AN EMPIRICAL INVESTIGATION OF THE IMPACT OF CORPORATE STRATEGY AND EXISTING BUYER-SUPPLIER RELATIONSHIPS ON THE USE OF ELECTRONIC PROCUREMENT APPLICATIONS IN US-BASED FIRMS

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Abstract: Given the emerging nature of e-procurement, additional empirical research is necessary to understand the antecedents of its use. Therefore, the purpose of this study is to empirically test the relationship between the firm's corporate strategy as well as the strategic importance of the existing buyer-supplier relationship and the use of nine different e-procurement applications. A total of 128 purchasing/supply management professionals completed the self-administered survey. The data revealed a positive, significant relationship between the firms' use of a low-cost corporate strategy and e-procurement applications which are considered market mechanisms. The data revealed a negative, significant relationship between the firms' use of a low-cost corporate strategy and e-procurement applications that are considered coordination flows. The data did not support a significant relationship between the strategic importance of the existing buyer-supplier relationship and use of the various e-procurement applications.

1 INTRODUCTION

The use of e-business has undeniably changed the way that organizations across all industries conduct business. Increasing numbers of purchasing/supply management decision-makers have adopted various electronic procurement (e-procurement) applications in an attempt to achieve the proposed benefits of lower purchase prices, enhanced productivity, and increased efficiency. Presutti (2003, p. 221) defined e-procurement as "a technology solution that facilitates corporate buying using the Internet." Min and Galle (2002, p. 227) advanced a more detailed conceptualization of e-procurement and defined it as "business-to-business purchasing practice that utilizes electronic commerce to identify potential sources of supply, to purchase goods and services, to transfer payment, and to interact with suppliers".

Many different types of e-procurement applications exist and firms employ them for diverse purposes. Given the variety of e-procurement applications, several researchers have developed topologies to classify them. For example de Boer, et al. (2001) identified the following six e-procurement applications: e-sourcing (identifying new potential suppliers), e-tendering (supplier contact such as request for price), e-informing (obtaining information about suppliers), e-reverse auctions (purchasing goods/services based on a bidding process), and e-MRO/Web-based ERP (order creation, placement, and receipt). Knudsen (2003) identified e-collaboration (synchronization between buyer and supplier through data sharing) as an additional category of e-procurement. Additional researchers who established taxonomies for e-procurement applications include Wang, et al. (2004); García-Dastugue and Lambert (2003); Frohlich and Westbrook (2002); Kehoe and Boughton (2001); and Whitaker, et al. (2001).

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2 PROBLEM STATEMENT AND PURPOSE

Given the wide variety of e-procurement applications available to purchasing/supply management organizations, how does the firm decide which is/are appropriate for their purposes? Over the years, researchers have explored the factors that impact adoption decisions and e-procurement is no exception. Previous researchers have examined the role of firm size (Pearcy and Giunipero 2007), degree of centralization (Moon 2005), competitive environment (Wu, et al. 2003), and the firm's technical capabilities (Zahay and Handfield 2004) in the adoption of e-procurement. However, much still remains undiscovered about the empirical relationship between corporate strategy, buyer-supplier relationships and the adoption of specific e-procurement applications.

The purpose of this study is to answer two major research questions: 1) What is the relationship between corporate strategy and the adoption of 9 different e-procurement applications? 2) What is the relationship between the strategic importance of the existing buyer-supplier relationship and these nine different e-procurement applications?

Understanding the role of corporate strategy in the adoption of e-procurement applications is important because less-than optimal outcomes can result if a firm adopts a specific e-procurement application without regard to its consistency with corporate strategy (Porter 2000). A significant stream of literature exists that supports the notion that the firm's purchasing strategies and activities must be consistent with overall corporate strategy (e.g., Narasimhan and Carter; 1998; Landeros and Monczka 1989; Andrews 1971). However, there is a lack of empirical research that specifically examines this relationship in the realm of e-procurement.

