Winter 12-4-2009

# Understanding Buyer's Adoption Intent of B2B Electronic Marketplaces

Shih-Wei Chou

I-Hua Hung

# UNDERSTANDING BUYER'S ADOPTION INTENT OF B2B ELECTRONIC MARKETPLACES

Shih-Wei Chou[1], and I-Hua Hung[2]
[1]Department of Information Management, National Kaohsiung First University of Science and Technology, Taiwan, R.O.C.
[2]College of Management, National Kaohsiung First University of Science and Technology, Taiwan, R.O.C.
[1]swchou@ccms.nkfust.edu.tw; [2]u9628911@ccms.nkfust.edu.tw

## Abstract

Despite the significant role of business-to-business (B2B) e-marketplaces (EMPs) in providing firms with opportunities to transform the way that organizations conduct trading activities and supply chain management (SCM) tasks, few studies emphasize the motive for adoption intent of EMPs. Drawing on institutional theory and information processing theory, this study develops a model aiming for delineating the relationship between institutional pressures (in terms of mimetic, coercive, and normative pressures), benefits of SCM tasks (involving interdependent tasks and procurement life cycle (PLC) activities), and adoption intent. Data collected from 79 potential adopters of EMPs largely support our research hypotheses. Theoretical contribution and managerial implications of this study are discussed.

**Key words:** institutional pressures, supply chain management (SCM), e-marketplaces (EMPs), interdependent tasks, procurement life cycle (PLC)

## Introduction

E-marketplaces (EMPs), as one kind of inter-organizational systems, enhance communication, coordination and collaboration between trading partners or buyers and sellers. Studies also suggest that EMP plays a key role in the performance of supply chain management (SCM) and business-to-business (B2B) commerce [23][22][30], arguing that EMPs enable seamless information, as well as physical and financial flow between firms. EMPs have the potential to offer enormous benefits to both organizational buyers and sellers. The major benefit for sellers is to broaden their customer bases and to reach out to new profitable customers, leading to new trading activities between business partners. Buyers benefit mainly from significant reduction in procurement costs [32][41]. Given the large potential of B2B e-marketplaces, quite a few B2B e-marketplaces have launched in the dot-com boom period of the late 1990s [40]--more than 4000 B2B e-marketplaces are in operation by 2004 [39].

Although some experts are optimistic about the future of e-marketplaces, others show that about two B2B e-marketplaces would be sufficient in each industry [2]. Empirical findings show that many of the e-marketplaces established in the dot-com era have terminated their operations without ever turning a profit [29]. But many others have successfully been established as viable arenas for organizational trading activities in industries such as cars, metals, and chemicals [32][39]. Given the many thriving B2B e-marketplaces, major market analyst firms, including Gartner Research and Meta Groupt, begin to predict the renaissance of e-marketplaces.

Various types of B2B e-marketplaces have been established to date. Among the large number of approaches used to classify them, it is worth mentioning the following two to identify the scope of the present study. The first is based on who operates a B2B e-marketplace (private versus nonprivate), and the second on the number of industries served by a market-place (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). The nonprivate marketplaces incorporate public and consortium-based e-marketplaces, which are created and operated by an independent third-party intermediary (e.g. Alibaba) and a group of dominant players in an industry (e.g. Elemica) respectively [35]. Vertical marketplaces are industry specific (e.g. Covisint), while horizontal marketplaces serve more than one industry (e.g. Global Trade Village). The current study focuses on intermediary e-marketplaces serving more than one industry because most of the existing e-marketplaces fall into this category [32].

Despite the potential benefits of using B2B e-marketplaces to facilitate organizational trading activities, relative few of the prior studies investigate the intention of EMPs adoption intent. To fill this gap,

drawing on both institutional theory and information processing theory, this study seeks to better understand the motivation of B2B e-marketplaces adoption. EMPs differ significantly from vertical integration in traditional organizations in that supply chain partners are integrated via information flows rather than ownership [16]. According to them, the main features of EMPs are the shift from connection of physical processes, including shipment, inventory, and warehousing, to information-based integration across upstream and downstream operations. This study focuses on two fundamental features of SCM tasks, channel interdependence and procurement life cycle (PLC) [23][30], and understanding how the efficiency of them is related to a firm's motive for EMPs adoption intent. Channel interdependence refers to dependence of a SCM task between partners in SCM context, including pooled interdependence, sequential interdependence, and reciprocal interdependence [38]. Procurement life cycle (PLC) entails all the internal and external operations regarded as necessary for a SCM task, including five stages (search, negotiation and price discovery, ordering, order coordination, and payment) [24]. Since both PLC and task interdependence play a key role in affecting SCM performance based on organizational information processing theory, this study investigates how they affect the adoption of EMPs.

In addition to the motivation of improving information processing efficiency, drawing on institutional theory, EMPs adoption can also be affected by legitimacy [20][22]. Specifically, institutional pressures, i.e. coercive, mimetic and normative pressures, have been proposed and found to be significant factors leading a firm to conform to norms and expectations regulated by other constituents, either trading partners or competitors in the institutional environments [22][32]. While prior work has identified the roles of institutional pressures and information processing in adoption intent separately, they fail to consider how institutional pressures affect the efficiency of fundamental features of SCM tasks (PLC and channel interdependence), which in turn influences the adoption intent. According to institutional theory, organizations' decision making can best be understood with the lens of organizational legitimacy, which refers to the acceptance of an organization within its external environment. Legitimacy is conferred on an organization by external constituents when the values and actions of the organization are congruent with its external environment, such as their key suppliers and other organizations that produce similar services or products [15].

