An Empirical Study of Success Factors in the Business-to-Business E-Marketplace from Perspectives of Buyers and Sellers

Munkhbat Luvsanbyamba1, In Keun Chung 2

1IT Coordinator, MCS Asia Pacific Breweries LLC 438 Alexandra Road, #16-01 Alexandra Point, Singapore 119958, muujii@gmail.com
2Professor, College of Business, Hankuk University of Foreign Studies 270 Imun-dong, Dongdaemun-gu, Seoul, Korea, ikchung@hufs.ac.kr
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Abstract

This study extends the previous research framework—the TOE (technological, organizational, and environmental perspectives) model of technological innovation—by using a revised model—the TOIM (technological, organizational, interorganizational, and marketplace perspectives) model. The study tests additional variables, including trust (interorganizational perspective), aggregation, and service quality (marketplace perspective), for buyers and sellers in the e-marketplace. As the hypotheses for the new factors were supported, the results significantly contributed to further this line of research for the academics and have practical implications for participants in the e-marketplace.

Keywords: Electronic Marketplace(EM), Information Technology(IT), Innovation.

1. Introduction

Various innovations in information technology (IT) in the last two decades have dramatically reduced time and cost requirements for processing and disseminating information [19]. Therefore, the use of IT applications for supporting organizational and interorganizational processes is not a new phenomenon. There is a growing body of literature on the adoption and implementation of IT. Most of the previous studies examining this topic have been conducted before the widespread growth and use of the Internet and internet-based solutions [20].

In the last few years, innovations in the e-marketplace have produced a dramatically transformed procurement process (supply chain) that is fundamentally different from the traditional one. Although some firms have successfully used the Internet to manage their supply chain, others have been less fortunate. To a large extent, the difference lies in the ability of organizations to identify the critical factors that influence their decisions and use the Internet accordingly [27].

However, the general circumstance has been changing in the last few years. The diffusion of the e-marketplace (EM) in Korea has been substantial. E-marketplace participants have been changing their business models to take advantage of this development, which is beyond the limited scale of the original implementation. Thus, this indicates a need for the identification of the key success factors for buyers and sellers in the e-marketplace to help them to fully develop their potential. Few studies have addressed the success factors in the use of the e-marketplace, particularly in Korea, and thus, this study is expected to contribute to the theoretical and practical development of the e-marketplace. In this regard, this study determines the success factors through a large-scale empirical study of buyers and sellers in the e-marketplace.

2. E-Marketplace

In any new and quickly changing environment, terms used to describe new phenomena are often confusing and continuously evolving. A number of terms have been used to refer to the e-marketplace, including e-hubs, exchanges, market makers, and auctions. Further, the e-marketplace can be defined as an interorganizational system, a community, an electronic...
platform, a meeting place, a virtual location, or infrastructure. The term “e-marketplace” is typically used by researchers. Archer et al. [1] described the e-marketplace from three perspectives: an electronic market, a centralized market, and a value network. Unlike a traditional market, the e-marketplace represents a virtual space in an electronic network; an interorganizational information system that allows participating buyers and sellers to exchange information on prices and products; and an e-application (or an internet-based e-commerce platform) that matches multiple buyers with suppliers during transactions. The existing e-marketplace capitalizes on the open standards of internet technology and other advances in IT to overcome the limitations of the pre-internet e-marketplace [30].

In the 1990s, previous studies typically examined the e-marketplace from conceptual and economic perspectives. Since 2000, business-to-business (B2B) electronic commerce has been expected to grow rapidly because of the substantial diffusion of the Internet. Thus, a large number of studies have examined e-commerce adoption and diffusion, and there has been a substantial proliferation of the e-marketplace [2], [3], [4], [7], [8], [12], [19], [20], [21], [30].

According to Bakos [2], “Markets have three main functions: matching buyers and sellers; facilitating exchange of information, goods, services and payments associated with market transactions; and providing an institutional infrastructure, such as legal and regulatory framework that enables the efficient functioning of the market.”

The e-marketplace (or an electronic market system) is an interorganizational information system that allows participating buyers and sellers to exchange information on prices and products [3]. Malone et al. [19] suggested the effects of the e-marketplace with electronic communication effects, electronic brokerage effects, and integration effects.

The adoption of internet-based applications provides opportunities as well as introduces new challenges for firms. The Internet has dramatically influenced the way in which business is conducted. Markets, industries, and businesses are being transformed. IT is now a major driver for transforming businesses and markets [9].

