A FRAMEWORK FOR THE CLASSIFICATION OF B2B EC STRATEGIES

JONG-MIN CHOE

Kyungpook National University, School of Business
E-mail: choejj@knu.ac.kr

Abstract - This study focused on B2B EC with suppliers. Based on the degrees of information sharing between buyers and sellers as well as the levels of suppliers' power, we suggested a framework that is useful for classifying types of B2B EC strategies. According to this framework, four kinds of B2B EC strategies were proposed: electronic marketplace, electronic procurement, electronic partnerships and electronic distribution. With a cluster analysis, we empirically confirmed these four kinds of B2B EC strategies, and demonstrated the usefulness of a framework for the classification of types of B2B EC.

Index Terms - Electronic commerce, Information sharing, Resource-based view, Transaction cost theory, Suppliers' power

I. INTRODUCTION

It seems that since there has been no concrete framework, which supports the identification and validation of the types of B2B EC, the confusion in the classification of kinds of EC has occurred in prior studies. If a framework useful for the identification and taxonomization of kinds of EC is developed, a framework can be employed for manufacturing firms to identify and select an appropriate or required type of B2B EC under their circumstances. Two broad categories of B2B EC include EC with suppliers and EC with customers. To develop a framework, this study focuses on EC with suppliers since information flows and cooperation through EC with suppliers are prerequisite conditions for value creation in manufacturing firms [11]. To develop a framework, as classification criteria, this study employs the following two dimensions: degrees of information flow between focal firm and its main suppliers, and suppliers' power. The theoretical bases of adopting these two dimensions as classification criteria are the resource-based theory and transaction cost economics. Through this framework, we suggest four kinds of B2B EC, which can be adopted by manufacturing firms. Finally, we empirically confirm the framework and demonstrate the four types of B2B EC.

II. THEORETICAL UNDERPINNINGS

A. Resource-based View, Transaction Cost Theory, and Types of B2B EC

According to the knowledge-based view, which is another facet of the resource-based theory, it is asserted that an organization can share and integrate necessary knowledge resources with its partners through collaborative information flows between an organization and partner firms [15]. Inter-organizational knowledge sharing and integration can expand and supplement the supply of knowledge resources in an organization, and contribute to the acquisition of creative and distinctive knowledge, which leads to enhancement of organizational competitiveness. From the knowledge-based perspective, it is represented that B2B EC has been shown to be a key means for the creation of shared knowledge in supply chains to respond to various types of uncertainties (e.g., product, technology and environment) [13]. Inter-organizational information exchanges with B2B EC in buyer and supplier firms support the knowledge transfer, sharing and acquisition that are vital to intensifying their competitive positions [6].

Transaction cost economics maintains that in inter-organizational relationships, firms choose the governance and control structures, which can minimize transaction costs and can raise the possibilities of attaining organizations' targeted performance [3]. In inter-firm relationships, there are two forms of risk represented as relational risk and performance risk, which all directly link to increase of transaction costs [7]. Suppliers' strong power gives rise to high levels of transaction risks for buyers, especially, relational risk, and, as a result, the transaction costs charged to buyer firms are increased [4]. Since through B2B EC, inter-organizational transaction activities can be controlled and coordinated, and the minimization of transaction costs can be attained, the types of B2B EC are regarded as complex forms of inter-firm control mechanisms [9]. From the transaction cost theory, which contends that firms decide and select types of inter-organizational control devices most contributing to minimization of trading costs, it is proposed that buyer firms' choice of kinds of B2B EC considerably depends on the strength or weakness of suppliers' power, which also affects transaction costs.

B. Inter-organizational Information Exchange and Types of B2B EC

In B2B EC, for a focal firm to efficiently coordinate transaction tasks with its suppliers and to speedily respond to diverse classes of uncertainties, information of high quality, which refers to accuracy, usefulness and accessibility, has to be electronically shared between a buyer company and its partners [10].

Market-based transactions are simply characterized as discrete contracts that represent relatively short-term and bargaining relationships between highly autonomous buyers and sellers [12]. In traditional market relationships, a minimum amount of information exchange between trading firms is sufficient since the buyer's goal is to fulfill an immediate need at the lowest possible cost. In cases of electronic procurement and electronic partnerships, existing relationships with supplier firms can become more tightly coupled and continue for a longer period than in an electronic market. Thus, to maintain a close connection between a buyer firm and its partners, the amount of information exchanged in electronic procurement and partnerships is usually much more than what is exchanged in an electronic marketplace [5]. However, the amount of information exchanged in an electronic marketplace is a little limited, and thus, a buyer firm seeking frequent and rich information sharing with its partners must choose kinds of B2B EC such as electronic partnerships.