Based on the above rationale, the questions this paper seeks to answer are: (1) how do institutional pressures affect the way in which buyers employ the key features of SCM tasks (in term of PLC and channel interdependence)? (2) and how the above features in turn influence buyers' motive for EMPs adoption intent? In answering these questions, this research differs from prior EMPs-related investigations in the following ways. First, as a novel contribution, we investigate to what extent the features of SCM tasks mediate the effect of institutional forces on EMPs adoption intent. Second, recognizing the inherent multidimensionality of the concept of SCM tasks, PLC and channel interdependence are selected to represent the information processing capability of a firm and a SCM context it faces respectively. Finally, this study extends prior research on EMPs adoption intent by confirming that EMPs adoption intent is affected by both institutional forces and the features of SCM tasks, and the latter also mediates the relationship between institutional forces and adoption intent. Our findings enrich information processing and institutional theory by showing how they can be used together to explain EMPs adoption intent.

## Theory and hypothesis development

Figure 1 lists the research model of this study. To explain buyers' intent of EMPs adoption, this study draws on two theories—organizational information processing theory (OIPT) and institutional theory,

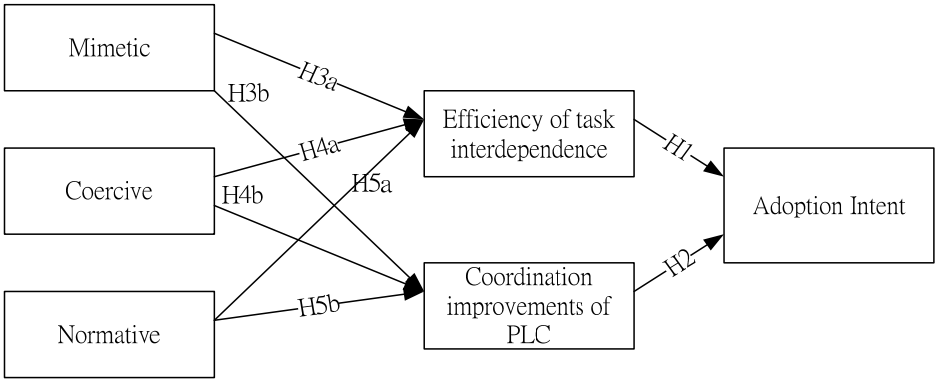



Figure 1. Research model

and postulates that the key reasons for a firm's adoption of EMPs are usually based on two primary motives—improving the effectiveness of information processing and achieving organizational legitimacy [20][23]. For the former, organizations adopt B2B e-marketplaces based on the rationalistic expectation of processing information efficiently and effectively such as collection of appropriate information, firms' timely movement for addressing the uncertainty in the supply channel, and transmission without distortion [23]. On the other hand, firms that embrace the legitimacy-oriented perspective as their primary motive for adopting B2B e-marketplaces emphasize the importance of social norms and institutional expectations existing in the external environment. For example, a firm devotes its time and energy to developing more effective processes and strategies of PLC and of interdependent tasks because others have already adopted them. Following prior work [11][37], adoption intent was chosen as the dependent variable for potential adopters.

**Organizational information processing theory and intermediate benefits of B2B commerce**

According to OIPT, in order to prosper, organizations must resolve uncertainty. Different organizations may be confronted by different amount and types of uncertainty, including the unstable external environment, the predictable core processes, and the level of interdependence among those subdivisions [19]. B2B e-marketplaces can be viewed as a particular class of information processing mechanism [35]. One of the motives that firms participate in a B2B e-marketplace is because it may help the firms obtain quality information [8][19]. To improve channel performance and handle the contextual factors that give rise to information processing needs that a supply channel faces, firms participating in the channel relationships use appropriate information processing mechanism to enhance the information flow and thereby reduce uncertainty [30].

Effective information processing is likely to affect the coordination of business operations and monitoring of operations, from which the performance of SCM tasks can be improved [23]. Coordination costs are costs of coordinating decisions and operations among economic activities that occur between channel partners [6]. The decision and operational activities in the procurement cycle include ordering, receiving and storing products, and payments [30]. Studies also report that IT is capable of reducing both of these costs [5][26]. They propose that when choosing from alternative IT-enabled governance structures, a firm tends to use the one that best fits its economic efficiency rationales. Two types of IT-enabled governance structures have been identified—electronic markets (e.g. nonprivate B2B e-marketplaces) and electronic hierarchies (e.g. electronic data exchange (EDI)) [32][35].

Barua et al. (1995) argue that truly understanding how IT investments create value for the organization requires a research model that includes the intermediate benefits or intermediate variables through which the functional impacts occur. Understanding the intermediate benefits helps us explain why buyers adopt e-marketplaces in more details. Two types of intermediate benefits are likely to improve transaction efficiency in the context of B2B e-marketplaces—efficiency of interdependent tasks and coordination improvements of procurement life cycle activities (PLC) [23][30].

In the continuum of task interdependence, three anchor points have been identified—pooled interdependence, sequential interdependence, and reciprocal interdependence [23][38]. Since task interdependence plays a key role in affecting information uncertainty and performance in SCM context, the above three types of interdependence were used to measure firms' capability of handling uncertainty. Pooled dependency is likely to result in a mutual dependence because the supply-channel participants pool their resources. For example, the channel partners may share resources such as transportation vehicles and call center operations. In this situation, channel partners may exchange information that is limited to what is operationally necessary. Sequential dependency implies that units work in series where the output from one unit becomes input to another unit. For instance, an automobile manufacturer focusing on assembly lines production uses the automobile parts produced by partners in the alliance. To perform the above operations effectively and efficiently, the channel partners need to exchange information about related activities of B2B commerce, including order entry, and inventory control. Finally, in reciprocal dependency, members of a supply channel feed their work back and forth among themselves—each receives input from and provides output to the other, often interactively. Reciprocal dependency is usually used for highly customized components or integrated subsystems that entail high levels of coordination between the channel participants [7]. To achieve this, exchanging information between partners across multiple stages is necessary, from the concept design through the development of tooling and manufacturing processes at the assembler and the supplier [9].