The success of the e-marketplace is determined by the objectives of its adoption. Thus, perceived benefits can measure the success of the e-marketplace. The most obvious and easily quantifiable benefits come from cost reductions at both the internal and interorganizational levels. Another benefit comes from other participants in the interorganizational system. An even larger source of revenue comes from increased sales of the sponsoring company’s products [15]. A number of studies have examined the success of the e-marketplace and interorganizational information systems [6], [9], [10], [11], [13], [16], [17], [18], [24], [26], [27], [28], [31].

3. Research model and hypotheses

3.1. Research model

This study focuses on the critical success factors that affect the use of the e-marketplace. The success factors were drawn from previous research on innovation, adoption, and diffusion theory. This study suggests the following factors for empirical research: trust from the interorganizational perspective; the complexity, compatibility, and maturity of technology from the technological perspective; e-business readiness and top management support from the organizational perspective; and aggregation, collaboration, and service quality from the e-marketplace perspective.

Mishra [20] classified previous studies according to IT adoption and use, the e-marketplace, and organizational innovation. According to this classification, there are three research streams based on timing and content. The first stream of research investigates the impact of IT on the nature of buyer-supplier coordination [5], [7], [19]. According to this stream of research, a reduction in transaction costs would be a major facilitator of the firm’s participation in B2B markets. The second stream focuses on the antecedents of IT adoption and use [12], [14]. This second stream draws on organizational theory, innovation theory, and network externality to examine the factors influencing IT adoption and use by firms. Finally, the third stream examines not only the benefits of IT use in interorganizational cooperation but also the operational and strategic impact of IT adoption and use by firms. The present study is related to the third stream.
in that this study considers the success factors in the e-marketplace.

The research model was developed by extending the TOE (technological, organizational, and environmental) perspectives of Tornatzky [29] to TOIM (technological, organizational, interorganizational, and e-marketplace) perspectives. Environmental factors may not have considerable influence on the performance of the e-marketplace. Participating in the e-marketplace may not be regarded as a revolutionary innovation in that a large number of firms are already using the Internet for daily activities. Hence, lower technological complexity may have a positive effect on the use of the e-marketplace by buyers and suppliers.

Fig 1. Research Model

3.2. Research hypotheses

Firms that understand the potential of technology typically realize the need for using it to fully integrate with existing applications to derive the benefits [22]. Based on the research model, this study proposes the following hypotheses.

3.2.1. Interorganizational factors

3.2.1.1. Trust: Without a trusting relationship, it would be very difficult to implement interorganizational systems. Soliman and Jane (2004) suggested that trusting organizations are more willing to invest in EDI (Electronic Data Interchange) and share information with their business partners. Moreover, trust can limit opportunistic behavior [28].

H1a: Trust has a positive effect on the performance of buyers in the e-marketplace.

H1b: Trust has a positive effect on the performance of sellers in the e-marketplace.

3.2.2. Technological factors

Technological infrastructure provides the enabling backbone of e-business services [24].

3.2.2.1. Complexity (Simplicity): Because the complexity of an innovation can inhibit its adoption, it typically has a negative effect on technology adoption [29]. Further, it can limit further diffusion in that firms may not be able to easily integrate it with the rest of their organizational activities [23]. Thus, in accordance with the maturity of IT and the diffusion of the Internet,
lower complexity may have a positive effect on the performance of buyers and sellers in the e-marketplace.

H2a: Lower complexity has a positive effect on the performance of buyers in the e-marketplace.
H2b: Lower complexity has a positive effect on the performance of sellers in the e-marketplace.

3.2.2.2. Compatibility: The compatibility of an innovation refers to the degree to which the innovation is perceived to be consistent with existing values, past experiences, and needs of potential adopters [25]. Application systems must be compatible in the adopting organization so that the organization could share the information necessary to conduct its business and reduce costs. This factor has been an important issue since the early days of EDI implementation. Hence, higher compatibility may have a positive association with a higher level of performance by inducing a higher level of satisfaction among users, partners and information system managers [22].

H3a: Compatibility has a positive effect on the performance of buyers in the e-marketplace.
H3b: Compatibility has a positive effect on the performance of sellers in the e-marketplace.

3.2.2.3. Maturity of technology: Adopting emerging technologies, which are typically not mature, can be risky, and thus, more mature technologies can provide the adopter with higher-quality resources. A new technology matures as communities accumulate knowledge of the technology and have easier access to supportive tools and related products.