C. Supplier's Power and Types of B2B EC

Power means the capacity to exert one's will over others in order to realize certain intended benefits. When there exist a large number of contactable suppliers, which are almost same in satisfying the requirements of customers, and so, power of suppliers is very weak, customer firms can properly control the transactional relationships with suppliers through simply competitive bidding and not detailed contracts [8]. However, if power of suppliers is relatively strong, the transaction risks (i.e., the relational and performance risks) conceived by customer firms certainly increase. Since the main characteristics of an electronic market include the fact that buyers' dependence on suppliers is very low and buyer firms can easily change their trading partners according to their intentions, the power of suppliers cannot be strong [14]. In electronic procurement, only the vendor that is unilaterally chosen by buyer firms can provide parts or materials that exactly meet the requirements of buyers, and thus, the power of suppliers is relatively weak. Through electronic partnerships, a buyer company can construct strategic partner relationships with its suppliers to exploit their complementary knowledge and capabilities in implementing cooperative projects such as joint new product development and R&D [16].

III. A FRAMEWORK FOR THE CLASSIFICATION OF TYPES OF B2B EC

The types of B2B EC can be identified, decided and selected based on the degrees of information exchange needed between manufacturing firms and their suppliers. Since B2B EC is a means to respond to various kinds of uncertainties and severe competitions through information or knowledge sharing [15], the required or actual amount of information flows between buyers and sellers itself certainly reflects the adoption necessity of a specific kind of B2B EC. Supplier firms' power, which is attributed from their importance, uniqueness, and a buyer's dependence and asset specificity, positively affects the increase of transaction risks in a buyer firm [1], which incurs a large amount of trading costs. In the views of transaction cost economics, since B2B EC is a complex inter-firm control device to lower transaction risks and reduce trading costs, according to the levels of supplier's power, different kinds of B2B EC must be adopted to control transactional relationship with a vendor firm. According to the degrees of inter-firm information flow or main suppliers' power, manufacturing firms may pursue different kinds of B2B EC. Figure 1 shows the framework and the four types of B2B EC strategies: electronic procurement, electronic marketplace, electronic partnerships, and electronic distribution.

Figure 1: A Framework for the Classification of Types of B2B EC

		Suppliers' power	
		Low	High
Information exchange	High	Electronic procurement strategy	Electronic partnerships strategy
	Low	Electronic marketplace strategy	Electronic distribution strategy

IV. RESEARCH METHODS

A. Sample and Data Collection

Data for this study were drawn from a survey of the current status of B2B EC used in Korean manufacturing firms. In total, 500 organizations were randomly selected from a population of about 1,000 firms that are listed on the Korean stock market. The survey was conducted during a 3-month period between October 2016 and January 2017. Table 1 summarizes the sample characteristics according to the industrial type of the firms.

Table 1: Sample Characteristics

Type of industry	Chemical industry	Machine industry	Auto-mobile	Electronic Industry	Textile	Food	Paper & pulp	Non-metal	Metal industry	Rubber	Total
No. of firms	22	17	19	14	5	3	3	8	11	3	105

No. of employees	Below 100	100 - 300	300 - 500	500 - 1,000	1,000 -	Total
No. of firms	17	20	22	17	29	105

B. Measurements

Based on the four items' measures developed by Cheng [6], information exchange was measured on a seven-point Likert-type scale that ranged from 'strongly agree' to 'strongly disagree'. The four items include frequent exchange, always sharing, exchanging all kinds of information, and sharing of proprietary information. The levels of suppliers' power were measured by the three items, which were developed and validated in the studies of Cheng [6]. Respondents answered the extent to which they agree or disagree with each item. A seven-point Likert-type scale was used to measure the degrees of power. The three items are main suppliers' authorities (power) in decisions, transactions, and EC adoption. The degrees of B2B EC adoption represent the usage degrees of the electronic marketplace, procurement, partnerships, and distribution for manufacturing firms to purchase parts or materials from their main suppliers. Based on the measures of Barua et al. [2], the usage degree in each kind of B2B EC was measured by the purchasing ratio of each type of B2B EC (i.e., purchasing volume of each kind of B2B EC for the year 2016 was divided by the total purchasing volume for the year 2016). The four question items, which were developed by Youn et al. [15], were utilized to measure supply-chain performance. The levels of it were measured on a seven-point Likert-type scale, anchored by 'strongly disagree' and 'strongly agree'. The four items include costs and time reductions, and improvement of transaction tasks and response capabilities.