Given all of the three forms of interdependence are likely to occur in B2B commerce and the extent to which the success of a supply channel depends on how firms are capable of processing the information of the above interdependence efficiently and effectively [23], we expect that EMPs' information processing capabilities to handle the information processing need of channel dependency (i.e.

efficiency of task interdependency) play a key role in their adoption intent. This leads to H1.

**H1:** Efficiency of task interdependence will positively influence the adoption intent of a B2B e-marketplace among organizational buyers.

In addition to the efficiency of interorganizational task, how to coordinate the internal activities of firms may also affect their adoption intent of a B2B e-marketplace. Theory suggests that when confronted with uncertainty, including demand uncertainty, supply uncertainty, and relationship uncertainty (firm and supplier investment, and trust), firms implement structural mechanisms and information processing capability to enhance the information flow and thereby reduce uncertainty [30]. This usually entails the redesign of business processes in organizations and implementation of integrated IS (information systems) that improve information flow and reduce uncertainty within organizational subunits [12][23].

Following Premkumar et al (2005), a firms' capability of addressing uncertainty and facilitating information flow is conceptualized as the coordination improvements of PLC activities. PLC activities consist of multiple stages, including search, negotiation and pricing or price discovery, ordering, order coordination, and payment [24]. Each stage has different communication needs—while some stages rely on unstructured communication that is difficult to automate, such as communicating customized product specifications or price negotiation, other stages use structured transaction communication, such as orders, invoices, and so on. Fully addressing PLC activities need a variety of information processing capabilities [36], thus a powerful information processing mechanism such as EMP may help a firm coordinate its PLC activities.

Study shows that coordination improvements of PLC play a key role in motivating firms' adoption intent of B2B EMPs [30][35]. The reasons are twofold. First, one of the reasons for buyers' adoption of EMPs is to reduce the transaction cost, which refers to the costs associated with finding someone with whom to do business, reaching an agreement about the price and other aspects, and ensuring that the terms of the agreement are fulfilled [35]. From a transaction cost perspective, the firms emphasizing coordination improvements of a firm's PLC activities are thus more likely to have higher adoption intent of e-marketplaces. Second, theory [25] suggests that the use of EMPs may improve a firm's service and quality in B2B commerce, including continuity of supply, convenience and speed of processing. Firms aiming to improve their coordination of PLC activities hope for a one-stop-shop environment, including value-added information, delivery logistics services, and customized offerings [35]. Since EMPs aim to provide the above services, we expect that the firms attempting to improve their efficiency of PLC activities are more likely to adopt EMPs. Based on the above arguments, we have H2.

**H2:** Coordination improvements of PLC will positively influence the adoption intent of a B2B e-marketplace among organizational buyers.

**Institutional theory and isomorphism pressures**

This study uses institutional theory to explain the role of organizational legitimacy in affecting buyers' motives for the adoption of B2B e-marketplaces. According to institutional theory, organizations' decision making can best be understood with the lens of the concept of organizational legitimacy, referring to the acceptance of an organization within its external environment [13]. Legitimacy is conferred on an organization by external constituents when the values and actions of the organization are congruent with those of its constituents, including key suppliers, consumers, and so on [15]. Organizational isomorphism, indicating that organizations tend to adopt processes, structures, and strategies that their constituents have already adopted, refers to one of the most fundamental mechanisms through which organizations achieve organizational legitimacy [13]. Study suggests that uncertainty about the adoption of new innovation is likely to be reduced by using isomorphism [32]. They identified three types of isomorphic processes--mimetic, coercive, and normative, that serve as external institutional pressures for an organization.

Mimetic pressures indicate that over time organizations become more similar to other organizations in their environment, because the organizations adopt processes or strategies similar to their constituents' [1][15]. Organizations tend to be affected by two types of mimetic pressures. The first one is bandwagon effect, which suggests that when the majority of organizations in their environment have taken the same action, it is likely organizations are subject to imitating these actions without a great of thought [27]. Second, when confronted with high levels of uncertainty about the outcomes of a strategic action, organizations achieve legitimacy by closely monitoring actions taken by others to identify successful practices applied to them and by following the "best practices" adopted by other similar organizations [13]. Mimicking early adopters is able to reduce the costs associated with searching for alternatives [32].

Several IS-related studies have used mimetic isomorphism to explain the adoption of IT. Following Son and Benbasat's (2007) research, this study focuses on two types of mimetic pressures salient to B2B commerce—the extent of adoption by

competitors within an industry and the perceived success of competitor adopters.

Research shows that mimetic pressures have been used for attracting more participants and encouraging them to participate in the related-activities of EMPs [22][32]. Task interdependency and PLC activities refer to the processes and strategies essential to B2B commerce and their efficiency and effectiveness play a critical role in supply-channel performance [23][30]. Thus, we expect that the efficiency of task interdependency and the coordination improvements of PLC activities are likely to be affected by mimetic pressures. This leads to H3a and H3b.

**H3a:** Mimetic pressures will positively influence buyers' efficiency of task interdependence.

**H3b:** Mimetic pressures will positively influence buyers' coordination improvements of PLC.

Coercive pressures refer to the fact that firms are likely to be affected by both formal and informal pressures exerted by other firms on which they are dependent and by cultural expectations in the society within which firms function [15]. Formal and informal pressures may lead to soliciting compliance of an organization's stakeholders, including trading partners (e.g. customers and suppliers involved in performing interdependent tasks), investors, and government regulatory agencies [34]. Coercive pressures may take several forms, such as force, threats, and invitations of a firm's trading partners to the EMP [15]. Coercive pressures directly or indirectly affect a firm's adoption of EMPs and the strategies related to B2B commerce. In a private e-marketplace owned by a large firm, coercive pressures influence a firm's adoption and business processes directly, such as inviting trading partners to the e-marketplace or enforcement of cooperation between participants. In other types of EMPs such as intermediary marketplaces, dominant organizations in an industry may indirectly pressure others in the industry to follow the rules such as the process flow or PLC activities [42]. Research on the adoption of B2B e-marketplaces identifies the association between such indirect pressures and the successful deployment of nonprivate EMPs [32], suggesting that under the pressure of the dominant players in an industry, other firms are more willing to participate in EMPs and follow the rules established by the dominant players, such as the structures and strategies used in processing information, negotiation, payment, and delivery [42].

