

The Impact of E-Procurement, Information Sharing, Partner Relationship, and Supply Chain Integration on Supply Chain Performance

Chang, Hsin Hsin, National Cheng Kung University, No.1, University Road, Tainan City
701, Taiwan , +88662757575 ext:53326, easyhhc@mail.ncku.edu.tw

Tsai, Yao Chuan, National Cheng Kung University, No.1, University Road, Tainan City
701, +88662757575 ext:53339, tsaia@mail.ncku.edu.tw

Yeh, Jong Chao, National Cheng Kung University, No.1, University Road, Tainan City
701, +886919274188, opbob.yeh@msa.hinet.net

ABSTRACT

This study investigates the correlation between e-procurement and supply chain performance, which includes important factors of partner relationship, information sharing, and supply chain integration within supply chain system. Initially, it adopts qualitative method to do case studies with three manufacturing firms and revised the original research model and hypotheses based on the results of case studies. Continuously, we used theoretical studies and quantitative analysis to confirm and verify the research model. The results of data analysis show that e-procurement could promote information sharing and supply chain integration. Information sharing has demonstrated the development of partner relationship and support supply chain integration as well as supply chain performance to be an important role in e-procurement system. The partner relationship has variant level of importance across different industries, since price and quality are more important concerns for certain companies. Finally, the most difference between qualitative and quantitative analysis is that supply chain integration is significantly related to supply chain performance in practice.

Keywords: E-procurement, Supply chain performance, Partner relationship, Information sharing, Supply chain integration

Introduction

Since procurement is a very important element in supply chain, in order to understand the concept in more detail, this study is using these factors as constructs to study the effects of e-procurement factors on supply chain performance and aims to discuss the relationship between e-procurement and supply chain performance as well as to investigate the essential roles of partner relationship, information sharing, and supply chain integration played in this system. The purposes of this study are as follows: (1) to identify the most important factors of e-procurement implementing on supply chain performance. (2) To investigate the effects of e-procurement on partner relationship, information sharing, and supply chain integration. (3) To examine the relation between e-procurement system and supply chain performance, in addition to the relations between e-procurement, partner relationship, information sharing, supply chain integration and supply chain performance. The results of finding can contribute to the operations of enterprises in practice.

Literature Review and Research Hypotheses

E-Procurement

According to the studies of Croom (2000), de Boer et al. (2002), Presutti (2003), Kim and Shunk (2004), Albrecht et al. (2005), and Tatsis et al. (2006) on purchasing, e-procurement, and e-marketplace discussed above, which this study defines that “*e-procurement is organization’s procurement using the internet technologies, including e-design, e-sourcing, e-negotiation and e-evaluation*”.

Partner Relationship

Partner relationship is a critical issue for business. This study focused Obligational Contractual Relations (OCR), the relationship orientation may be viewed as philosophy of doing business successfully and as an organizational culture that puts the buyer-supplier relationship at the center of a firm’s strategic and operational thinking (Panayides and So, 2005). Therefore, it can be expected that firms delivered e-procurement system in the supply chain are likely to strengthen partner relationship. Hence, the first hypothesis of this study is: H1: E-procurement is positively related to partner relationship

Information Sharing

The study of Tan, Lyman, and Wisner (2002) showed that information sharing is related to the use of IT, and the term, sharing, includes formal and informal information, communication and determination of customers’ future need, and even participation in sourcing decision. E-procurement has played more and more central role in SCM. Hence, the second hypothesis proposed by this study is:

H2: E-procurement is positively related to information sharing

Supply Chain Integration

Procurement cannot operate in isolation from other elements of the business. Morash and Clinton (1997) and Frohlich and Westbrook (2001) mentioned that supply chain structure is often considered as organizational efforts by three or more firms to manage and integrate materials and related information flows in order to get closer to customers. Its meaning of supply chain structure is consistent with our concept of supply chain integration.

Croom and Johnson (2003) identified five main improvements in the procurement process that e-procurement enabled: supporting managers’ budgetary control, offering robust process performance with fewer failures, offering far greater transparency and accessibility across the whole process for all stakeholders, improving systems reliability, ensuring compliance to process, and improving management information reinforced user compliance. These help us to form the third hypothesis:

H3: E-procurement is positively related to supply chain integration

Inter-organizational information systems can play an important role in supporting the resulting bilateral relationship (Bakos, 1991). Therefore, if firms enhance its information sharing ability, they are likely to strengthen their partner relationship. From the discussion

above, this study formed the fourth hypothesis:

