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Effect of purchase volume flexibility and purchase mix flexibility on e-procurement performance: An analysis of two perspectives

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ABSTRACT

Despite the widespread adoption of e-procurement by firms in recent years, academic research examining the mechanisms through which e-procurement applications lead to performance has been scarce. Anecdotal evidence points to numerous situations where companies have failed to harness the potential of e-procurement. In this paper, we argue that online *purchase volume* and *mix flexibilities* facilitated by these applications play a significant role in the ability of firms to benefit from e-procurement. We examine this tenet from both an *economic* as well as a *social* perspective. We propose that increased online purchase volume flexibility as well as online purchase mix flexibility can be facilitated by two mechanisms – supplier customization as explained by transaction costs perspective, and information sharing between supply chain partners using a social exchange theoretical perspective. The increased purchase volume and mix flexibility in turn leads to better performance along the dimensions of cost, quality, and delivery. We present and test a nuanced perspective where we argue that (i) the effect of supplier customization on both purchase volume and mix flexibilities will be moderated by the frequency of transactions conducted online, and (ii) the effect of information sharing on both purchase volume and mix flexibilities will be moderated by trust in the supplier. We estimate our research model using survey data collected from 130 purchasing and procurement managers. We find strong support for our proposed research model with results indicating that purchase volume and mix flexibilities play a vital mediating role in impacting e-procurement performance. Theoretical and practical implications of the findings are discussed.

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1. Introduction

The procurement function is considered the focal point of effective strategic supply chain management in contemporary organizations (Talluri and Sarkis, 2002). Advances in information technology (IT) have enabled firms to streamline the procurement process and value-chain activities to achieve substantial economic benefits (Devaraj et al., 2007; Gosain et al., 2005; Hill and Scudder, 2002). In particular, e-procurement – the automation of a firm's procurement process – is becoming increasingly recognized for its potential to improve business operations and reduce expenses. While a number of firms have been able to leverage e-procurement applications to lower costs and increase overall profitability, others have grappled with the intricacies of these technologies and the mechanisms through which they can impact procurement practices and economic benefits (Olson and Boyer, 2003). In this

paper, our focus is to examine how e-procurement influences purchase volume flexibility and purchase mix flexibility in relation to the traditional purchasing context, and how such flexibilities impact e-procurement performance. The key roles played by e-procurement applications in enabling firms to enhance purchase volume and mix flexibilities, and the consequent impact of such enhancements, have been largely ignored in the existing literature.

In general, flexibility in business processes has become increasingly important for firms to respond efficiently to evolving customer requirements, intense global competition, and rapid technological advancements (Sambamurthy et al., 2003; Swafford et al., 2006). Thus, flexibility has been a topic of intense interest among operations management (OM) researchers (De Groot, 1994; Gerwin, 1993; Jordan and Graves, 1995; Koste and Malhotra, 1999; Suarez et al., 1996). However, prior research has focused predominantly on examining the different dimensions of manufacturing flexibility, the relationship between these dimensions, and the impact of these dimensions of flexibility on performance (Cao and Dowlatshahi, 2005). Flexibility in other business processes and the role that information technology can play in obtaining flexibility has not been investigated in detail in extant literature.

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We conceptualize purchase volume and purchase mix flexibilities as the ability of a firm to modify the mix and volume of input goods dynamically using e-procurement with little penalty in time and effort. We draw upon Duclos et al. (2003), who suggest that flexibility allows managers to change product mix and volume, relatively quickly and without much struggle. Grounding our research in the theoretical perspectives of transactions costs economics (TCE) and social exchange theory (SET), we propose that purchase volume and mix flexibilities in e-procurement can be facilitated by two major factors – information sharing and supplier customization. We further propose that two theoretically-grounded important contextual factors – trust and frequency – accentuate the relationships between purchase volume and mix flexibilities and their antecedents. This study provides a hitherto unexplored perspective on purchase volume flexibility and purchase mix flexibility facilitated by e-procurement and the antecedents that facilitate them.