In B2B EMPs, when a dominant party with control over scarce and important resources demands its trading partners to adopt business practices or structures to server its interests, it is likely a target firm will comply with the demand to secure its access to these resources and to ensure better supply-channel performance [22]. In the context of SCM, empirical studies [35][32][42] show that coercive pressures have a positive influence on the target firm's adoption, including structure and control of the fulfillment process, strategic partners network and so on. Extending this notation, we expect that coercive pressures positively affect the improvements in the efficiency of task interdependence and in the coordination of PLC activities, leading to H4a and H4b.

**H4a:** Coercive pressures will positively influence buyers' efficiency of task interdependence.

**H4b:** Coercive pressures will positively influence buyers' coordination improvements of PLC.

Normative pressures imply that strategic processes taken by organizations are subject to the values and norms shared among the members of their social networks [31]. Organizations' behavior is based on their beliefs about what members in their social networks view as appropriate [13]. Normative pressures can be derived from several sources, including trade and professional associations, accreditation agencies, and channel partners. Through direct and indirect interactions with others in EMPs, organizational decision makers learn how to deal with transactional processes and provide personalized and customized services, and understand what the desirable and undesirable consequences of certain organizational actions are [32][35]. This is similar to the notation of "informational social influence" proposed in the interpersonal relationship context, arguing that the value of an innovation relies heavily on social interactions between members of a social network [14].

Since the primary aim of B2B EMPs is to support trading activities between buyers and sellers, trading partners' business practices are likely to affect a firm's decision to move toward the EMP. Theory suggests that the extent to which an e-marketplace is successful and valuable depends on the number of trading partners who have already adopted the EMP [17][28]. This assertion has been confirmed by Teo et al's (2003) study in the context of EDI. Empirical studies [33][42] show that normative pressures can be implemented in B2B e-marketplaces such as advertising the number of participants and the number of products listed, demonstrating various trade functions and the transactions volumes. When exposed to the above information from EMPs, nonadopters is likely to have adoption intent due to normative pressures. Son and Benbasat (2007) found that the extent of adoption by suppliers is positively associated with buyers' decisions to adopt B2B EMPs. Based on the above arguments, we propose that the more suppliers or partners in IOS have adopted the business practice, norms, or values of professionals regarding how

work should be conducted in the context of B2B EMPs, the more buyers would focus on improving their efficiency of task interdependence and coordination of PLC, because these refer to the key business practices in e-marketplaces that buyers aim to address [23][30].

Normative pressures can also be derived from participation in trade and professional associations [37]. Organizational behavior is associated with normative rules such as active participation in a wide range of events, including conferences and educational programs organized by trade and professional associations [15]. The more individuals participate in the above events, or subscribe to the professional publications of these associations, the more likely they learn the prevalent norms and innovations in the institutional environments, which in turn affect their adoption of business practices [22][32]. In a SCM context, since task interdependence and PLC activities refer to the professionally appropriate practices that influence operational and strategic benefits of buyers [23], we expect that improving their performance is affected by the normative pressures, leading to H5a and H5b.

**H5a:** Normative pressures will positively influence buyers' efficiency of task interdependence.
**H5b:** Normative pressures will positively influence buyers' coordination improvements of PLC.

## Research methodology

### Development of measures

While SCM entails a dyadic environment, this study examines the phenomenon from the buyer's perspective in the dyad. To test the proposed model, we collected data from the firms that are in the preadoption period of B2B EMPs established for the industry (or potential adopters) in which they operate, using a survey questionnaire administered to members of the e-market association of Taiwan (EAT) between July 2008 to December 2008. We developed the items in the questionnaire by adapting measures that have been validated by prior work. All latent variables were measured with multiple items on five-point Likert scales, anchored with "strongly disagree" to "strongly agree."

The measures for the legitimacy-oriented constructs were directly adapted from prior studies [32][37] with some minor modifications, so that they were suitable for the context of this paper. The adoption intent for potential adopters was assessed with three-item measures adapted from Son and Benbasat (2007). The measures of coordination improvements of PLC and of efficiency of task interdependence were adapted from Premkumar et al. (2005) and Kim et al. (2006) respectively.

The draft questionnaire was pretested for face and content validity with two IS executives who have been involved in their firms' procurement activities and have considerable experience in EMPs. This procedure resulted in some modifications of the wording of several survey items and dropping 4 items. Then, pilot tests were conducted by selecting the respondents (N=55) who are currently the members of the EAT and their firms are in the preadoption period. Respondents of the pilot tests were asked not only to provide feedback and suggestions for improvement if the meaning of questionnaire was not clear, but also to answer all the questions by following the instructions that were given. A total of fifty respondents returned the completed questionnaires.

### Sample and data collection procedure

A total of 500 potential respondents who are familiar with an organization's SCM activities were selected from a membership list of the EAT. Of the 500 potential respondents, 323 members' firms belong to the preadoption period. A sample frame of 55 randomly chosen members was used for the pilot test, and the remaining 268 members constituted a sample frame for the main study. We mailed them both a survey questionnaire and a cover letter endorsed by the president of the EAT to encourage members' participation in the survey. 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 submitting the online version of the completed questionnaire.

A total of 97 respondents returned the questionnaire either by mail (74; 76.3%) or online (23; 23.7%), yielding a response rate of 30%, which is typical for similar surveys conducted in Taiwan. After discarding unusable responses, we obtained 79 useful responses. Because of no changes were made in the questionnaire after the pilot testing, ten responses from the pilot testing were added to the sample of this study. Thus, 89 responses were used in the subsequent analysis.