V. DATA ANALYSES AND RESULTS

A. Reliability and Validity

Table 2: Results of Reliability and Validity Test

Items Factor	1	2	3	4	Eigen value	% of variance	Alpha coefficient
Supply-chain performance	0.91	0.95	0.95	0.89	3.5	35.1	0.96
Information exchange	0.73	0.81	0.87	0.79	2.6	26.0	0.82
Suppliers' power	0.92	0.93	-	-	1.8	18.4	0.87

* Factor loadings below 0.4 were not presented.

B. Empirical Evidence of the Four Types of B2B EC Strategies

With a cluster analysis, this study classified sample firms according to the levels of inter-organizational information sharing and suppliers' power. The distance coefficient is presented in table 3. The points at which the distance coefficient suddenly jumps indicate suitable stages in the clustering sequence for analysis. The mean values of variables within each cluster are presented in table 4, along with the Kruskal-Wallis test results (χ^2 values) for each clustering variable. The χ^2 scores indicate that statistical differences exist for the individual variables across clusters. Since in this study, a seven-point Likert-type scale was used for the measurements of inter-organizational information sharing and suppliers' power, the middle score (i.e., four-score) can be employed as the common dividing point with which the levels can be roughly classified into two groups: high and low.

Table 3: Distance Coefficients of Cluster Analysis

Stage	95	96	97	98	99	100	101	102	103	104
Coefficient	32.4	37.8	44.1	52.9	62.0	77.3	109.3	149.0	202.3	306.3
Increasing rate of coefficient	-	16.6%	16.6	19.9	17.2	24.6	41.3	36.3	35.7	51.4
No. of cluster	10	9	8	7	6	5	4	3	2	1

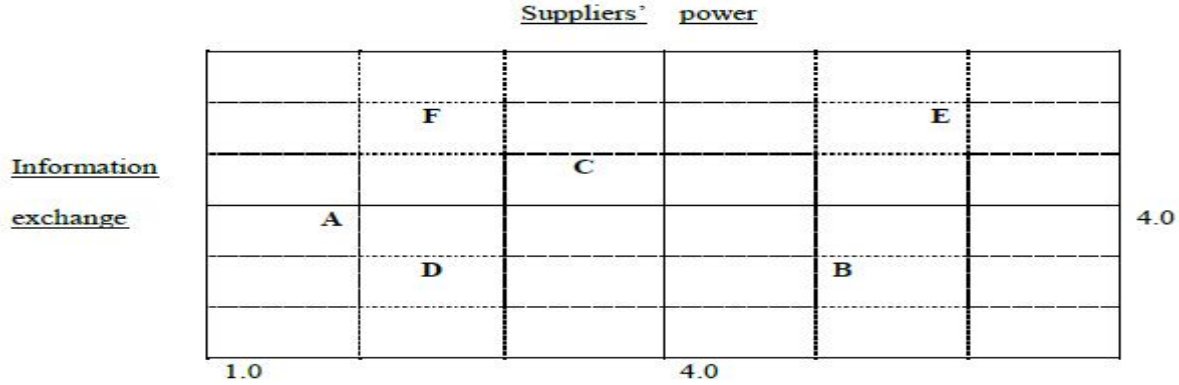
Table 4: Results of Cluster Analysis (Kruskal-Wallis Test)

Items	A(n=23) E-marketplace	B(n=14) E-distribution	C(n=27) E-procurement	D(n=15) E-marketplace	E(n=8) E-partnerships	F(n=18) E-procurement	χ^2
IIE	3.5(4)	2.8(5)	4.1(3)	2.5(6)	5.9(1)	5.2(2)	76.2 [a]
SP	1.9(6)	5.3(2)	3.6(3)	2.5(4)	6.0(1)	2.2(5)	81.8 [a]

· The numbers are mean scores, and the numbers in parentheses are rankings.
· IIE: Inter-organizational information exchange, SP: suppliers' power, a: $p<0.01$.

In the case of cluster E, the mean values of inter-organizational information exchange and sellers' power are higher than the middle point. Thus, cluster E may represent firms that prefer an electronic partnerships strategy. In the case of cluster B, the mean value of inter-organizational information sharing is lower, but that of suppliers' power is higher than the middle score. Accordingly, B shows the manufacturing firms adopting an electronic distribution strategy. However, in the cases of clusters C and F, the mean values of information exchange between buyers and sellers are higher, but those of vendors' power are lower than the middle point. The firms of clusters C and F may prefer and pursue an electronic procurement strategy. In clusters A and D, the mean values of inter-organizational information sharing and suppliers' power are considerably lower than the middle score. Thus, clusters A and D may indicate manufacturing firms adopting an electronic marketplace strategy. Figure 2 shows the location of each cluster on the grid of degrees of information exchange and suppliers' power. These results seem to support the assertion that types of B2B EC strategies adopted by manufacturing firms are generally grouped into the four kinds.