H4a: The maturity of the technology has a positive effect on the performance of buyers in the e-marketplace.
H4b: The maturity of the technology has a positive effect on the performance of sellers in the e-marketplace.

3.2.3. Organizational factors

3.2.3.1. E-Business readiness: The e-business readiness of a firm is related to technological factors in that a firm must have proper resources to participate in e-commerce. It also addresses the readiness of the firm’s management and its knowledge of the technology that is to be used in its new e-commerce strategy [24]. If participants already have the necessary experience and capability in using information systems and the Internet to facilitate the transaction process, the use of the e-marketplace becomes more likely [30].

H5a: E-business readiness has a positive effect on the performance of buyers in the e-marketplace.
H5b: E-business readiness has a positive effect on the performance of sellers in the e-marketplace.

3.2.3.2. Top management support: Top management support is critical for the successful adoption of new ideas and technologies in organizations. Interorganizational systems, with their important business implications, clearly require top management support for crossing organizational boundaries and gaining commitment from business partners [22], [24].

H6a: Top management support has a positive effect on the performance of buyers in the e-marketplace.
H6b: Top management support has a positive effect on the performance of sellers in the e-marketplace.

3.2.4. E-marketplace factors

3.2.4.1. Market aggregation: Intermediaries aggregate multiple buyers and suppliers in one place to reduce the search cost of identifying business partners. In this way, they can achieve economies of scale and scope, reduce information asymmetry, and increase the bargaining power of buyers and suppliers. Intermediaries also aggregate product offerings and provide buyers with product features [1].
Market aggregation can overcome market fragmentation, provide suppliers with market access, and provide buyers with more choices with greater price transparency [30].

H7a: Market aggregation has a positive effect on the performance of buyers in the e-marketplace.

H7b: Market aggregation has a positive effect on the performance of sellers in the e-marketplace.

3.2.4.2. Service quality: Service quality measures the desired characteristics of an e-commerce system [9]. Service quality is tested by ease of use, transaction transparency, the standardization of catalogues, and information accuracy.

H8a: The higher service quality of e-marketplace participants has a positive effect on the performance of buyers in the e-marketplace.

H8b: The higher service quality of e-marketplace participants has a positive effect on the performance of sellers in the e-marketplace.

4. Empirical study

4.1. Measurement

A questionnaire was developed by using a pool of survey instruments from previous studies and was pretested. A total of 62 questionnaires was returned out of 400 questionnaires sent out (a response rate of 15.5%). The respondents were asked to answer each question based on a seven-point Likert scale. A wide variety of firms responded, from relatively small firms (24%) with revenues under 500 million Korean Won to large firms (16%) with revenues over 100 billion Korean Won. In terms of the number of employees, 53% had fewer than 50, and 14% had more than 1,000. More than 58% of the respondents were senior executives. Further, 48% of the respondents represented the buyer side, 32% represented the seller side, and the remaining 19% were third-party players. In addition, 39% used the e-marketplace as both buyers and sellers. The sample reflected a wide range of industries, and thus, it provided a fair representation of the population of e-marketplace participants.

The validity and reliability of the instrument for the variables were checked, and the results provide support for its validity and reliability. Further, multiple regression analyses were conducted to test the hypotheses.

For the validity of the measurement instrument, the data were analyzed through an exploratory factor analysis and a reliability test. Principal component factor analysis and Cronbach’s alpha were used for the reliability.

Content validity, which assesses whether the measurement is complete and sound, was established by carefully selecting the items measuring the constructs and subjecting them to various pretests and pilot tests. Factor analysis is a statistical technique for classifying a large number of interrelated variables into a smaller number of factors representing a more complex dimension of a more abstract phenomenon. Factor analysis is a useful method for constructing multi-item scales in which each scale represents a specific factor.

A factor analysis was conducted both to assess the construct validity of the measures and to determine the underlying factors influencing the use of the e-marketplace. Because each variable was measured using multi-item constructs, a principal component factor analysis with a varimax rotation was conducted to check the uni-dimensionality of the items. These items loaded on eight factors, and five items (MOT4, MOT5, EBR1, SERQ1, and SERQ5) with a loading of less than 0.5 were excluded. Table 1 shows the results of the validity test.
**Table 1.** Validity test for research variables

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Cronbach’s alpha, which measures the extent to which individual items “hang together,” was used to estimate the average of all possible split-half reliability coefficients. The higher the alpha value, the more “tightly connected” the items in the scale are.