It is also important to develop a better understanding of the role of existing buyer-supplier relationships in the adoption of e-procurement applications. Given the time, effort, and resources required to develop and maintain successful cooperative buyer-supplier relationships, empirical evidence about how these relationships impact the firm's processes and activities is critical. Increasingly, cooperative buyer-supplier relationships are viewed as an asset to the firm (Johnson 1999). If a buyer-supplier relationship is strategically vital to the firm, it is important for managers to ascertain which e-procurement application(s) will best support the maintenance and growth of the relationship. Conversely, if a firm engages in arms-length transactions with its suppliers, mangers must implement e-procurement applications that facilitate the most important aspect of these business interactions, namely price.

This study contributes to an emerging stream of academic research regarding e-procurement use by examining two potentially vital antecedents in the use of nine different e-procurement applications across 33 different industries. Purchasing/supply managers can benefit from this research by improving their corporate alignment. They can provide improved support of the overall corporate strategy, through the selection and use of e-procurement applications that support the desired strategy.

In order to examine this topic, a review of the existing literature and the research hypotheses are presented. This is followed by a description of the research methodology and presentation of the results. The paper concludes with a discussion of the findings, managerial implications, and limitations.

3 LITERATURE REVIEW AND DEVELOPMENT OF THE HYPOTHESES

3.1 Types of E-procurement Applications

García-Dastugue and Lambert (2003) established a framework to assist managers in the process of selecting e-procurement applications that fit their business situation or circumstances. This framework was then applied to the use of seven Internet-based technologies that were grouped in two categories. The two categories identified were *market mechanisms* and *coordination flows*.

According to García-Dastugue and Lambert (2003), when firms use market mechanisms, the goal is to engage in a transactional business interaction with suppliers where the primary focus is making a purchase at a certain price. Therefore, market mechanisms are suitable for firms looking to promote price competition among potential suppliers. Market mechanisms also involve limited information sharing between the buyer and supplier and are often restricted to basic information such conditions of the transaction, delivery, and payment (García-Dastugue and Lambert 2003). The authors classified another group of e-procurement applications as *coordination flows*. In contrast to market mechanisms, firms use coordination flows to facilitate ongoing relationships

rather than make purchase decisions based on price. García-Dastugue and Lambert (2003) further stated that coordination flows allow firms to share information which will ensure the uninterrupted flow of products (e.g., production planning or product development).

3.2 The Relationship between Corporate Strategy and Use of E-procurement Applications

While the academic literature identifies a number of different theories of corporate strategy (e.g., Thompson and Strickland 1995; Miles and Snow 1978), Porter's (1980) theoretical framework was used in this study. Porter (1980) suggested that corporate strategy refers to the planning and implementation of measures that firms use to ensure that the policies and actions of functional departments are coordinated and directed at some common set of goals. Porter's theory of corporate strategy was selected because it has been widely accepted by academicians, and has been successfully applied across a wide variety of industries and countries (Campbell-Hunt 2000, Govindarajan 1988). Porter (1980) developed a theory which maintains that in an attempt to secure competitive advantage, firms have the option of employing three broad types of strategies - cost reduction, differentiation, or focus. Cost reduction was selected for this research because Porter regarded it as the clearest of them all (Porter, 1998, p. 12).

When a firm assumes an overall cost leadership strategy, it implements a number of policies, procedures, tactics and activities directed toward achieving this objective (Porter 1980). Astute decision-makers recognize that the firm's tactics and activities must be consistent with the firm's overall corporate strategy. The fit between the firm's strategy and its activities or tactics is not a recent concern in the literature. Andrews (1971) asserted that a functionally motivated practice that seems to have merit when considered individually might fail to produce the desired outcomes because of its mismatch with the firm's overall strategic orientation. Monczka and Trent (1991) and Narasimhan and Carter (1998) support the notion that the firm's purchasing/supply management tactics/activities should emanate from its corporate strategy. The work of Smeltzer and Ruzicka (2000) and Knudsen (2003) extend this premise and find that a firm's selection and use various e-procurement applications should come as a result of a thorough understanding of how their use fits into the firm's corporate strategy.

