E-procurement: Evolution and adoption. A review of Literature

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Abstract

This paper presents an exploratory literature on the concept of e-procurement. The aim was to understand the concept of e-procurement, its evolution and adoption in the market economy as well as higher education. It was established that whereas e-procurement has had a rapid growth in the manufacturing sector, a lot is still desired in the higher education sector following the slow pace of adoption.

Key words: Procurement, e-procurement, Higher Education.

Introduction

Recently, the use of internet supported procurement has arisen as in fundamental component of e-business in modern firms (Mishara, Konana, & Barua, 2007) as well as in institutions of higher learning. Indeed "e-procurement" has probably been the trendiest word in the public procurement profession in recent years (Alsaç, 2017). E-procurement has been widely recognized for carrying the potential to significantly increase the buyers' and sellers' benefits. The Deutsche Bank research (Meyer, 2011) established that a full transition to e-procurement could generate savings of between 50 billion and 70 billion Euro. Earlier research had shown that the extent of e-procurement infrastructure integration between organizations had a direct impact on the savings and benefits obtained by an organization (Min and Galle, 2003). Implying that lack of or poor integration of e-procurement infrastructure lowered benefits and could increase costs, while a good integration had yielded the opposite effect. As a result of this promise, business today has focused on the supply function to a greater extent than it previously did (Purchase & Dooley, 2005).

E-procurement which has been offered varied interpretations simply refers to the process of purchasing goods and services electronically (internet-enabled) required for an organization's operation (Mitchell, 2000). It involves electronic interaction between or among parties involved

in the procurement process rather than physical exchange or contact. While there is an array of opportunities and advantages e-procurement offers, adoption of e-procurement systems in organizations especially Higher Education Institutions is not happening as quickly as predicted. User organizations are faced with a complex decision to make as to whether along to digitalize their purchases and procurement function or remain traditional (Davila, Gupta & Palmer, 2003). Some reasons have been presented by researchers to explain the delayed adoption of e-procurement by many of the organizations. While some organizations have opted to adopt a 'wait and see' approach to e-procurement, others are faced with a complexity of decisions resulting from an array of software programs available on market (Osmonbekov, Bello and Gilliland, 2002). This paper will therefore explore the historical background to e-procurement, the e-procurement process, e-procurement in higher education, the principal benefits and challenges of e-procurements, and the prospects of e-procurement in higher education.

Historical background

E-procurement has been termed as the child of the internet age (Ageshin, 2001). The emergency of internet has had a radical impact on the corporate purchasing practices. Following the emergency of internet, innovations resulting in what have come to be known as Business-to-Business (B2B) marketplaces, electronic supply chains, trading hubs or trading communities situated as web-based procurement networks have been enormous. The diffusion of e-procurement systems in the late 1990s has created the potential for reorganizing the MRO supply chains (Puschmann & Alt, 2005). E-procurement is gradually replacing the traditional procurement processes of tendering and increasing efficiency and effectiveness the process of sourcing input products and services at low cost, while ensuring that such inputs meet the specific technical and tendering requirements (Ong, 2000). It is based on this background that Kohli (2012, p.258) defines e-Procurement/ e-Tendering as "conducting on the internet the equivalent of the manual tendering process, with the ostensible objective of enhancing Transparency and Efficiency of Public Procurement".

Whereas e-procurement emerged in the 1990s with the emergency of internet, it has been recognized that e-procurement gained popularity around the year 2000 with the emergence of the two competitors Ariba and Commerce One, companies that both specialized in the support of

electronic procurement for Maintenance, Repair and Operations (MRO) products (Segev Gebauer, & Fäber, 2000). With the aid of the then so-called 'buy-side solutions', large companies started to build up their own electronic multi-vendor and customer self-serviced catalogues (Tanner, WÖlfle, Schubert, & Quade, 2008). Thus the introduction of Internet-based procurement applications provoked a migration from a centrally organized procurement (central buying) department to a 'desktop procurement' environment, which aided the initiation of electronic procurement by any employee who needed a product. It was these two trends that aided 'decentralized purchasing' and 'multi-vendor catalogues', the path towards increased electronic procurement.

Further still, e-procurement gained increased attention in the academic work in recent years when academicians (such as Carter & Monczka, 2005; Crossgate, 2007; Williams & Handy, 2007) started writing about the subject. In the early 2000s, online market places, reverse auctions and desktop procurement systems constituted the major topics of interest among scholars (Eyholzer, 2002; Segev, et al., 2000).

Components of e-procurement

Vendor management

An integrated, internet-based, self-service Vendor Management System is a one of the critical components of e-procurement. This component of e-procurement has resulted from the innovation of "Self-Service Technologies (SSTs), such as vending machines and multimedia kiosks" (Musso, 2010, p.29).

