	0.861		
IC	5.63	1.51	0.978	0.171	0.150	0.127	−0.086	−0.055	0.187	0.054	0.098	0.079	0.021	−0.148	0.957	
SZ	4.54	1.50	n/a	0.153	0.162	0.029	0.209	0.062	−0.141	−0.195	−0.105	−0.098	0.169	−0.086	0.227	0.792

Notes: PL = participation level; AS = asset specificity of products; PC = complexity of products; FU = frequency uncertainty of demand; VU = volume uncertainty of demand; VL = market volatility; CA = adoption among competitors; CS = perceived success of adopted competitors; SD = perceived dominance of supplier adopters; SA = adoption among suppliers; PR = participation in professional and trade associations; IC = IT capabilities; SZ = firm size. n/a = not applicable.
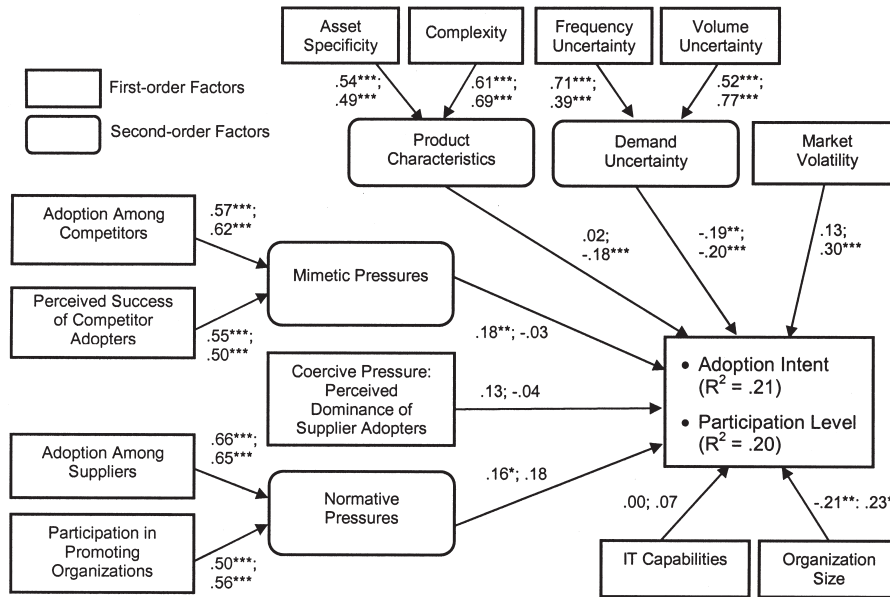
Figure 2. Results of the Model Testing
Notes: Path coefficients (or weights) for the potential adopter sample are shown first and followed for the current adopter sample. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$ (one-tailed tests).

assessed by estimating a composite reliability measure. All of the composite reliability measures were greater than the suggested minimum level of 0.70 [50], indicating an acceptable level of internal consistency. Table 4 presents the mean and standard deviation of the individual items, along with the significance of mean differences between potential and current adopter samples. Tables 5 and 6 display descriptive statistics of the constructs and PLS-computed correlations between them.

Results of Analyses

Figure 2 reports the results of the structural model estimation, including standardized path coefficients, their t-statistics and significance based on one-tailed t-tests, and the amount of variances explained (R^2). We used one-tailed tests because all hypotheses in the study are one-directional. The bootstrap procedure with 200 resamples was used to compute standard errors. Based on the significance of the path coefficients in the full research models (Model 3 in Table 7), H2 and H4 were supported strongly and H6 was marginally supported in the potential adopter sample. H1, H2, and H3 were supported strongly in the current adopter sample. Hypotheses related to the effects of subconstructs were assessed by examining both the weights of the formative subconstructs and path coefficients from the underlying constructs to the main dependent constructs of interest (i.e., adoption intent and participation level) in each sample [15, 18, 66].

Table 7. Structural Model Comparisons

	Potential adopters			Current adopters		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Product characteristics	0.09		0.02	−0.17**		−0.18**
Demand uncertainty	−0.20**		−0.19**	−0.22**		−0.20**
Market volatility	0.08		0.13	0.33***		0.30***
Mimetic pressures		0.20**	0.18**		0.03	−0.03
Coercive pressure		0.13	0.13		−0.01	−0.04
Normative pressures		0.14*	0.16*		0.21*	0.18
IT capabilities	0.00	−0.02	0.00	0.07	0.12	0.07
Size	−0.23**	−0.20**	−0.21**	0.23*	0.14	0.23*
R^2	0.09	0.17	0.21	0.18	0.09	0.20