Based on previous research, which suggests that purchasing activities, including the use of e-procurement applications is impacted by corporate strategy, the following is hypothesized:

H1: A positive, significant relationship will exist between the use of a low-cost corporate strategy and the use e-procurement applications that are classified as market mechanisms.

H2: A negative, significant relationship will exist between the use of a low-cost corporate strategy and the use of e-procurement applications that are classified as coordination flows.

3.3 Strategic Importance of the Existing Buyer-Supplier Relationship

Starting nearly two decades ago, increasing numbers of buying firms opted to move toward longer-term, cooperative relationships with their suppliers in an attempt to improve business outcomes (Kalwani, and Narayandas 1995). Some researchers take a broader view of long-term, cooperative relationships and assert that they not only provide benefits to each party, but they also consider these relationships as strategic assets (e.g., Webster 1992; Achrol 1991; Thorelli 1986).

When the firm's competitive position is contingent upon the joint capabilities and resources of its partner (i.e., the relationship is strategically important [see Johnson 1999]), it is expected that the buying firm will seek to engage in activities which preserve/advance the relationship. Under this circumstance, the supplier has already been selected and the use of e-procurement is directed toward maintaining the long-term relationship and sharing information that will ensure the uninterrupted flow of goods, rather than on reducing the purchase price. Therefore, the following is hypothesized:

H3: A negative, significant relationship will exist between the relative strategic importance of the existing buyer-supplier relationship and the use of e-procurement applications that are classified as market mechanisms**.**

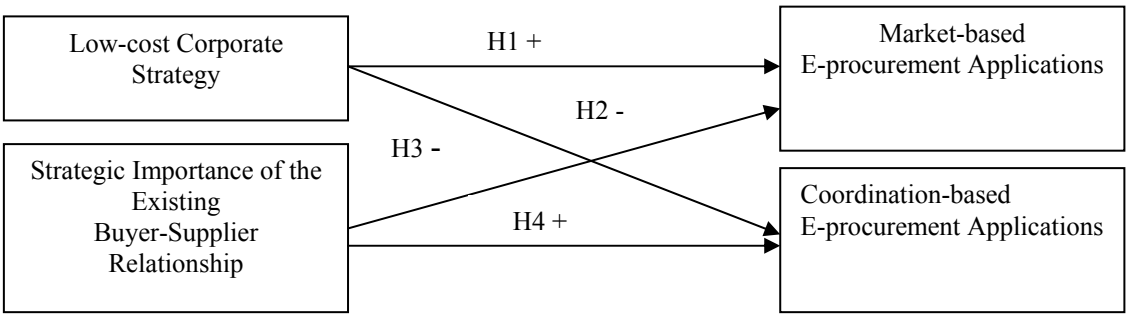

Figure 1: The Research Model.

H4: A positive, significant relationship will exist between the relative strategic importance of the existing buyer-supplier relationship and the use of e-procurement applications that are classified as coordination flows.

4 METHODOLOGY

4.1 The Instrument

The "low-cost corporate strategy" construct was measured using a scale developed by Zahra and Covin (1993). The 4-item scale was anchored in reference to the firm's key competitors, which, according to Zahra and Covin (1993) is appropriate because it recognizes the fact that strategy is a comparative term. The elements of corporate strategy that were assessed included: operating efficiency, efficiency in securing raw materials, capacity utilization, efficiency of the distribution channel, and reduction of production cost. Each item was measured on a 5-point Likert scale ranging from 1 = "much less than your competitors" to 5 = "much more than your competitors".

"Strategic importance of the existing buyer-supplier relationship" was measured using three (after scale purification) of the six items identified by Johnson's (1999) study. Survey participants were asked to respond to the following items regarding their decision to utilize a popular e-procurement application with suppliers: "It is very important for our organization to maintain relationships with these suppliers", "When developing our firm's strategy, we consider these suppliers as a large part of the picture"; "Our firm's long-term strategy depends on maintaining a good, healthy relationship with these suppliers". Each item was measured on a 5-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree.