An array of industries and a fair distribution of responding organizations, in terms of size, were in our samples (see Table 1). These respondents came from potential adopter organizations, which were defined as organizations that were aware of B2B e-marketplaces operating in their industry, but these

Table 1
Profile of organizations in the samples

| | **Potential adopters of e-marketplaces (N=89)** | |
|---|---|---|
| | Frequency | Percentage |
| **Industry groups** | | |
| Manufacturer | 20 | 22.5 |
| Electronics/semiconductor | 16 | 18.0 |
| Information technology | 21 | 23.6 |

| | | |
|---|---|---|
| Transportation | 3 | 3.4 |
| Construction/building | 1 | 1.1 |
| Government | 2 | 2.2 |
| Metals/steel | 1 | 1.1 |
| Finance/insurance | 4 | 4.5 |
| Petrochemistry/plastics | 4 | 4.5 |
| Others | 17 | 19.1 |
| **Annual sales revenue (in Taiwanese dollars)** | | |
| Less than $100 millions | 29 | 32.6 |
| $100 millions--$500 millions | 22 | 24.7 |
| $500 millions--$1 billions | 10 | 11.2 |
| $1 billions--$5 billions | 7 | 7.9 |
| More than $5 billions | 21 | 23.6 |
| **Number of employees** | | |
| Less than 100 | 26 | 29.2 |
| 100-300 | 24 | 27.0 |
| 300-500 | 10 | 11.2 |
| 500-1000 | 3 | 3.4 |
| More than 1000 | 26 | 29.2 |

firms had not adopted the e-marketplaces. In addition, nonresponse bias was assessed, using the procedure recommended by Armstrong and Overton (1977). 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 type of industry groups. Accordingly, there were no apparent problems that might skew responses.

## Data analysis

The Partial Least Squares (PLS) approach to structural equation modeling was used to validate the proposed model, using PLS-Graph 3.0. Compared with covariance-based modeling approaches such as LISREL, a PLS approach is considered to be more suitable to model small- and medium-sized samples[10].

Table 2

Composite Reliability, Average variance extracted

| Construct | Composite reliability | Average Variance extracted | Cronbach's Alpha |
|---|---|---|---|
| AI | 0.89 | 0.74 | 0.76 |
| TI | 0.87 | 0.77 | 0.70 |
| PLC | 0.88 | 0.56 | 0.83 |
| MP | 0.93 | 0.77 | 0.89 |
| CP | 0.84 | 0.65 | 0.72 |
| NP | 0.94 | 0.80 | 0.91 |

Adoption intent (AI); Efficiency of task interdependence (TI); Coordination improvements of PLC (PLC); Mimetic pressure (MP); Coercive pressure (CP); Normative pressure (NP)

**Measurement model**

Following recommended two-stage analytical procedures [21], confirmatory factor analysis was first conducted to examine the measurement model; then, the structural relationships were evaluated.

To validate our measurement model, three types of validity were assessed—content validity, convergent validity, and discriminant validity. Content validity was established by ensuring consistency between the measurement items and the extant literature. This was done by interviewing senior practitioners and pilot-testing the instrument. To validate convergent validity, we examined composite reliability and average variance extracted (AVE) from the measures [21]. Although many studies employing PLS have used 0.5 as the threshold measure of the reliability, 0.7 is a recommended value for a reliable construct [10]. As shown in Table 2, our composite reliability values range from 0.87 to 0.94. As to the AVE, a score of 0.5 indicates acceptability [18]. The AVE values in Table 2 range from 0.56 to 0.8, demonstrating the acceptability of AVE measures. Finally, we verified the discriminant validity of our instrument by examining the square root of AVE as suggested by Fornel and Larcker (1981). The result in Table 3 attests the discriminant validity—the square root of the AVE for each construct is greater than the levels of correlations involving the construct. Further, the results of the inter-construct correlations also show that each construct shares larger variance

Table 3

Composite Reliability, AVE, Construct Correlation for Potential Adopters

| Construct | Mean | S.D. | AI | TI | PLC | MP | CP | NP |
|---|---|---|---|---|---|---|---|---|
| AI | 3.00 | 1.16 | 0.860 | | | | | |
| TI | 3.59 | 0.65 | 0.528 | 0.877 | | | | |
| PLC | 3.63 | 0.68 | 0.432 | 0.518 | 0.748 | | | |
| MP | 3.29 | 0.65 | 0.612 | 0.481 | 0.439 | 0.877 | | |
| CP | 3.62 | 0.72 | 0.397 | 0.521 | 0.225 | 0.405 | 0.806 | |
| NP | 3.26 | 0.74 | 0.616 | 0.574 | 0.479 | 0.705 | 0.474 | 0.894 |

with its own measures than with other measures—both loadings and cross-loadings confirm discriminant validity.