Notes: Model 1: efficiency-oriented factors + control variables only; Model 2: legitimacy-oriented factors + control variables only; Model 3: Full model.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Therefore, once the main hypothesis had been supported in each sample, its corollaries with respect to the effects of associated subconstructs were assessed by examining the weights of the formative subconstructs. For example, adoption among competitors was found to significantly influence the adoption intent of potential adopters because both the path coefficient from mimetic pressures to adoption intent and the weight of the formative subconstruct, adoption among competitors, were significant. In the potential adopter sample, H2a, H2b, H4a, and H4b were strongly supported and H6a and H6b were marginally supported. In the current adopter sample, H1a, H1b, H2a, and H2b were strongly supported.

To test H7 and H8, a pseudo F-test [49] was used to assess the effects of adding a set of the theoretical factors on the change in R^2 of adoption intent and participation level when the other set of theoretical factors was already present in the model. The results indicate that adding efficiency-oriented factors to the legitimacy-oriented factors contributed to a significant increase in the variance explained for both adoption intent among potential adopters and for participation level among current adopters. However, adding the legitimacy-oriented factors to the efficiency-oriented factors contributed a significant increase in the variance explained for only adoption intent among potential adopters, not for participation level among current adopters (see Tables 7 and 8). These findings support H8, but not H7.

Discussion and Conclusion

THE MAJOR OBJECTIVE OF THIS STUDY WAS TO IDENTIFY the two sets of factors—rooted in efficiency- and legitimacy-oriented perspectives—that influence organizational participation in B2B e-marketplaces and gauge their relative importance in explaining organizational adoption and use of B2B e-marketplaces, respectively, among potential and current adopters. The results of analysis based on 98 potential adopter and 85 current adopter organizations indicate that clearly different patterns exist between the two sets of factors in explaining organizational adoption and use of B2B e-marketplaces.

Discussion of the Findings

Among the three efficiency-oriented factors in our research model, only demand uncertainty was found to have a significant influence on both adoption intent and participation level. As expected, demand uncertainty and its subconstructs of frequency uncertainty and volume uncertainty negatively influence both potential adopters' intent and current adopters' use of B2B e-marketplaces. When the demand for products exchanged in a B2B e-marketplace is characterized as high in terms of both frequency uncertainty and volume uncertainty, e-marketplaces are found to be less attractive to both potential and current adopters. However, these results are contradictory to the alternative argument that organizations will purchase products with high levels of demand uncertainty via B2B e-marketplaces because they do not want to be tightly coupled with suppliers for purchasing such products.

Table 8. Results of Pseudo F-Test

Comparison		R^2 Model 1	R^2 Model 2	R^2 Model 3	f^2-value	Pseudo F-statistic	Degrees of freedom
Potential adopters	1	0.09		0.21	0.15	14.28****	(1, 95)
	2		0.17	0.21	0.05	4.76**	(1, 95)
Current adopters	3	0.18		0.20	0.03	2.08	(1, 82)
	4		0.09	0.20	0.14	11.42***	(1, 82)

** $p < 0.05$; *** $p < 0.01$; **** $p < 0.001$.

Both asset specificity and complexity of products were found to have significant and negative effects on the level of participation in e-marketplaces, but not on adoption intent. Organizations exchange products via e-marketplaces more extensively when the products available in the e-marketplace are characterized as low in both asset specificity and product complexity. Our results on the level of participation in B2B e-marketplaces are supportive of Malone et al.'s [45] arguments, which have not previously received empirical support based on a large-scale field study. Market volatility was found to have a significant and positive impact on the participation level among current adopters, but not on adoption intent among potential adopters. Interestingly, current adopters are found to respond differently, depending on whether they face uncertainty attributable to the nature of the demand (demand uncertainty of products) or uncertainty attributable to the market environment of the products (market volatility). These results confirm our assertion that care should be exercised to distinguish between different types of uncertainty so that the uncertainty construct is employed appropriately to the specific research purpose and context.

With respect to the effects of legitimacy-oriented factors, we found that two iso-morphic processes—mimetic and normative pressures—have significant effects on adoption intent, but not on participation level. All of their subconstructs (i.e., adoption among competitors, perceived success of competitor adopters, adoption among suppliers, and participation in trade and professional associations) were also found to strongly influence organizations' intention to initially adopt a B2B e-marketplace. As expected, these legitimacy-oriented factors lack the same importance for explaining the participation level for current adopters. Unlike efficiency-oriented factors, legitimacy-oriented factors exhibit clearly different patterns between the two periods. Based on these results, organizations seem to endeavor to legitimize their decisions to initially adopt B2B e-marketplaces through isomorphic processes. However, once they have adopted a B2B e-marketplace, isomorphic processes do not wield a big influence in increasing their level of participation in the e-marketplace; instead, efficiency-oriented factors appear to predominate.