For the internal consistency of the instrument, Cronbach’s alpha values of the variables were computed, which ranged from 0.732 to 0.891 (Table 2). The results indicate that all the constructs had adequate alpha values (>0.6).
Table 2. Reliability

<table>
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4.2. Hypothesis testing

All the hypotheses were tested through the multiple regression of the determinants on the performance (success) of buyers and sellers in the e-marketplace. From the buyer’s perspective, the six variables had a significant relationship with the performance of buyers in the e-marketplace. The regression results indicate that trust was related to the performance of buyers at the significance level of 0.000, providing support for H1a, H4a, H5a, H6a, H7a, and H8a. Further, H1b, H6b and H8b were supported from the seller’s perspective. Accordingly, the results indicate the following relationships:

For buyers: 
\[ Y = 0.54 + 0.523 \text{TRUST} + 0.132 \text{CPLX} + 0.046 \text{CPAT} + 0.308 \text{MOT} + 0.307 \text{EBR} + 0.366 \text{AGG} + 0.498 \text{SERQ} \]  
\[ (F=6.275 \ p<0.01, R^2 = 0.569). \]

For sellers: 
\[ Y = -0.101 + 0.472 \text{TRUST} - 0.002 \text{CPLX} + 0.099 \text{CPAT} + 0.107 \text{MOT} + 0.180 \text{EBR} + 0.413 \text{MOT} + 0.098 \text{AGG} + 0.465 \text{SERQ} \]  
\[ (F=9.996 \ p<0.01, R^2 = 0.734). \]

Many of the hypotheses were supported, particularly from the buyer’s perspective, indicating the academic importance of this study. The independent variables, including trust, the maturity of technology, e-business readiness, top management support, aggregation, and service quality, were positively correlated with the dependent variable, the performance of buyers.

Trust had a significant positive effect on the performance of buyers, which is consistent with the findings of Mishra [20] and Soliman [27], who suggested that trust is an important factor in the interorganizational relationship in e-commerce. The results of this study indicate that trust was most likely to influence the performance of e-marketplace participants.

Technological factors such as the complexity, compatibility, and maturity of technology were not supported. These factors did not have substantial effects on the performance of buyers and sellers. The Internet has become easy to use, and its cost has declined. Hence, these characteristics of the Internet would promote buyer activities in the e-marketplace.

E-business readiness was supported from the buyer’s perspective. Buyers were more likely to participate in the e-marketplace than sellers. It may be fundamentally true that sellers do not like the e-marketplace. According to Truong [30], “If a buyer already has experience and capability in using information technologies, information systems and the Internet to facilitate the purchasing process, the utilization of EMs will be increased. E-business readiness will strengthen market aggregation created by EMs.”

Top management support had a positive effect on the use and adoption of the e-marketplace from the seller’s as well as the buyer’s perspective. It was also one of the critical factors in the adoption of innovation.
Aggregation, a fundamental characteristic, may be more so for the online market (i.e., the e-marketplace). More sellers and products in the market provide more benefits to buyers in that such a market provides an environment in which search costs could be lowered and lower prices could be offered to buyers. Aggregation promoted the buyer’s activities more than the seller’s in the e-marketplace, and thus, the hypothesis was supported only for the buyers. However, this may also be due to the fact that 76% of the respondents in the e-marketplace were buyers.

Service quality, a newly generated variable, was not an adoption factor. This factor was measured by ease of use, the transparency of transactions, and the standardization of catalogues. The e-marketplace is an internet-based business platform that supports all activities related to business transactions and interactions among various participants. As such, firms have been focusing more on service quality than on technology. Accordingly, this factor was supported for buyers as well as sellers.

5. Conclusions

This study extends the previous research framework—the TOE (technological, organizational, and environmental perspectives) model of technological innovation [29]—by using a revised model—the TOIM (technological, organizational, interorganizational, and marketplace perspectives) model. The study tests additional variables, including trust (interorganizational perspective), aggregation, and service quality (marketplace perspective), for buyers and sellers in the e-marketplace. From the buyer’s perspective, trust, maturity of technology, e-business readiness, top management support, aggregation and service quality were supported, whereas only trust, aggregation and service quality were supported from the seller’s perspective. It seems to be a significant contribution to this research stream as the newly added variables in this research in the TOIM model were (trust, aggregation and service quality) supported. The reason why maturity of technology, e-business readiness and aggregation were not supported from the seller’s perspective might be that the sellers are the provider of the technology and aggregation aspect of e-commerce. It seems to be that the research outcome has implications for participants in the e-marketplace.

6. References