The enhanced purchase volume and mix flexibilities engendered by e-procurement applications can also have substantial impacts on procurement process performance. While the prior literature in manufacturing strategy suggests that cost, quality, delivery, and flexibility are main competitive priorities and performance metrics, we suggest that flexibility may play a much more important role in e-procurement than has been acknowledged in the prior research. Our proposition is that other metrics – cost, quality and delivery – are driven by online volume and mix flexibilities in the context of procurement. While there is precedence in the literature of researchers analyzing firm performance based on flexibility (Devaraj et al., 2007; Jack and Raturi, 2002; Kekre and Srinivasan, 1990; Suarez et al., 1996; Vickery et al., 1999), to the best of our knowledge, this is one of the first studies in OM that theorizes the role played by online purchase volume flexibility and online purchase mix flexibility in the context of e-procurement and empirically validates it. Prior studies have examined the role of quality on e-procurement satisfaction (Vaidyanathan and Devaraj, 2008), buyer-side competence in B2B commerce (Rosenzweig and Roth, 2007), and organizational collaboration (Sanders, 2007). However, our focus is on online purchase volume and mix flexibilities, and furthermore we propose that the use of flexible purchase processes facilitated by e-procurement can enable organizations to cope with changes in the marketplace to respond proactively to the contingencies presented by uncertain business environments. Such flexibility in procurement process may result in significant performance benefits along cost, quality and responsiveness dimensions. We test our research model with survey data collected from 130 purchasing and procurement managers from various industries. Results obtained from employing structural equation modeling provide strong support for our research model.

This paper makes four key contributions to the existing literature. First, we investigate the role of volume and mix flexibilities in e-procurement, which has been not been studied extensively in the existing literature. In fact, scholars have issued several research calls for a fine-grained understanding of purchase volume and mix flexibilities (Duclos et al., 2003). This study responds to such calls. Our research model provides a nuanced understanding of the key roles played by purchase volume and mix flexibilities on e-procurement performance and the facilitating conditions that enable firms to leverage these flexibilities in the context of e-procurement. We demonstrate that purchase volume and mix flexibilities can indeed impact other business process performance metrics such as cost, quality, and delivery. Second, given that organizational understanding of successful e-procurement use, the mechanisms through which e-procurement use impacts business processes, and the implications of such use are still lacking in the literature (Bradley, 2005; Vaidyanathan and Devaraj, 2008) we propose that e-procurement can be used as a means for firms to gain

flexibility. To the best of our knowledge, the flexibility aspect of e-procurement has been largely ignored in the existing literature. This study provides a potential new direction for the examination of e-procurement applications in firms. Third, we provide support for and extend the literature that suggests that the use of information systems can enhance the flexibility and agility of firms and enable them to respond to market signals with ease (Sambamurthy et al., 2003). Finally, by drawing on TCE and SET, this paper proposes, and finds empirical support for, two key enablers of purchase volume and mix flexibilities, as also moderators that impact the inter-relationship between them.

The rest of the paper is organized as follows. We present the theoretical background along with the hypotheses in the next section. In Section 3, we present the details of our empirical approach, and discuss the adequacy of the measures used in the study. The results of our analyses and findings of our study are discussed in Section 4. Finally, in Section 5, we discuss the limitations and implications of this study, and suggest areas of further research.

2. Theory and hypotheses development

We first present our research model (in Fig. 1) as a roadmap, following which we discuss the theoretical underpinnings of the model. As illustrated in Fig. 1, we suggest that online purchase volume and mix flexibilities are key constructs that determine the performance of the e-procurement process in organizations. Drawing on two different theoretical perspectives, we propose that online purchase volume flexibility and online purchase mix flexibility can have two key antecedents. According to TCE, asset specificity is a key driver of transaction costs and the relationship between supply chain partners. Asset specificity has emerged as a reliable and consistent predictor of inter-organizational relationships and sourcing decisions (Poppo and Zenger, 1998). Asset specificity is related to alternative uses of the asset involved in the transaction, and it is measured by the lack of standardization. In our context, asset specificity is operationalized as supplier customization. The extent to which a supplier has customized its assets, processes and tools to meet a buyer's requirements is a significant indicator of its commitment to meet the idiosyncratic requirements of the buyer, and is a key economic factor that may impact online purchase volume and mix flexibilities.

According to SET, pure economic factors are insufficient to explain inter-organizational relationships, and social factors inform why firms engage in extensive coordination in the interests of maintaining long term relationships. In our context, we have conceptualized information sharing as the key social factor that may influence online purchase volume and mix flexibilities. Scholars have acknowledged communication as an essential factor in e-procurement and suggested that product customization and information sharing constitute key characteristics in e-procurement processes (Chen et al., 2004; Doney and Cannon, 1997; Muffato and Payaro, 2004; Subramani, 2004). Doney and Cannon (1997) argue that supplier customization, and confidential information sharing are among the two most important characteristics in inter-organizational relationships and the coordination of activities.

This paper has also conceptualized two moderating variables grounded in TCE and SET – frequency of transactions and trust – that are likely to impact the direct relationships between supplier customization and purchase volume and mix flexibilities and between information sharing and purchase volume and mix flexibilities respectively. The dependent constructs of interest in our model are cost, quality, and responsiveness obtained through online purchasing in comparison to traditional modes of purchasing. We discuss specific hypotheses related to buyer-supplier characteristics,

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