Coercive pressures did not significantly explain either adoption intent or the level of participation. This was inconsistent with the findings of Teo et al. [66], who reported the positive effects of coercive pressures on the adoption of EDI among potential organizations. The differences in the nature of the two types of IOS technologies can be offered as a plausible explanation for these conflicting findings. Because EDI is used primarily to support trading activities between *existing* buyers and sellers, coercive pressures from their trading partners strongly influence an organization's decision to adopt EDI. However, the effect of coercive pressures, such as the perceived dominance of supplier adopters, was not a significant predictor of initial adoption of B2B e-marketplaces in which finding a new trading partner is among the primary motivations for participation.

We also found that IT capabilities do not have strong effects on either adoption intent or participation level. The findings are somewhat surprising because prior studies demonstrated that IT capabilities of an organization foster adoption of IT, including IOS technologies such as EDI [18]. One possible explanation for the conflicting

finding is that, unlike implementation of other types of IT (EDI, enterprise systems, etc.), purchasing via a B2B e-marketplace does not require an organizational buyer to possess high levels of IT capabilities. Many of the potential and current adopters of B2B e-marketplaces appear to be "simple buyers working off Excel spreadsheets" [68, p. 28]. Of course, when an organizational buyer wants to tightly integrate its IT systems supporting the procurement function with those of a B2B e-marketplace, IT capabilities of the organization are expected to play an important role. However, our findings suggest that many organizational buyers currently purchase goods via a B2B e-marketplace without tight integration of IT systems.

Interestingly, organization size had a significant and negative impact ($p < 0.05$) on adoption intent, but a positive impact ($p < 0.10$) on participation level. Contrary to our expectation, small organizations were found to be more proactive in initially adopting B2B e-marketplaces for buying goods. However, the relationship between organization size and participation level was opposite in the postadoption stage, suggesting that large organizations are committed to purchasing goods through a B2B e-marketplace to a greater extent.

Theoretical and Managerial Implications

This paper contributes to the emerging body of knowledge in the area of organizational adoption of B2B e-marketplaces in several important ways. First, this study extends Grewal et al. [29] by identifying specific salient factors rooted in each of efficiency- and legitimacy-oriented motives. Drawn from transaction cost and institutional theories, this study is the first, to the best of our knowledge, to develop and empirically test a research framework that incorporates, within the context of organizational adoption of B2B e-marketplaces, the two sets of specific salient factors rooted in the two different perspectives. We believe that identification of the specific factors contributes to theoretical knowledge in this area and is also more managerially meaningful than merely identifying the two main types of organizational motives.

Second, this study offers strong evidence that it is worth comparing the antecedents of organizational adoption and continued use of B2B e-marketplaces. Our findings indicate that the two sets of factors exhibit different patterns in explaining the adoption intent of and the level of participation in B2B e-marketplaces. Further, we found that individual factors, including product characteristics, market volatility, mimetic pressures, and normative pressures, were strongly influential on either adoption intent or participation level, but not both. Based on the results, this study extends Teo et al.'s [66] work on EDI adoption by providing additional evidence for the applicability of institutional theory as a guide to understanding organizational adoption of IOS. In fact, this study moves this earlier work a step further by demonstrating that factors rooted in institutional theory can have a strong impact on initial adoption of B2B e-marketplaces but not on their continued use.

Third, this study offers empirical support, based upon data from a large-scale field study, for propositions developed earlier. For instance, we offer empirical evidence for Malone et al.'s [45] well-known propositions, based on conceptual analysis, concern-

ing two types of product characteristics (asset specificity and complexity of products) that have existed for almost two decades. It is our hope that our empirical findings contribute to enhanced knowledge of organizational adoption of B2B e-marketplaces and, potentially, of IT governance choices between electronic markets and electronic hierarchies.