Self-service Vendor Management System is the last face of technological innovation in dealing with the final consumer. It responds to the increasing desire by customers wanting quick and convenient access to competitively priced products. Vending machines are continually updating with the emerging technologies, as well as the variety of products that are being sold. For example following the emergence of reliable and affordable wireless technologies, we have seen an emergence of one of the latest vending innovations - telemetry. Wireless technology has facilitated the efficient usability of telemetry and thus provided the channel through which cashless payments can be authenticated (Musso, 2010).

With a secure internet-based, vendor self-serviced system, vendors in higher education can accomplish a number of tasks efficiently. These include: registering online to conduct business with the university including vendor registration process via the web; registering online to receive various 'area interest' competitive bids and quotes for commodities without burdensome administrative efforts of procurement personnel; receiving automatic, instant notification of bid/quote opportunities in specific area of interest via e-mail, fax and the web without procurement personnel interaction; reviewing and responding to bids and quotes online with little interaction by procurement personnel while complying with the university's business rules and; communicate online with procurement personnel regarding various procurement issues (Karam and Bsharah, 2001).

Electronic Bid/quote and automation

E-procurement has got an internet-based Bid/Quote Auction system integrated in the procurement process. Unlike the traditional bidding/auctioning process which requires the bidders to be in a specified bidding room at a specified time, electronic bid/quote and auctioning can take place using a centralized server approach and or an interconnected server approach for localized markets. When using a centralized server approach; a central server displays the item to be sold, announcing the deadline for placing bids. Bidders can access the server for bid placements and it is their responsibility to ensure that their bids get to the server before the deadline. The item is sold to the highest bidder as soon as the deadline is past (Ezhilchelvan & Morgan, 2001). Some well-known central server systems are eBay and AuctionBot. The server may be accessed by long- or short-distance bidders via Internet, or by mobile systems, or by agents executing on the server itself as reflected in Figure 1.

On the other hand, the while using the Interconnected Servers approach, there is a server for a given local market, which exercises policies best suited to local conditions and market mechanisms, e.g. setting bidding deadlines by taking into account of the reliability and the available bandwidth of the local portion of the Internet, formulating payment rules that are feasible and/or popular with the local traders, among other factors. Local market servers are connected to each other by the Internet or by a high-bandwidth private network as show in Figure 2 with a communication infrastructure that enables them to conduct business-to-business

transactions. Consequently, a collection of interconnected local markets creates the global market (Karam and Bsharah, 2001).

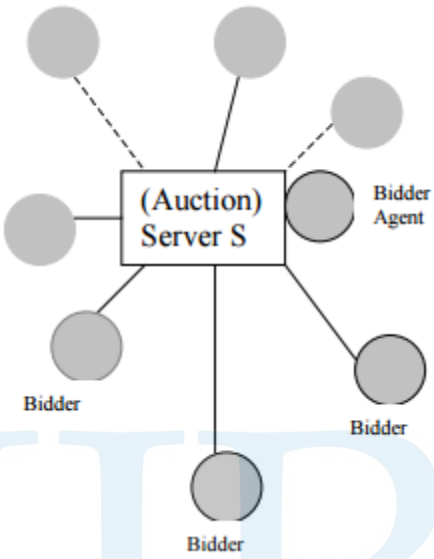

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Figure 1: Central Server System

Adapted from: *Ezhilchelvan, P. and Morgan, G. (2001, p.4). A dependable Distributed Auction System: Architecture and an Implementation Framework.*

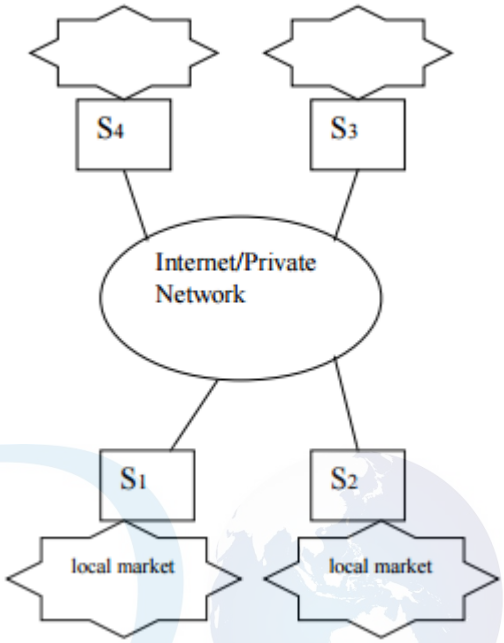

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Figure 2. Interconnected Local Market Servers

Adapted from: *Ezhilchelvan, P. and Morgan, G. (2001, p.4). A dependable Distributed Auction System: Architecture and an Implementation Framework.*

Internet-supported bid and quote automation has a number of common features that characterize its operation. Such include but not limited to: instant electronic bid/quote and Request for Proposal (RFP) notification based on 'areas of interest'; online retrieval of bids, quotes and RFP's; secure, interactive, online bid/quote response for including compliance checking and enforcement of all university competitive-bidding business rules; locked repository for compliance of 'sealed bid' requirements; online publication and notification of bid/quote and RFP awards; automatic, online availability of purchase orders for awarded bids and quotes;

automatic invoicing from online purchase orders and; full integration with internal procurement system or Enterprise Resource Planning (ERP).