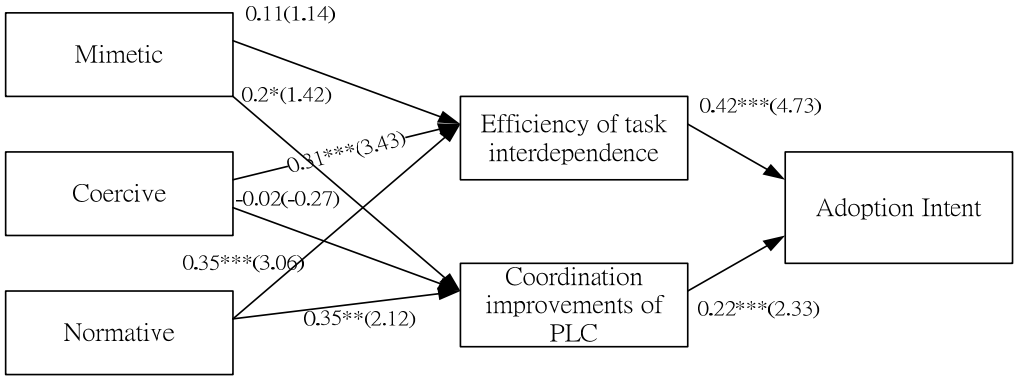
**Structural model**

The test of the structural model includes estimating the path coefficients, which indicate the strengths of the relationships between dependent and independent variables, and the $R^2$, which shows the amount of variance explained by the independent variable(s). $R^2$ represents the predictive power of the model and interprets the same as in multiple regression. Based on a confidence estimation procedure other than the normal approximation, a bootstrap resampling procedure was used to generate t-statistics and stand error [10]. Resamples of 500 was chosen, indicating that sampling with replacement from the original sample set and this procedure continues to sample until it reaches the specified number of 500. The results of the path analysis are shown in Figure 2. As expected, the level of EMPs adoption intent were affected by both the efficiency of task interdependence (β=0.42, p<0.01, H1) and the coordination improvements of PLC (β=0.22, p<0.01, H2) significantly, suggesting that both of the fundamental SCM tasks' performance (i.e. efficiency or coordination improvements) exert a significant influence on the EMPs adoption intent. Regarding the influence of legitimacy-related factors, efficiency of task interdependence is positively affected by coercive pressures (β=0.31, p<0.01, H4a) and normative pressures (β=0.35, p<0.01, H5a), but not by mimetic pressures (β=0.11, H3a). The coordination improvements of PLC are influenced by mimetic pressures (β=0.20, p<0.1, H3b) and normative pressures (β=0.35, p<0.01, H5b), but not by coercive pressures (β=-0.02, H4b).

To further examine the intermediate effect of both the efficiency of task interdependence and coordination improvements of PLC, we first tested the direct relationships, including a model of mimetic, coercive, and normative pressures predicting the adoption intent. The βs of mimetic, coercive, and normative pressures were 0.34 (p<0.01), 0.1 (p<0.05), 0.33 (p<0.01) respectively, accounting for 32.7%. We then proceeded to see if there is a mediation effect by adding the intervening constructs (efficiency of task interdependence and coordination improvements of PLC). The foregoing constructs partially mediated the relationships between the mechanisms of organizational isomorphism (in terms of mimetic, coercive, and normative pressures) and adoption intent because the indirect paths were significant and the direct paths were lessened. Besides, the increase in $R^2$ (i.e. from 0.33 to 0.47) perhaps shows that mimetic, coercive, and normative pressures are not the only variables that predict efficiency of task interdependence and coordination improvements of PLC.

## Discussion, implications, and limitations

Our study provides valuable insight into the adoption intent of EMPs, in terms of organizational isomorphism and the performance of the fundamental features of SCM tasks (i.e. PLC and channel interdependence). This is the first empirical study, to the best of our knowledge, explaining the motive for EMPs buyers' adoption intent from legitimacy-oriented and information processing perspectives. While our model was based on Son and Benbasat's (2007) research, including mimetic, coercive, and normative pressures, and adoption intent, we proposed an alternative way that may affect buyers' adoption intent—i.e. improving the efficiency of fundamental SCM tasks. In other words, we contended that buyers' EMPs adoption intent is affected not only by the organizational legitimacy, but also by whether EMPs improve the performance of fundamental features of SCM tasks. Our findings confirm that adoption intent is affected by both the efficiency of interdependence tasks and the coordination improvements of PLC, which in turn are




*p<0.1; **p<0.05; ***p<0.01

Figure 2. Results of the model testing

influenced by most of the mechanisms of organizational isomorphism. The following sections elaborate on the implications of our findings.

**Organizational legitimacy, task interdependence, PLC, and EMPs adoption intent**

From Figure 2, as expected, we found that both the efficiency of task interdependence and coordination improvements of PLC are positively associated with EMPs adoption intent. Three implications regarding the influence of the organizational legitimacy can be drawn. First, different types of institutional pressures exert different level of impact on the efficiency of fundamental features of SCM tasks. Normative pressures exert the most significant impact on the efficiency of task interdependence, while mimetic pressures have the least effect. This implies that different types of instructional pressures affect the efficiency of task interdependence differently. Our hypothesis on the relationship between mimetic pressures and task interdependence is not support. There are two possible explanations. First, when a firm faces interdependent tasks, they rely more on inter-organizational channels and shared norms (i.e. normative pressures), leading to adopting new practices which are consistent with the norms and values of its constituents in the institutional environment,. On the other hand, the efficiency of task interdependence is less likely to be affected by the perceived success of competitors' actions (or mimetic pressures) because mimetic pressures don't usually operate in inter-organizational relationships [22].

Second, regarding the influence of institutional pressures on the coordination improvements of PLC, normative pressures have the most impact, while coercive pressures have the least. This implies that normative pressures play a key role in affecting not only the performance of inter-organizational tasks (such as interdependence tasks) but also the coordination improvements of intra-organizational tasks (such as PLC activities) in SCM context. Our findings don't support the hypothesis on the relationship between coercive pressures and coordination improvements of PLC. The possible reason is that the EMPs of this study don't involve an extremely large firm (or a dominant organization), upon which other firms (focal firms) are dependent. Thus, certain strategic actions or institutional rules taken by dominant organizations in an industry don't make the focal firm perceive a high legitimate requirement for adopting EMPs.