The findings of this study also have important implications for both B2B e-marketplace developers and organizations that consider adopting B2B e-marketplaces. First, B2B e-marketplace developers are advised to consider both efficiency- and legitimacy-oriented motives that can influence organizations' initial adoption in their e-marketplaces. It is worth noting that legitimacy-oriented motives have different effects on organizational initial adoption of B2B e-marketplaces and their continued use. B2B e-marketplace developers are advised to emphasize legitimacy-oriented benefits through exerting mimetic and normative pressures in promoting their e-marketplaces to potential adopters, rather than to current participants. However, the ability of B2B e-marketplace developers to bring more participants to their e-marketplaces is insufficient as a basis for building vibrant e-marketplaces in which large volumes of transactions are conducted between buyers and sellers. B2B e-marketplace participants who join because of legitimacy-oriented motives may not actively transact with others in the e-marketplace unless they realize efficiency-oriented benefits. To enhance the liquidity of their B2B e-marketplaces, developers should take into consideration what types of products should be most prominent in their e-marketplaces in terms of characteristics, the nature of demand, and market volatility. For instance, it is recommended that, for organizations to become committed to purchase online through e-marketplaces, B2B e-marketplace developers should focus more on products that are low in both asset specificity and product complexity.

Second, potential adopting organizations are also advised to consider both legitimacy- and efficiency-oriented reasons in their decisions to adopt a B2B e-marketplace. Organizations eventually may not transact much business via a B2B e-marketplace if their decision to adopt the e-marketplace is primarily driven by legitimacy-oriented motives derived from environmental pressures. In such cases, the investment necessary for initial adoption of the B2B e-marketplace may be wasted. Therefore, it is recommended that in the initial adoption decision stage, organizations should seek efficiency-oriented reasons for their participation.

Limitations and Future Research Directions

Several limitations of this study deserve consideration. The first of these is common method bias, which is prevalent in survey-based empirical studies that measure all variables in a single questionnaire [55]. Harman's one-factor statistical test [53] was used to perform an exploratory factor analysis on all the items used to measure the constructs in our research model. Neither a single factor nor a general factor was found. Furthermore, the first factors that emerged accounted for only 17 percent and 19 percent, respectively, of the variance in the potential adopter and the current adopter

samples. When these results are considered together, common method bias does not appear to be a serious threat to the findings of this study.

Another limitation lies in the use of adoption intent rather than actual behavior of initial adoption of a B2B e-marketplace. Similar to earlier work that has been conducted within the context of organizational adoption of IT (e.g., [18, 66]), we chose this approach over the dichotomous yes/no decision approach (e.g., [31, 60]), because it can mitigate the backward-looking problem prevalent in IT adoption studies with cross-sectional study designs [55]. The dichotomous approach is considered to be problematic because the reconstruction of the preadoption perception among adopters may be unreliable [27, 51].

Another limitation relates to the limited scope of this study, which was conducted within the context of organizational buyers' adoption and use of nonprivate, vertical B2B e-marketplaces. As such, some potential factors in our research framework, such as demand uncertainty of products, may not be applicable to understanding the adoption of organizational sellers. Likewise, the findings of our study cannot be generalized to other types of B2B e-marketplaces, such as horizontal e-marketplaces in which maintenance, repair, and operation products are mainly traded among participants from multiple industries, and private e-marketplaces in which an individual company connects itself directly to its buyers/suppliers. Readers are thus advised to exercise caution when generalizing the results of this study.

Finally, it should also be noted that the study might have omitted other factors that are important in explaining initial adoption and continued use of B2B e-marketplaces. This is primarily because the study focuses on factors rooted in the two central types of organizational motives. As such, the levels of R^2 were somewhat lower than those reported in other studies[7] that were conducted to explain organizational adoption and continued use of IOS such as EDI. We suggest that future studies, to achieve a higher level of R^2, need to offer a more comprehensive set of factors. For example, future studies may incorporate relational factors (e.g., trust in an intermediary that operates a B2B e-marketplace) and factors related to barriers in adoption and implementation (e.g., perceived costs and concerns for security).

Several potential avenues are suggested as directions for future research. First, we recommend directing future research toward extending the current study by refining our research model to be suitable for organizational sellers and by empirically testing the model. Given that participation by both buyers and sellers is a key to building a successful B2B e-marketplace, the future study's findings, combined with those of this study, would contribute to a more comprehensive understanding of organizational participation in B2B e-marketplaces.

Second, we suggest that future research could expand the scope of our understanding about organizations' strategic moves toward B2B e-marketplaces by applying other theoretical perspectives (e.g., organizational learning, diffusion of innovation theory, or resource dependency theory) than only the theoretical perspective on organizational motivation applied in this study. By doing so, findings of future research may provide additional important insights into the process of organizational adoption of B2B e-marketplaces, which can complement the findings of this study. It is also recommended that

future research apply multiple theoretical perspectives in a single study and compare their relative efficacy for understanding organizational adoption of B2B e-marketplaces.

