

Assimilation patterns in the use of electronic procurement innovations: A cluster analysis

Arun Rai ^{a,*}, Xinlin Tang ^{b,1}, Paul Brown ^{c,2}, Mark Keil ^{d,3}

^a Department of Computer Information Systems, Center for Process Innovation, Robinson College of Business, Electronic Commerce Institute, Georgia State University, 35 Broad Street, Atlanta, GA 30303, USA

^b Center for Process Innovation; Robinson College of Business, Georgia State University, Atlanta, GA 30303, USA

^c Clark Atlanta University, Atlanta, GA 30314, USA

^d Department of Computer Information Systems, J. Mack Robinson College of Business, Georgia State University, Atlanta, GA 30303, USA

Accepted 28 August 2005

Available online 24 October 2005

Abstract

Electronic procurement innovations (EPI) have been adopted by many firms as a means of improving their procurement efficiency and effectiveness, but little research has been conducted to determine whether the assimilation of EPI really increases procurement productivity and which factors influence its assimilation. Drawing on data from 166 firms, we conducted an exploratory study to address these questions, using cluster analysis that revealed four different clusters or patterns of EPI assimilation: none, focused niche, asymmetric, and broad-based deployment. The level of EPI assimilation was closely related to procurement productivity. Greater levels of EPI assimilation were associated with higher levels of top management support and greater IT sophistication. Also, interesting patterns emerged between the various elements of EPI infrastructure capability, specifically flexibility and comprehensiveness of standards, EPI security, and the level of EPI assimilation.

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Keywords: Electronic procurement innovations (EPI); Procurement productivity; Cluster analysis

1. Introduction

As companies strive to provide more value to customer by improving site performance and reducing costs, they are also turning their attention to the

procurement process [34]. This process, which serves as the interface between an organization and its suppliers, used to be viewed as having little strategic importance [39,44,56]. Many purchasing departments were viewed as merely “buying” or “shipping” units. In addition, their function was inefficient [47], e.g., nearly 95% of the non-production goods, which account for a third or more of a corporation’s expenditures, are still acquired using paper-based processes [18]. The lack of efficiency is so bad that many companies spend far more on managing the procurement cycle than on the goods actually purchased [6]; e.g., on average it costs \$ 107 to process a paper-based purchase order with an average cycle time of 7.3 days from order to fulfillment [10].

* Corresponding author. Tel.: +1 404 651 4011; fax: +1 404 463 9292.

E-mail addresses: arunrai@gsu.edu (A. Rai), xinlin.tang@eci.gsu.edu (X. Tang), pbrown@cau.edu (P. Brown), mkeil@gsu.edu (M. Keil).

¹ Tel.: +1 404 463 9309; fax: +1 404 463 9292.

² Tel.: +1 404 880 8154.

³ Tel.: +1 404 651 3830; fax: +1 404 651 3842.

IT provides a means to improve the procurement process by providing a digital infrastructure for collaboration [51]. General Electric (GE) in the USA is a company which is realizing benefits by using the Internet. Its trading process network (TPN) is an online business community that allows it to transact over \$ 1 billion worth of business with more than 1400 suppliers around the world. TPN simplifies the old time-consuming contract bidding and award processes. Unlike industry giants, most companies are using off-the-shelf solutions to facilitate their procurement process. Electronic procurement tools are targeted at procurement related activities that enable organizations to integrate processes with suppliers and yield benefits for participants in the value chain [11,13].

Benefits associated with investment in electronic procurement tools are supposed to include increased information visibility and reduced search time. However, these possible benefits cannot guarantee performance gains: a link should be established between technology adoption for different facets of the procurement process, how these facets are facilitated by technology, and performance improvement.

Since there has been no prior research on the usage patterns of EPIs across buyer organizations, we decided to conduct a survey to discover distinct usage patterns and investigate their relationship to procurement productivity and its technical and managerial enablers. Towards this end, we addressed the following three questions:

(1) What distinct EPI usage patterns can be observed by examining different levels of EPI assimilation across key EPI innovations?

(2) How do different EPI usage patterns relate to procurement productivity?

(3) How do IT-enabled process innovation enablers, specifically top management support, IT sophistication, and EPI infrastructure, influence EPI assimilation?

2. Electronic procurement innovation

To improve the procurement process, many organizations have started to use electronic procurement innovations (EPIs); these, when acquired and deployed, change how an organization conducts procurement. Core procurement processes include supplier selection, order placement, order fulfillment, and payment and settlement [57]. Each of these processes is supported through EPIs that have been developed for reverse auctions, catalog management, order fulfillment, and payment and settlement [29]. Table 1 provides the definitions for each of these four EPIs.

Traditionally, if a buyer needed some specific product or service, he or she had to investigate, qualify, and negotiate with several potential suppliers before selecting one. To facilitate this process, the *online reverse auction* was introduced to enable temporal and geographical convenience, reduced cost of contact, instant feedback, and privacy. In electronic reverse auctions, a buyer offers a tender to invited suppliers who bid for the contract at the lowest price, usually in a short time span (hours or minutes). By putting these auctions online, buyers can streamline the process. This creates

Table 1
Definition of electronic procurement innovations

Major procurement processes	Electronic procurement innovations	Definition
Supplier selection	Electronic reverse auctions (ERA)	Reverse auctions are the reverse of traditional auctions in which the seller accepts bids from potential buyers. In reverse auctions that are now commonly hosted on web sites, a buyer receives bids from several would be sellers and settles on an offer. Goods are bought and sold, and information is exchanged among buyers and sellers in a private (i.e., hosted by a single company) or public (i.e., with many firms) electronic marketplace
Order placement	Electronic catalog management innovations (ECM)	Refers to the generation, maintenance, and presentation of web-based data about products offered by suppliers. Typical data include price, availability, and quality
Order fulfillment	Electronic order fulfillment innovations (EOF)	Refers to automation of processes conducted after sale is confirmed. Includes automated ordering, shipping and reordering, and receiving. Allows provision for real-time order tracking and requisition status
Payment and settlement	Electronic payment and settlement innovations (EPS)	Provide for issuance of billing, payment and reconciliation of debits, credits and invoices between partners. Also supports product returns and their associated financial impacts

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