H4: Information sharing is positively related to partner relationship

_Presutti (2003) mentioned that the real-time exchange of information in the e-design stage is crucial because of shrinking product life cycles and reducing time-to-market which is the competitive advantage comes from. As a result, it can be said that firms that enhanced their information sharing ability are likely to improve their supply chain integration. These provided the hypothesis below:

H5: Information sharing is positively related to supply chain integration

Partner relationship plays an important role for integration in a supply chain. Therefore, it can be expected that if firms strengthened their partner relationship, they are likely to improve their supply chain integration. These helped us to form the hypothesis below:

H6: Partner relationship is positively related to supply chain integration

Supply Chain Performance Measurement

There are a lot of arguments about performance measurement, and it has no consistent opinion until now. Presutti (2003) proposed that economic value added (EVA) is a good measure for performance that convinces top management of the efficacy of an e-procurement strategy. In this section, we mentioned that Information sharing is about the information flow, the timeliness of information availability, and the openness and transparency. It will affect performance apparently. Hence, we provided the hypothesis:

H7: Information sharing is positively related to supply chain performance

Many scholars have other more comprehensive thoughts regarding partner relationship and supply chain performance (Sink and Langley ,1997; Lee et al., 1997; Evans and Wurster ,2001; Amit and Zott ,2001; Liker and Choi, 2004). All of these support the hypothesis:

H8: Partner relationship is positively related to supply chain performance

Firms that intend to reap the strategic advantage of their participation in e-marketplaces should be aware that their interaction with other firms requires an integration of various functional areas within an organization and coordination with external participant organizations (Eng, 2004). All of these indicated that firms which improve their supply chain integration are likely to increase their supply chain performance.

H9: Supply chain integration is positively related to supply chain performance

Research Framework and Research Methods

Conceptual Framework

Five primary dimensions in this study, it not only focuses on the relationship between e-procurement and supply chain performance but also specifically discusses five constructs and nine hypotheses.

Methodology

This study conducted both qualitative and quantitative methods to examine these relationships. Questionnaire were measured on 1 to 7 point Likert-type scale, data were analysis through SPSS 10.5. The monolithic model fit and test the hypotheses can be measured through SEM. LISREL was used to check the measurement properties of the constructs.

Case Study

This study adopted case study interviews with relevant members who have a lot of experiences in procurement system before developing the formal questionnaire. By means of the interviews with three firms that implemented e-procurement along the supply chain, we can reveal the information corresponds to our hypotheses, and whether our measurement items can correctly represent the research construct.

Results of case studies, all hypotheses are supported in the case studies, except for H1, H6 and H8. These three hypotheses are partially supported.

Statistical Analysis and Results

Descriptive Analysis

According to the nature of each construct, the unit-of-analysis of the research framework is at the enterprise level; and hence, data were collected by a mail survey based on the list of “The 5,000 Largest Corporations in Taiwan” (China Credit Information Services 2005). Questionnaires along with a prepaid-return envelope were mailed to 700 firms chosen randomly. The resulting sample consisted of 108 usable questionnaires, a response rate of 15.43 %.

Statistical Analysis

A comprehensive instrument validation and reliability procedure were followed to validate the instrument empirically.

Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA)

Based on modified questionnaires, the research used EFA to measure the constructs except e-procurement. All the results correspond to our criteria. Especially, Cronbach’s alpha and item-to-total correlation revealed all variables in our model with high internal consistency and reliability (Cronbach, 1951; Nunnally, 1978; Hair et al., 2006).SEM was used to test construct validity. For the construct of e-procurement which has explicit factors, this study used CFA to test its validity and reliability. The results showed that the composite reliability value (CR) is 0.983 and variance extracted (VE) is 0.75. The criteria of CR value and VE are 0.6 and 0.5 respectively (Fornell and Larcker, 1981). Thus, the construct of e-procurement has higher internal consistence and reliability. Moreover, its convergent validity is higher.

Discriminant Validity

The results of the 108 pair-wise tests of discriminant validity are for SCM practices. All x^2 difference are significant at the $P < 0.05$ level and the difference between constructs are more than 3.84 indicating strong support for the discriminate validity criterion.

Hypotheses Testing

All hypotheses are supported, except for H1, H6 and H9.

Conclusions and Suggestions

Result of Case Study and Data Analysis

According to the statistic results, e-procurement can't enhance partner relationship. The China Steel case showed that partner relationship is not a key factor in steel industry. For them, product quality and price are the most important issues. Therefore, e-procurement in this research does not significantly enhance partner relationship to promote supply chain performance. But partner relationship is, in general, still a very important factor to promote supply chain performance as in many references and the argument of scholars. The analytical results indicated that e-procurement is positively related to information sharing. This study discovered that firms should implement e-procurement systems in supply chain for better communication and performance improving. The value of information and the coordination between partners are also important issues for information sharing.