Figure 2: Location of Each Cluster on the Grid (B2B EC Strategies)



CONCLUSION AND DISCUSSION

In this study, based on the degrees of information sharing between buyers and sellers, and the levels of suppliers' power, we suggested a framework that is useful for classifying types of B2B EC strategies in manufacturing firms. According to the framework, four kinds of strategies were proposed and empirically confirmed: the electronic marketplace, procurement, partnerships, and distribution strategies. The framework, constructed in this research, can be utilized in various ways. When a firm wants to introduce B2B EC with suppliers, this framework helps a firm to decide and select an appropriate kind of B2B EC. The framework can also be applied to evaluate whether a proper form of B2B EC has been adopted or not. In addition, the framework can be employed and utilized in future studies. The discordance between the required type of B2B EC and the actually adopted form of B2B EC and the negative affect on supply-chain performance can be empirically examined in future research. With the framework, the kinds of B2B EC can be identified, and the influence factors for the adoption of each types of B2B EC may be investigated.

REFERENCES

[1] Abbeele, F. Roodhooft, and L. Warlop, "The effect of cost Information on buyer-supplier negotiations in different power setting," Accounting, Organizations and Society, vol. 34, pp. 245-266, 2009.

[2] Barua, P. Konana, B. Whinston, and F. Yin, "Driving e-business excellence," Sloan Management Review, vol. 38, pp. 36-44, 2001.

[3] Barua, and D. Mani, "Augmenting conflict resolution with informational response: A holistic view of governance choice in business process outsourcing," Journal of Management Information Systems, vol. 31, pp. 72-105, 2014.

[4] M. Caker, "Intertwined coordination mechanisms in inter-organizational relationships with dominated suppliers," Management Accounting Research, vol. 19, pp. 31-251, 2008.

[5] H. Chang, and H. Wong, "Adoption of e-procurement and participation of e-marketplace on firm performance: trust as a moderator," Information & Management, vol. 47, pp. 262-270, 2010.

[6] J. Cheng, "Inter-organizational relationships and information sharing in supply chains," International Journal of Information Management, vol. 31, pp. 374-384, 2011.

[7] T. K. Das, and B. Teng, "Risk types and inter-firm alliances structures," Journal of Management Studies, vol. 33, pp. 827–43, 1996.

[8] Donada, and C. Nogatchewsky, "Vassal or lord buyers: how to exert management control in asymmetric inter-firm transactional relationships?" Management Accounting Research, vol. 17, pp. 259-287, 2006.

[9] V. Grover, and A. Saeed, "The impact of product, market, \ and relationship characteristics on inter-organizational system integration in manufacturer-supplier dyads," Journal of Management Information Systems, vol. 23, pp. 185-216, 2007.

[10] E. Hartono, X. Li, K. Na, and T. Simpson, "The role of the quality of shared information in inter-organizational systems use," International Journal of Information Management, vol. 30, pp. 399-407, 2010.

[11] N. S. Iyer, R. Germain, and C. Claycomb, "B2B e-commerce supply chain integration and performance: a contingency fit perspective on the role of environment," Information & Management, vol. 46, pp. 313-322, 2009.

[12] S. Ring, and H. Van de Ven, "Structuring cooperative relationships between organizations," Strategic Management Journal, vol. 13, pp. 483-498, 1992.

[13] P. B. Seddon, "Implications for strategic IS research of the resource-based theory of the firm: A reflection," Journal of Strategic Information systems, vol. 23, pp. 257-269, 2014.

[14] E. Tang, Y. Shee, and T. Tang, "A conceptual model for interactive buyer-supplier relationship in electronic commerce," International Journal of Information Management, vol. 21, pp. 49-68, 2001.

[15] S.H. Youn, M. Yang, J. H. Kim, and P. Hong, "Supply-chain information capabilities and performance outcomes: An empirical study of Korean steel suppliers," International Journal of Information Management, vol. 34, pp. 369-380, 2014.

[16] Z. Zhu, J. Zhao, X. Tang, and Y. Zhang, "Leveraging e-business process for business value: A layered structure perspective," Information & Management, vol. 52, pp. 679-691, 2015.

★★★