Finally, a future study can be carried out to assess the efficacy of efficiency-oriented variables (e.g., asset specificity, product complexity, demand uncertainty, and market volatility) at the individual product level. Our study was conducted at the firm level so that the efficiency-oriented variables were measured with respect to products as a whole that an organization could purchase from a B2B e-marketplace. Future research may be conducted at the individual product level to examine the effects of the efficiency-oriented variables on the organizational decision to purchase an individual product from e-marketplaces.

Concluding Remarks

This paper expands the horizon of B2B e-marketplace participation research by systematically examining the effects of efficiency- and legitimacy-oriented factors, respectively, on organizational adoption and use of B2B e-marketplaces among potential and current adopters. Drawing on the existing base of knowledge of organizational participation in B2B e-marketplaces, we developed and tested a conceptual framework that explains organizational adoption and use of B2B e-marketplaces. The results of this study identify the core sets of factors rooted in efficiency- and legitimacy-oriented perspectives that strongly influence adoption intent or participation level, or both. This study also sheds light on the different patterns that the two groups of factors display in explaining organizational adoption and use of B2B e-marketplaces.

NOTES

1. These two dimensions of demand uncertainty were originally referred to as *technological uncertainty* and *volume uncertainty,* respectively [16]. We relabeled technological uncertainty as frequency uncertainty to better connote the original meaning of the variable.

2. We note that one could alternatively propose positive effects of demand uncertainty on organizations' participation in B2B e-marketplaces. Because products with a higher level of demand uncertainty may lead suppliers to experience unexpected production costs or excess capacity while threatening buyers with stock-outs or excess inventory [67], close long-term buyer–supplier relationships supported by electronic hierarchies may be of limited value. Under such circumstances, organizations may elect to trade in e-marketplaces so that they can reduce time and cost associated with searching for new trading partners.

3. Chatterjee et al. [13] empirically demonstrate that the strategic investment rationale, which refers to an organization's identification of promising new strategic opportunities, and related justifications for committing resources toward the implementation of these opportunities strongly influence the implementation of technological innovations.

4. We conducted this study at the firm level rather than at the product level because organizations cannot easily justify their participation with economic benefits from purchase of a single product [16]. It should also be noted that products of interest in an organization's decision to participate in an e-marketplace are primarily those traded in the e-marketplace rather than all products that the organization purchases from any sources. Accordingly, respondents were asked to consider *products as a whole that their organization could purchase from a B2B e-marketplace.*

5. Because these two items were intended to measure different aspects of organization size that do not necessarily correlate directly to each other, they were viewed as a formative, rather than reflective, scale for organization size.

6. The approach is described in detail as the molar model approach in Chin and Gopal [15].

7. For instance, the level of R^2 for the initial adoption of IOS reported in prior studies ranges from 31 percent to 33 percent (e.g., [18, 66]). On the other hand, prior studies have reported R^2 for IOS usage in the range from 16 percent to 29 percent (e.g., [62, 75]).

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Appendix A. Measurement Items

Adoption Intent (only for potential adopters)

IN1. We intend to participate in a B2B e-marketplace.
IN2. It is likely that our firm will take some steps to participate in a B2B e-marketplace in the future.
IN3. How soon do you think that your firm will participate in a B2B e-marketplace?

[ ] Less than 6 months; [ ] 6 to 12 months; [ ] 12 to 18 months; [ ] 18 to 24 months;
[ ] More than 24 months; [ ] No plan to participate in a B2B e-marketplace

Measures below are from the current adopter version. Slight modifications in the wordings of measures made for the nonadopter version are shown in brackets. The B2B e-marketplace below refers to an e-marketplace in which a respondent's organization is currently participating.

Participation Level (PL)

Exploration Stage

- We are registered in the B2B e-marketplace, but carry virtually no business via the e-marketplace.
- We are evaluating the pros and cons of doing business via the B2B e-marketplace.

Trial Stage

- We have made several transactions via the B2B e-marketplace.
- We are still evaluating the pros and cons of doing business via the B2B e-marketplace.
- Doing business via the e-marketplace has still *not* become an important part of our business operations.

Commitment Stage

- We are making transactions via the B2B e-marketplace whenever necessary.
- Doing business via the B2B e-marketplace is an important part of our business operations.

Measures for Efficiency-Oriented Constructs

When answering the questions in this section, please consider "the products" as referring to the products as a whole that your firm may be able to purchase via the B2B e-marketplace [may consider purchasing via a B2B e-marketplace].

Asset Specificity of Products

AS1. The products need to be designed specifically to our needs.
AS2. The products need to be customized (or tailored) specifically to our needs before we buy.
AS3. The products are of value to only a small number of buyers.