E-Catalogs

An electronic catalogue is a critical component of any e-procurement process. Electronic catalogs can be defined broadly as "electronic representations of information about the products and/or services of an organization" (Baron, Shaw, & Bailey, 2000, p.94). Just like in the traditional procurement mail-order catalog, electronic catalogs contain and provide detailed information regarding the products and or services available for sale. Because of the diverse needs and a wide array of buyers on the market, suppliers customize the content in the electronic catalogs to meet the specific needs of a specific group of buyers. Consequently, this information is imported into a database and integrated in the e-procurement webpage(s). Content providers in the e-catalogs have to ensure that the following services are efficiently offered: Converting catalog data into a uniform language and format; Gathering and aggregating data from multiple suppliers into one catalog; and publishing and maintaining the product catalog and keeping it up to date.

Karam and Bsharah (2001) outline a number of features of internet based electronic catalogs, these include: vendor maintained catalog content and updates with full compliance to negotiated pricing; availability on every desktop and to every user without major infrastructure requirements; enhanced requisitioning and approval process with graphical content and product configuration tools; full central control over catalog content and approved vendors; enhanced application of university business rules; electronic order generation to selected vendor(s) upon final purchase approval; electronic invoicing from vendor after product/service delivery; and full integration with procurement system Enterprise Resource Planning (ERP).

Basing on the above key features of e-catalogues, three types of catalogues can be seen to exit. These include: 1). Product catalogs. These contain information on tangible items of a firm such as office products, medical supplies, and farm supplies, among others. 2). Service catalogs: These offer data on available professional services that are not tangible and may include information on such services as office maintenance, temporary personnel, and cleaning services

among others. 3). Commodity-specific catalogs. These provide data on specific product families such as chemicals, paper among other raw materials (BuyIT, 2004).

E-procurement processes

Shakya [ed.] (2017) considers a typical procurement process to be going through an eight step-by-step process as shown in Figure 3 in which Shakya calls an End-to-End system. The process begins with 'tender document preparation to the payment step.

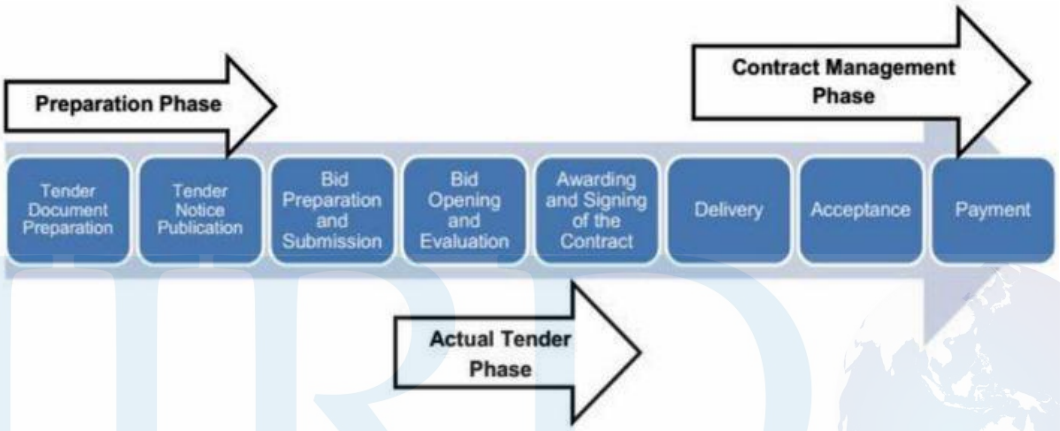

Figure 3: End-to-End Vs Step-by-step procurement process

Adapted from: Shakya, K. J. (2017). Digital Governance and E-Government Principles Applied to Public Procurement". USA: The World Bank.

Shakya (2017) argues that an end-to-end e-procurement system goes through either all the steps present in Figure 3 or at least the first two phases that ends with the signing of the contract. This step by step process of e-procurements carries with it a number of advantages. These include: 1). the potential to allow a smooth transition from paper based procurement procedures to electronic procedures; 2). dispersion of the cost of system development through the time and consequently the initial investment requirement is reduced; 3). reduction in possible mistakes by users due to the changes brought in the procurement procedures by e-procurement; 4). Constructive feedback can be collected from stakeholders that can be useful in correcting any mistakes as well as guiding in the development of new applications in a more user friendly manner (Shakya, 2017). These benefits spread through higher education institutions where e-procurement is efficiently integrated.