Finally, concerning the mediation effect of the efficiency of SCM tasks, different types of institutional pressures exert different level of influence on adoption intent. First, mimetic pressures affect adoption intent either directly or indirectly through the coordination improvements of PLC. As noted before, the effect of mimetic pressures on adoption intent was partially mediated by the efficiency of SCM tasks. This implies that adoption intent is not fully affected by the explicit benefits derived from PLC activities. Rather, implicit benefits derived from mimetic pressures also contribute to the EMPs adoption because mimicking behavior enables firms to minimize the costs associated with searching for alternatives and to follow the best practices adopted by other similar firms. In addition, our findings also show that mimetic pressures only affect the performance of PLC, their influence on interdependence tasks is not significant. This indicates that mimetic pressures don't exert the same influence on every kind of SCM tasks. For interdependence tasks, since the best practices that a firm can adopt depend on the type of channel interdependence (such as pooled interdependence) the firm is involved in, interdependence tasks are unlikely to be affected by mimetic pressures. Second, coercive pressures affect adoption intent either directly or indirectly through the efficiency of task interdependence. The relationship between coercive pressures and adoption intent is partially mediated by the efficiency of SCM tasks. These findings confirm that organizations are likely to be subjected to formal and informal pressures exerted on organizations by other organizations upon which they are dependent. This is the possible reason why the performance of interdependent tasks is more likely to be affected by coercive pressures, but coordination improvements of PLC are not. Finally, normative pressures affect adoption intent either directly or indirectly through improving the performance of SCM tasks, including interdependent tasks and PLC activities. Our results attest that strategic processes taken by organizations are affected either by inter-organizational shared norms or by intra-organizational decision making, which in turn influence the organization's performance of interdependent tasks and PLC activities respectively. Our model also shows among the three institutional pressures, normative pressures exert the most significant influence on the benefits of SCM tasks, which in turn affect adoption intent.

**Limitations and future research**

This study has three limitations. First, we emphasized a limited number of variables that may affect EPMs adoption intent. Although these factors play a critical role in affecting EMPs adoption intent, other factors such as power, and trust may influence EMPs adoption. Second, this study considered the adoption intent from legitimacy-oriented and information processing perspectives of ERPs, other perspectives may also affect the adoption intent such as efficiency-oriented and non-contractibility (in terms of responsiveness, technology investment and so on) perspectives. Future study may take these variables into consideration. Finally, the usually limitations of cross-sectional surveys are ascribed to

lack of causality, as is this study. In-depth process-oriented research design based on institutional pressures and information processing theory may help us understand why different types of institutional pressures cause the performance of SCM tasks (interdependence tasks and PLC activities) to increase/decrease. This is the important issue that should be addressed in the future.

**Implications for practice and theory**

From the theoretical perspective, our research extends current understanding of drivers for EMPs adoption intent. In particular, we differentiate different types of institutional pressures and assess their varying effects on benefits of SCM tasks and EMPs adoption intent. Prior research on IS tend to consider the impact of institutional pressures on adoption intent and ignore how the benefits of SCM tasks mediate the above relationship. In contrast, our study helps delineate the relationships among different types of institutional pressures, benefits of SCM tasks focused on inter-organizational channels (i.e. interdependent tasks) and intra-organization decision making (i.e. PLC activities), and adoption intent. Because EMPs refer to a special type of IS innovation, involving both inter-organizational and intra-organizational activities, integrating buyers perceived institutional pressures and the benefits of SCM tasks in a single model may shed new light on our understanding of drivers for EMPs adoption intent. Ignoring the mediating role of the benefits of SCM tasks may lead to inaccurate research results.

This study has implications for practice. Millions of dollars have been invested in IS to help firms gain competitive benefits. However, these investments may not reach their highest level of profits if firms don't integrate their internal activities across organizational boundaries, and leverage IS to achieve operational and strategic benefits so that the performance of SCM tasks, such as interdependent tasks and PLC activities can be improved effectively. Therefore, it is critical for the potential of EMPs adopters to use institutional pressures such as participating in professional and trade associations, or understanding the extent of adoption by suppliers (i.e. normative pressures) to facilitate the fulfillment of SCM tasks. Our findings provide EMPs adopters with useful guidance and knowledge. It is important for managers to realize the different effect of institutional pressures on SCM tasks. Based on our results, firms should focus on coercive and normative pressures when implementing interdependent tasks, and on mimetic and normative when addressing PLC issues.

## Reference


[1] Abrahamson, E. and Rosenkopf, L. Institutional and Competitive Bandwagons — Using Mathematical Modeling as a Tool to Explore Innovation Diffusion, *Academy of Management Review*, 18(3), 1993, pp.517.

[2] Ante, S. E. and Weintraub, A. Why B2B Is A Scary Place To Be: Too Many Business-to-Business Forums Are Chasing Too Few Dollars, *Business Week*, 2000, pp.34-37.

[3] Armstrong, J. S., and Overton, T. S. Estimating Nonresponse Bias in Mail Surveys, *Journal of Marketing Research*, 14(3), 1977, pp.396-402.

[4] Babbie, E. R. *Survey Research Methods*, Belmont, CA: Wadsworth, 1973.

[5] Bakos, Y. A Strategic Analysis of Electronic Marketplaces, *MIS Quarterly*, 15(3), 1991, pp.295-310.

[6] Bakos, J. Reducing Buyer Search Costs: Implications for Electronic Marketplaces, *Management Science*, 43(12), 1997, pp.1676-1692.

[7] Bensaou, M., and Venkatraman, N. Configurations of Inter-Organizational Relationships: A Comparison Between U.S. and Japanese Automakers, *Management Science*, 41(9), 1995, pp.1471-1492.

[8] Bensaou, M. and Venkatraman, N. Inter-Organizational Relationships and Information Technology: A Conceptual Synthesis and A Research Framework, *European Journal of Information Systems*, 5(1), 1996, pp.84-91.

[9] Bowersox, D., Closs, D., and Cooper, B. *Supply Chain Logistics Management*, New York: McGraw-Hill, 2002.

[10] Chin, W. W. *The Partial Least Squares Approach to Structural Equation Modeling*, In G. A. Marcoulides (ed.), Modern Methods for Business Research. London: Lawrence Erlbaum, 1998, pp.295-336.

[11] Chwelos, P., Benbasat, I., and Dexter, A. S. Research Report: Empirical Test of an EDI Adopting Model, *Information Systems Research*, 12(3), 2001, pp.304-321.

[12] Daft, R. L. *Organization Theory and Design*, 7th ed. South-Western College Publishing, Cincinnati, OH, 2001.