Complexity of Products

PC1. A large amount of information is required to describe the products.
PC2. Many attributes are required to describe the products.
PC3. The specifications of the products are relatively longer than other products we buy.

Frequency Uncertainty of Demand

FU1. We purchase the products on a regular basis.*
FU2. We purchase the products more frequently than other products we buy.*
FU3. We can accurately predict when we need to purchase the products next time.*

Volume Uncertainty of Demand

VU1. It is difficult to accurately estimate the volume of the products in our next purchase.
VU2. Our demand volume of the products fluctuates a lot over time.
VU3. Our demand volume of the products is very stable over time.*

Market Volatility

How do you rate the overall market environment of the products?
VL1. Stable/volatile
VL2. Certain/uncertain
VL3. Changes slowly/changes rapidly

Measures for Legitimacy-Oriented Constructs

Adoption Among Competitors

CA1. Many of our competitors are currently participating in the B2B e-marketplace [in a B2B e-marketplace].

CA2. Many of our competitors will be participating in the B2B e-marketplace [in a B2B e-marketplace] in the near future.

CA3. Our key competitors are currently participating in the B2B e-marketplace [in a B2B e-marketplace].

Perceived Success of Adopted Competitors

CS1. Our competitors that participate in the B2B e-marketplace [in a B2B e-marketplace] are benefiting greatly.

CS2. Our competitors that participate in the B2B e-marketplace [in a B2B e-marketplace] are perceived favorably by others in our industry.

CS3. Our competitors that participate in the B2B e-marketplace [in a B2B e-marketplace] are perceived favorably by their suppliers.

Perceived Dominance of Supplier Adopters

With regard to suppliers currently participating in the B2B e-marketplace [in a B2B e-marketplace], . . .

SD1. our firm's well-being depends on the suppliers' resources.

SD2. our firm cannot easily switch away from the suppliers.

SD3. our firm must maintain good relationships with the suppliers.**

SD4. the suppliers are the core suppliers in a concentrated industry.

Adoption Among Suppliers

SA1. Many of our suppliers are currently participating in the B2B e-marketplace [in a B2B e-marketplace].

SA2. Many of our suppliers will be participating in the B2B e-marketplace [in a B2B e-marketplace] in the near future.

Participation in Professional and Trade Associations

PR1. Large pressure is placed on our firm to participate in B2B e-marketplaces by industry sources (e.g., industry or trade associations).

PR2. We actively participate in industry, trade, or professional associations that promote participation in B2B e-marketplaces.

Control Variables

Firm Size

SZ1. What was the approximate annual sales or revenue in the last financial year (in Canadian dollars)?

[ ] Less than $1 million; [ ] $1–5 million; [ ] $5–10 million; [ ] $10–50 million; [ ] $50–200 million; [ ] $200–500 million; [ ] $500–1 billion; [ ] $1–5 billion; [ ] More than $5 billion

SZ2.[a] How many people does your firm currently employ? approximately _____

IT Capabilities

IC1. Our firm has strong IT planning capabilities.
IC2. Our firm has skilled IT staff.
IC3. Our firm has the knowledge necessary for deploying IT applications.
IC4. Our firm is experienced in deploying IT applications.

Notes: * reversed item; ** item deleted. [a] Log transformation was made for subsequent analysis purposes, due to its departure from normality based on results from skewness and kurtosis analysis.