The set of items used to assess "use of electronic-procurement applications" was developed by the researchers. Respondents were asked to respond to the following: "We use Internet-based technologies to:"…This statement was followed by a list of e-procurement applications. The respondents assessed each item on a 5-point Likert scale from 1 = strongly disagree to 5 = strongly agree. The e-procurement applications were identified by an extensive review of the trade and academic literatures and numerous in-depth case studies of firms operating in widely diverse industries as reported by Antonette, et al. (2002). Table I contains a list of the e-procurement applications assessed in the study.

In order to maximize the comprehensiveness of the questionnaire, it was pre-tested on a group of supply management professionals and academicians. Minor changes were made based on their recommendations prior to mailing.

4.2 Survey Participants and Questionnaire Mailing

The Institute for Supply Management (ISM), an organization composed of supply chain management professionals and academicians in the United States, provided the list of potential study participants. The sampling frame of 15,000 potential survey participants consisted of all members employed with firms in the following eleven industries: food products, paper products, chemicals, petroleum, rubber, primary metals, transportation equipment, fabricated metals, computer equipment, measuring and analyzing instruments, and electrical equipment.

The data, which were analyzed in the present study, were collected as part of a larger investigation of on-line reverse auction implementation. Therefore it was necessary to identify and select firms from the sampling frame that used the technology. The researchers identified 1,025 potential survey participants. A survey, cover letter,

and postage paid envelope were mailed to each of the potential participants and a follow-up postcard followed two weeks later in an attempt to increase the response rate.

5 RESULTS

5.1 Response Rate and Sample Demographics

A total of 128 useable surveys were received. This resulted in a 12.5% response rate. The respondents were experienced in the purchasing/supply management profession, with an average of nearly 12 years of experience. Thirty-three different industries were reported including petroleum/gas, transportation, telecommunications, pharmaceuticals, industrial equipment, and metals/mining were represented to name a few. The three most commonly reported lines of business were manufacturing (26%), food (12%) and auto parts (11%). The respondents held a variety of positions, with purchasing manager being the most common (18.8%), followed by senior buyer (20%) and director of e-business (19%). Annual revenues for the respondents' business unit also varied widely, ranging from $US4.5 million to $US45 billion, with a mean of $US5.49 billion. The dollar amount of purchases for which the respondents' were responsible ranged from $1US million to $US17 billion, with a mean of $US57 million.

5.2 Reliability Analysis

Each scale was subjected to a reliability analysis using Churchill's (1979) paradigm for scale development. Both the "low-cost corporate strategy" scale and the "relative strategic importance of the existing buyer-supplier relationship" scale were found to be reliable, with coefficient alphas of .79 and .86 respectively. The reliability of the "e-procurement applications" scale is discussed in a subsequent section.

5.3 Hypothesis Tests

The first step in testing the research hypotheses was to classify the e-procurement applications as market mechanisms or coordination flows. This was accomplished through the use of exploratory factor analysis (EFA) on the 12 e-procurement application items included on the survey. The EFA (rotated solution) on the 12-items revealed three factors, which was not theoretically supported. The first factor was comprised of 5 items with factor loadings ranging from .59 to .84. The second factor was comprised of 4 items with factor loadings ranging from .61 to .86. The third factor was comprised of only two items, "we use the Internet to access e-marketplaces" and "we use the software services of an e-purchasing solution provider". These items had factor loadings of .90 and .66 respectively. Using Tabachnick and Fidell (1996) as a guide in handling two-item factors, correlations were examined. The correlation between the two items did not exceed .7 (r = .44), nor were they relatively uncorrelated with the other items. Consequently, both items were deleted. One additional item, "we use Internet-based technologies to check suppliers' financial status" failed to load on any factor and was therefore deleted according to Comrey and Lee's (1992) rule-of-thumb.

The nine-item scale was then subjected to a reliability analysis. The resulting coefficient alpha was .70, with no possibility for improvement by deleting items. A confirmatory factor analysis (CFA) was performed on the scale. The rotated solution revealed two factors. The first factor was composed of four items and the factor loadings ranged from .64 to .88. The second factor was composed of five items and had factor loadings ranging from .62 to .85. The factors explained 58.7% of the variance in the data.