Managerial Implications

Both case study and our statistic test showed that information sharing played a very important role in e-procurement system and supply chain. E-procurement undoubtedly promotes information sharing and then improves supply chain performance. Information sharing has positive significances with partner relationship, supply chain integration, and supply chain performance. Hence, we must notice that information system or e-procurement system is just a tool, and the most important thing is how to use it. Enterprises adapting information system into business functions, like procurement to achieve performance and benefit, should evaluate the whole environment. How to take advantage of information system to fit the business requirement properly is a key point for business competence.

Research Limitation

E-procurement has been applied to business for many years in foreign enterprises. E-procurement in Taiwan is still in preliminary phase. This study investigated the trend of domestic e-business situation by studying the articles proposed by other famous foreign researchers who have discussed this issue critically. However, prior to fully development and flourishing of e-procurement in Taiwan, the results and applied theories of this study may still have a gap.

Reference

- Albrecht, C.C., Dean, D.L. and Hansen, J.V. (2005) "Marketplace and technology standards for B2B e-commerce: Progress, challenges, and the state of the art," *Information & Management*, 42(6), 865-875
- Amit, R. and Zott, C. (2001), "Value creation in e-business," *Strategic Management Journal*, 22(6/7), 493-520
- Bakos, J.Y. (1991) "A strategic analysis of e-marketplaces," *MIS Quarterly*, 15(3), 295-310
- Cronbach, L. (1951) "Coefficient alpha and the internal structure of tests," *Psychometrika*, 16(3), 297-334
- Croom, S. (2000) "The impact of web-based procurement on the management of operating resources supply," *Journal of Supply Chain Management*, 36(1), 4-13
- Croom, S. and Johnson, R. (2003) "E-service: Enhancing internal customer service through e-procurement," *International Journal of Service Industry Management*, 14(5), 539-555
- de Boer, L., Harink, J. and Heijboer G. (2002) "A conceptual model for assessing the impact of e-procurement," *European Journal of Purchasing and Supply Management*, 8(1), 25-33
- Eng, T.Y. (2004) "The role of e-marketplaces in supply chain management," *Industrial Marketing Management*, 33(2), 97-105
- Evans, P. and Wurster, T.S. (2001), "*Blown to Bits. How the new economics of information transforms strategy*," Harvard Business School Press, Boston
- Fornell, C. and Larcker, D. (1981) "Structural equation models with unobserved variables and measurement error," *Journal of Marketing Research*, 18(3), 39-50
- Frohlich, M.T. and Westbrook, R. (2001) "Arcs of integration: An international study of supply chain strategies," *Journal of Operations Management*, 19(2), 185-200
- Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E. and Tatham, R.L. (2006), *Multivariate Data Analysis sixth edition*, Prentice Hall.
- Kim, J.I. and Shunk, D.L. (2004) "Matching indirect procurement process with different B2B e-procurement systems," *Computers in Industry*, 53(2), 153-164
- Lee, H.L., Padmanabhan, V., and Whang, S., (1997) "Information distortion in a supply chain: The bullwhip," *Management Science*, 43(4), 546-558
- Liker, J.K. and Choi, T.Y. (2004) "Building deep supplier relationships," *Harvard Business Review*, 82(12), 104-113
- Morash, E.A. and Clinton, S.R., (1997) "The role of transportation capabilities in international SCM," *Transportation Journal*, 36(3), 5-17
- Nunnally, J., (1978), *Psychometric Theory*, NY: McGraw-Hill
- Panayides, P.M. and So, M. (2005) "Logistics service provider-client relationships," *Transportation Research Part E*, 41(3), 179-200
- Presutti Jr., W.D. (2003) "Supply management and e-procurement: Creating value added in the supply chain," *Industrial Marketing Management*, 32(3), 219-226
- Sink, H.L. and Langley Jr., C.J. (1997) "A managerial framework for the acquisition of third-party logistics services," *Journal of Business Logistics*, 18 (2), 163-187
- Tan, K.C., Lyman, S.B., and Wisner, J.D. (2002) "Supply chain management: A strategic perspective," *International Journal of Operations and Production Management*, 22(6), 614-631
- Tatsis, V., Mena, C., Van Wassenhove, L., and Whicker, L. (2006) "E-procurement in the Greek food and drink industry," *Journal of Purchasing and Supply management*, 12(2), 63-74.