Appendix B. Construct Item Correlations for Potential Adopters

	IN	AS	PC	FU	VU	VL	CA	CS	SD	SA	PR	IC
IN1	**0.92**	0.09	0.00	−0.23	−0.08	0.03	0.20	0.22	−0.22	0.14	0.21	0.03
IN2	**0.87**	−0.02	0.06	−0.18	0.00	0.01	0.17	0.15	−0.22	0.25	0.28	−0.01
IN3	**0.85**	0.09	0.13	−0.14	0.01	0.10	0.30	0.27	−0.17	0.28	0.24	0.16
AS1	0.10	**0.92**	0.55	−0.08	0.05	0.14	0.13	0.03	−0.18	0.09	0.11	0.04
AS2	0.07	**0.93**	0.48	0.02	0.02	0.18	0.13	0.08	−0.17	−0.06	0.03	0.01
AS3	−0.01	**0.80**	0.34	0.03	−0.02	0.04	0.08	−0.09	−0.30	−0.05	0.01	−0.03
PC1	0.11	0.50	**0.95**	−0.02	0.11	0.14	0.09	−0.05	−0.23	0.17	0.03	0.11
PC2	0.05	0.49	**0.95**	0.04	0.14	0.17	0.00	−0.08	−0.20	0.13	0.05	0.10
PC3	0.05	0.46	**0.85**	0.12	0.05	0.07	0.16	0.00	−0.27	0.17	0.03	0.07
FU1	−0.23	0.03	0.02	**0.87**	0.14	−0.03	0.07	0.02	−0.07	0.05	0.10	0.06
FU2	−0.20	0.10	0.04	**0.85**	0.06	−0.03	0.18	0.14	−0.02	0.01	0.02	−0.02
FU3	−0.09	−0.13	0.06	**0.79**	0.48	0.06	−0.02	−0.03	−0.04	0.05	0.14	0.07
VU1	0.00	−0.13	0.09	0.19	**0.71**	0.16	−0.06	−0.20	0.15	−0.05	−0.04	−0.06
VU2	0.03	0.16	0.15	0.23	**0.88**	0.40	−0.06	−0.09	0.07	−0.13	−0.01	0.00
VU3	−0.09	−0.02	0.02	0.27	**0.76**	0.25	−0.21	−0.16	0.12	−0.14	−0.15	−0.02
VL1	0.04	0.18	0.16	−0.02	0.32	**0.90**	−0.18	0.04	0.11	−0.13	−0.19	0.15
VL2	−0.02	0.14	0.18	0.01	0.33	**0.73**	−0.17	−0.05	0.05	−0.11	−0.21	0.08
VL3	0.03	0.07	0.12	0.04	0.35	**0.88**	−0.07	0.08	0.07	−0.13	−0.10	−0.01

Item	1	2	3	4	5	6	7	8	9	10	11	12
CA1	0.21	0.22	0.09	0.07	−0.06	−0.07	**0.93**	0.51	−0.17	0.25	0.25	0.04
CA2	0.29	−0.04	0.06	0.06	−0.18	−0.18	**0.87**	0.55	−0.24	0.42	0.29	0.03
CA3	0.19	0.17	0.09	0.09	−0.13	−0.09	**0.91**	0.52	−0.14	0.25	0.30	−0.01
CS1	0.19	0.06	−0.01	0.04	−0.25	0.05	0.52	**0.88**	−0.16	0.40	0.32	0.00
CS2	0.28	0.06	−0.03	−0.05	−0.21	0.13	0.59	**0.91**	−0.20	0.42	0.45	−0.02
CS3	0.19	−0.08	−0.09	0.15	−0.03	0.08	0.44	**0.88**	−0.10	0.43	0.34	0.01
SD1	0.18	0.23	0.29	0.06	−0.08	−0.03	0.26	0.24	**−0.81**	0.26	0.31	0.03
SD2	0.12	0.28	0.17	0.15	−0.02	−0.16	0.18	0.02	**−0.78**	0.15	0.25	0.11
SD3	0.24	0.14	0.17	−0.03	−0.20	−0.11	0.10	0.14	**−0.88**	0.34	0.37	−0.02
SD4												
SA1	0.22	−0.01	0.10	0.10	−0.02	−0.06	0.29	0.46	−0.29	**0.94**	0.46	0.03
SA2	0.27	0.00	0.22	−0.02	−0.23	−0.21	0.35	0.42	−0.31	**0.94**	0.46	0.09
PR1	0.17	0.11	0.01	0.20	0.02	0.03	0.20	0.39	−0.39	0.38	**0.84**	0.00
PR2	0.30	0.00	0.06	0.00	−0.16	−0.25	0.33	0.33	−0.27	0.45	**0.87**	−0.22
IC1	0.02	−0.03	−0.06	−0.05	−0.03	−0.13	−0.07	−0.16	0.05	−0.05	0.07	**−0.80**
IC2	−0.05	0.00	−0.04	0.04	0.03	−0.15	0.00	−0.01	−0.03	0.03	0.20	**−0.95**
IC3	−0.07	−0.02	−0.14	−0.10	0.01	−0.06	−0.05	−0.03	0.08	−0.12	0.07	**−0.98**
IC4	0.00	−0.02	−0.11	−0.11	−0.05	−0.13	−0.02	−0.04	0.04	−0.01	0.15	**−0.90**

Note: Correlations between items and their underlying construct are shown in boldface.