The two factors were then labeled according to the classification scheme of García-Dastugue and Lambert (2003). The first factor was composed of transactional, price-driven types of e-procurement applications (e.g., "search for low-cost sources of supply", "place orders on suppliers' websites"). This factor was labeled "*market mechanisms*". The second factor, which included e-procurement applications such as "plan and schedule production" and "collaborate with suppliers on product/service design issues", was labeled "*coordination flows*".

The researchers tested for discriminant validity in order to establish whether each set of items could be considered a distinct scale. The items exhibited significant correlations within each scale (ranging from .27 to .69) and were uncorrelated across scales, confirming discriminant validity. Both scales were also found to be reliable. Cronbach's alpha for the "market mechanism" scale was .77; it was .80 for "coordination flows" (see Table 1).

Table 1: Factor Analysis.

We use Internet-based Technologies to:	Factor	
	1 Market mechanisms	2 Coordination flows
Develop an integrated supply chain	.22	.70
Plan and schedule production	.08	.74
Collaborate with suppliers on product design issues	-.09	.85
Achieve cross-functional coordination	-.05	.83
Search for suppliers that will help us differentiate our products/services	-.15	.62
Search for low-cost suppliers	.64	-.07
Visit suppliers' websites	.83	-.02
Access on-line catalogs	.88	.07
Place orders on suppliers' web sites	.70	.02

Extraction method: Principle Component Analysis
Rotation Method: Varimax with Kaiser Normalization

The second step in testing the research hypotheses was the use of simple linear regression. The data provides support for H1. A positive, significant relationship exists between the use of a low-cost corporate strategy and the use of market mechanisms ($p<.0001$, adjusted $R^2 = .09$, $\beta = .42$). The data also provides support for H2. A negative, significant relationship exists between the use of a low-cost corporate strategy and the use of coordination flows ($p = .02$, adjusted $R^2 = .03$, $\beta = -.27$). Neither H3 nor H4 were supported by the data. Simple linear regression did not reveal a significant relationship (at $\alpha = .05$) between the relative strategic importance of the existing buyer-supplier relationship and the use of market mechanisms ($p = .12$) or coordination flows ($p = .95$).

6 DISCUSSION AND MANAGERIAL IMPLICATIONS

Firms in this study exhibit alignment between a low-cost corporate strategy and the use of market based e-procurement applications. Clearly, the respondents recognize the advantages of using these applications to drive lower price, thereby supporting a low-cost corporate strategy. While obtaining lower purchase prices is desirable, the knowledge component is also valuable.

For example, supply management professionals have the ability to visit web sites and access to on-line catalogs that permit quick comparison of prices.

An often overlooked benefit of e-procurement applications is the streamlining of the buying process and the lowering of the transactional costs associated with doing business. Placing orders electronically, via a seller's website or through a buyer's portal saves significant amounts in transaction costs. One source finds that the traditional purchase order cost $125-150 dollars per order. Switching to an e-procurement application reduces this price to less than $US25 per order (Antonette, et al. 2002)

Interestingly, no relationship was found between the strategic importance of the existing buyer-supplier relationship and the use of e-procurement applications. This implies that the firms in this sample chose to use both types of e-procurement applications with those suppliers who they perceived as being strategically important. Despite the fact that a supplier is perceived as being strategically important, this does not lower the competitive expectations of the purchasing/supply manager. The difference is that firms were also willing to use cooperative e-procurement applications with these strategic suppliers. These coordination-based e-procurement applications allowed increased coordinated efforts between the parties. The overall view implied here is that the strategically important supplier must be competitive and that the use of coordination flow applications will assist in streamlining that particular supplier's operations to assist with improvements in their operating efficiencies.

7 LIMITATIONS

The study was strictly limited to US-based supply managers and perhaps there are differences internationally. The sample was taken from SIC codes that were manufacturing-oriented. Purchasing professionals in the ISM tend to be oriented toward the manufacturing sector which is undergoing significant price pressures due to globalization. These pressures coupled with the huge impact of low-cost countries have driven many manufacturing firms to a low-cost strategy in order to survive and

compete. Perhaps, a more service-oriented sample would provide different results.

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