[13] Deephouse, D. L. Does Isomorphism Legitimate?, *Academy of Management Journal*, 39(4), 1996, pp.1024-1039.

[14] Deutsch, M. and Gerard, H. B. A Study of Normative and Informational Social Influences Upon Individual Judgment, *Journal of Abnormal and Social Psychology*, 51(4), 1955, pp.629-636.

[15] Dimaggio, P. J. and Powell, W. W. The Iron Cage Revisited—Institutional Isomorphism and Collective Rationality in Organizational Fields, *American Sociological Review*, 48(2), 1983, pp.147-160.

[16] Dong, S., Xu, S. X., and Zhu, K. X. Information Technology in Supply Chains: The

Value of IT-enabled Resources Under Competition, *Information Systems Research*, 20(1), 2009, pp.18-32.

[17] Farrell, J. and Saloner, G. Installed Base and Compatibility—Innovation, Product Preannouncements, and Predation, *American Economic Review*, 76(5), 1986, pp.940-955.

[18] Fornel, C. and Larcker, D. F. Structural Equation Models with Unobservable Variables and Measurement Errors, *Journal of Marketing Research*, 18(2), 1981, pp3.9-50.

[19] Galbraith, J. *Designing Complex Organizations. Readin*g, MA: Addison-Wesley, 1973..

[20] Grewal, R., Corner, J., and Mehta, R. An Investigation into The Antecedents of Organizational Participation in Business-to-Business Electronic Markets, *Journal of Marketing*, 65(3), 2001, pp.17-33.

[21] Hair, J. F., Anderson, R. E., Tatham, R. L., and Black, W. C. *Multivariate Data Analysis* (5th ed.), Prentice Hall, Englewood Cliffs, NJ, 1998.

[22] Ke, W., Liu, H., Wei, K.K., Gu, J., and Chen, H. How Do Mediated and Non-Mediated Power Affect Electronic Supply Chain Management System Adoption? The Mediating Effects of Trust and Institutional Pressures, *Decision Support Systems*, 2009, doi;10.1016/j.dss.2008.11.008.

[23] Kim, K. K., Umanath, N. S., and Kim, B. H. An Assessment of Electronic Information Transfer in B2B Supply-Channel Relationships, *Journal of MIS*, 22(3), 2006, pp.293-320.

[24] Leenders, M., Fearon, H., Flynn, A., and Johnson, P. *Purchasing and Supply Management*, 12th ed. New York: McGraw-Hill/Irwin, 2002.

[25] Lin, B., and Hsieh, C. Online Procurement: Implementation and Managerial Implication, *Human System Managemen*t, 19(2), 2000, pp.105-110.

[26] Malone, T. W., Yates, J, and Benjamin, R. I. Electronic Markets and Electronic Hierarchies, *Communications of the ACM*, 30(6), 1987, pp.484-497.

[27] March, J. G. Decision in Organizations and Theories of Choice, In A. Van de Ven and W. F. Joyce (eds.), *Perspectives on Organization Design and Behavior*. New York: John Wiley & Sons, 1981, pp.205-244.

[28] Markus, M. L. Toward a Critical Mass Theory of Interactive Media—Universal Access, Interdependence and Diffusion, *Communication Research*, 14(5), 1987, pp. 491-511.

[29] Ordanini, A. What Drives Market Transactions in B2B Exchanges?, *Communications of the ACM*, 49(4), 2006, Pp.89-93.

[30] Premkumar, G., Ramamurthy, K., and Saunders, C. S. Information Processing View of Organizations: An Exploratory Examination of Fit in the Context of Interorganizational Relationships, *Journal of MIS*, 22(1), 2005, pp.257-294.

[31] Scott, W. R. *Institutions and Organizations*, 2nd ed. Thousand Oaks, CA: Sage, 2001.

[32] Son, J. Y., and Benbasat, I. Organizational Buyers' Adoption and Use of B2B Electronic Marketplaces: Efficiency- and Legitimacy-Oriented Perspectives, *Journal of MIS*, 24(1), 2007, pp.55-99.

[33] Son, J. Y., Narasimhan, S., and Riggins, F. Effects of EDI-Specific Relational Factors and Channel Climate on EDI Usage in the Customer-Supplier Relationship, *Journal of MIS*, 22(1), 2005, pp.321-353.

[34] Srinivasan, R., Lilien, G. L., and Rangaswamy, A. Technological Opportunism and Radical Technology Adoption: An Application to E-business, *Journal of Marketing*, 66(3), 2002, pp.47-60.

[35] Standing, C., Love, P. E. D., Stckdale, R., and Gengatharen, D. Examining The Relationship Between Electronic Marketplace Strategy and Structure, *IEEE Transactions on Engineering Management*, 53(2), 2006, pp.297-311.

[36] Starr, E. C., Kambil, A., Whitaker, J. D., and Brooks, J. D. One Size Does Not Fit All—The Need For an E-marketplace Portfolio, *Advance in Supply Chain Management*, 3(1), 2000, pp.96-99.

[37] Teo, H. H., Wei, K. K., and Benbasat, I. Predicting Intention to Adopt Interorganizational Linkages: An Institutional Perspective, *MIS Quarterly*, 27(1), 2003, pp.19-49.

[38] Thompson, J. *Organizations in Action*, New York: McGraw-Hill, 1967.

[39] Ulfelder, S. B2B Exchange Survivors, *Computerworld*, 2004, pp.27-28.

[40] Wise, R. and Morrison, D. Beyond The Exchange—The Future of B2B, *Harvard Business Review*, 78(6), 2000, pp.86-96.

[41] Yao, Y., Palmer, J., and Dresner, M. An Interorganizational Perspective on the Use of Electronically-enabled Supply Chains, *Decision Support Systems*, 43(3), 2007, pp.884-896.

[42] Zhao, J., Wang, S., and Huang, W. V. A Study of B2B E-Market in China: E-Commerce Process Perspective, Information and Management, (45), 2008, pp.242-248