Appendix C. Construct Item Correlations for Current Adopters

	PL	AS	PC	FU	VU	VL	CA	CS	SD	SA	PR	IC
PL	**1.00**	−0.02	−0.16	−0.12	−0.15	0.22	0.09	0.16	0.07	−0.09	−0.28	0.17
AS1	0.02	**0.88**	0.37	0.01	0.12	0.14	0.04	0.11	0.27	−0.03	−0.27	0.15
AS2	0.03	**0.93**	0.41	0.08	0.06	0.17	−0.04	0.03	0.10	0.10	−0.19	0.06
AS3	−0.14	**0.73**	0.25	0.17	0.10	0.22	0.16	0.10	0.00	0.03	0.09	0.19
PC1	−0.17	0.30	**0.94**	0.15	0.21	0.16	−0.17	0.13	−0.03	−0.05	−0.01	0.08
PC2	−0.12	0.36	**0.96**	0.13	0.22	0.16	−0.11	0.12	−0.01	−0.08	−0.04	0.13
PC3	−0.15	0.49	**0.90**	0.13	0.26	0.14	0.00	0.20	0.07	−0.09	−0.10	0.14
FU1	0.02	0.17	0.19	**0.65**	0.12	0.18	−0.40	−0.29	−0.14	0.23	0.18	0.08
FU2	0.01	0.04	−0.14	**0.52**	0.02	−0.02	−0.20	−0.38	−0.31	0.20	0.02	−0.04
FU3	−0.17	0.04	0.15	**0.88**	0.51	0.13	−0.37	−0.18	−0.19	0.20	0.09	−0.14
VU1	−0.22	0.25	0.29	0.43	**0.74**	0.10	−0.27	0.09	−0.06	0.12	−0.10	−0.05
VU2	−0.09	0.05	0.25	0.26	**0.87**	0.23	−0.06	0.18	0.05	0.01	−0.08	−0.04
VU3	−0.08	−0.02	0.08	0.38	**0.86**	0.19	−0.10	0.14	−0.06	0.05	0.06	−0.05
VL1	0.17	0.26	0.10	0.12	0.15	**0.92**	0.01	0.27	0.21	−0.12	−0.28	0.23
VL2	0.24	0.20	0.24	0.20	0.20	**0.94**	−0.01	0.32	0.10	−0.16	−0.17	0.19
VL3	0.16	0.06	0.06	0.08	0.21	**0.76**	0.20	0.39	0.26	−0.25	−0.02	0.06
CA1	0.04	0.15	−0.08	−0.43	−0.24	0.08	**0.92**	0.57	0.27	−0.56	−0.16	0.05
CA2	0.12	0.01	−0.04	−0.41	−0.08	0.04	**0.88**	0.62	0.31	−0.77	−0.29	0.10
CA3	0.08	−0.02	−0.17	−0.39	−0.14	0.04	**0.88**	0.37	0.24	−0.50	−0.02	−0.01

CS1	0.09	0.33	0.17	−0.33	0.17	0.42	0.45	**0.75**	0.31	−0.43	−0.30	0.07
CS2	0.09	−0.03	0.32	−0.12	0.06	0.24	0.36	**0.78**	0.10	−0.37	−0.29	0.16
CS3	0.20	−0.05	−0.03	−0.32	0.17	0.27	0.61	**0.92**	0.24	−0.52	−0.24	0.03
SD1	0.03	0.04	−0.02	−0.44	−0.08	0.17	0.28	0.22	**0.60**	−0.34	−0.32	0.08
SD2	0.08	0.13	−0.06	−0.12	−0.04	0.17	0.26	0.23	**0.93**	−0.36	−0.18	−0.02
SD4	0.04	0.21	0.20	−0.27	0.02	0.18	0.25	0.24	**0.86**	−0.28	−0.20	0.24
SA1	0.05	0.03	0.01	−0.25	−0.09	0.18	0.72	0.44	0.32	**−0.92**	−0.32	−0.04
SA2	0.12	−0.10	0.14	−0.25	−0.04	0.18	0.55	0.56	0.40	**−0.92**	−0.37	0.00
PR1	0.13	0.17	−0.09	−0.12	0.09	0.12	0.24	0.42	0.28	−0.31	**−0.86**	0.09
PR2	0.34	0.11	0.17	−0.11	−0.01	0.19	0.08	0.16	0.15	−0.33	**−0.87**	0.16
IC1	0.21	0.17	0.15	−0.08	−0.06	0.24	0.02	0.13	0.07	0.02	−0.21	**0.95**
IC2	0.12	0.11	0.10	−0.09	−0.05	0.21	0.08	0.15	0.08	−0.01	−0.10	**0.97**
IC3	0.17	0.12	0.10	−0.07	−0.07	0.14	0.06	0.03	0.07	0.02	−0.09	**0.96**
IC4	0.13	0.16	0.13	−0.09	−0.02	0.11	0.07	0.07	0.10	0.05	−0.15	**0.95**

Note: Correlations between items and their underlying construct are shown in boldface.