E-procurement in Higher Education

Across the globe, higher education institutions are grappling with reduced funding as the safety net once provided by state funds, appropriations, gifts, high returns and tuition increases have been ripped away. Thus as the financial pressures in higher education continue to mount, higher education institutions have been forced to find effective internal ways of saving costs to achieve sustainability. One of the measures Fitzgerald (2015) recommended if the higher education institutions are to thrive is the adoption of technology which should include e-commerce initiatives. He recommends that an effective e-procurement system can significantly improve process efficiencies by eliminating paperwork, expediting contract fulfillment, and controlling compliance.

Indeed across the globe, Universities are finding a new, smart way to complete their sourcing and bidding process which is cost effective and less administrative demanding. As higher educational institutions search for effective ways to fight rising tuition and high overhead costs with efficiency and transparency initiatives, e-procurement presents itself as the most appropriate simple cost and time saving solution (Thomas, 2016). This is however a new concept in higher education and there is limited literature published on e-procurement in higher education.

E-procurement in higher education carries the potential to decentralize the procurement process because of the ability to initiate and complete a procurement process on one's desktop without following the bureaucratic centralized systems that are common in universities. Decentralized procurement brought about by the internet in higher education offers a unique advantage for principal investigators (PIs), who must manage their grants budgets as an independent department. Because higher education institutions outsource their funding from different sources which range from government funds to donor funding, establishing a decentralized system of procurement is beneficial. Grants from donors have special and strict conditions for managing them. The PIs is singularly responsible and accountable to the granting agency (Srivastava, 2016). Interestingly PIs typically prefer to spend more time on research and less on tedious procurement processes. Accordingly, to strike a balance between research and procurement processes, they require an automated system for creating requisitions, equipped

with "built-in" procurement components that streamline the approval process and improve the visibility of cost-chargeable expenses.

Challenges with e-procurement

A number of requirements are needed to have an effective adoption of e-procurement in any organization. These include but not limited to technology, objectives, information, staffing and skills (Khanapuri, Nayak, Soni, Sharma and Soni (2011). Such requirements carry with them a number of challenges in the adoption of e-procurement in relation to Compatibility, Integration, Adoption and regular use by employees and as well as lack of capacity by small suppliers (Mose, Njihia, & Magutu, 2013). Using a case of manufacturing firms in Nairobi Kenya, Mose, et al. identified a number of challenges that face the implementation of e-procurement and these included: usage of old IT equipment that need overhaul, high costs required to make the equipments compatible, lack of regular use by employees, resistance to change by users, lack of e-procurement implementation capacity by small suppliers, higher adoption costs and lack of finances (2011, p. 396).

Other challenges include: application of single e-procurement functions and thus not experiencing the full potential of e-procurement. Besides, despite the overwhelming evidence which shows the advantages of e-procurement systems, traditional systems such as EDI continue to persist, and have to be included in a company's overall e-procurement infrastructure (Puschmann & Alt, 2005). Implementation of such system requires companies need to know the critical success factors in implementing e-procurement strategies, processes and systems.

Critical Success Factors

Critical success factors represent a number of factors that determine a successful implementation of an e-procurement system in an institution, oversight of such may make implementation problematic. Whereas e-procurement came with a lot of potentials promised by the vendors of such systems, e-procurement got off to a slow start (Puschmann & Alt, 2005). Although the adoption of e-procurement has of recent increased rapidly, companies and higher education institutions face different challenges associated with the advent and use of e-procurement. Overcoming such require understanding critical success factors. These vary from

sector to sector although some are cross-cutting. Generally, successful implementation of e-procurement will require 1) employees and management commitment to success of adoption; 2) reliability of information technology and supplier performance; 3) monitoring the performance of e-procurement systems; 4) user acceptance of e-procurement systems and; 5) top management support (Mose, Njihia, & Magutu, 2013). Other critical success factors may include Risk perception, Training of staff in procurement practices, and continuous measurement of the key benefits, best practices and actual selection of the system (Mose, Njihia, & Magutu, 2013).

Conclusion

E-procurement is still young and growing field of commerce. It has however gain ground rapidly in manufacturing sector although with a much slower adoption in higher education. With the increasing decline in the financing of higher education however, sustainable methods of cost reduction is at the forefront of many higher education institutions and e-procurement presents itself as the smart solution with the potential to significantly cut overhead costs in higher education. It is therefore highly recommended that higher education institutions adopt e-procurement because of its well known benefits and potential of increasing growth and efficiency in higher education operations.

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