E-procurement for increasing agility of Business Processes: A Case study & Critical Research Reviews

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Abstract: Today, business is changing rapidly. Every enterprise needs to develop new service offerings and new technologies have to be adopted or reconfigured to stay in competition. Most service companies are tied with traditional project techniques, which include a staged approach. These stages need to be compressed and changed to meet time-to-market demands. Today every enterprise must be agile enough to respond to changing requirements of their customers. Agility has becomes the key attribute of business today as it faces uncertain and volatile environments. The enterprises operating in highly dynamic environment need agile processes. E-Procurement makes it possible to automate buying and selling over the internet. Typically an e-Procurement-enabled website will have product comparisons across vendors and various processes like tendering, auctioning, vendor management, and catalogue and contract management. High-end e-procurement solutions allow organizations to define their own processes in the form of workflows - thus utilizing concepts of business process modeling. In this paper we present the findings from a recent survey on e-procurement in India and explain how e-procurement can be used in such fast growing organization to speed up the business activity at the suitable agility level and its impact on operational efficiency in the procurement process.

Keywords: Agility, e-procurement, Neural Networks, Classification, Data mining, ERP

I INTRODUCTION

In the business buzzword universe, flexibility and agility are often tossed around interchangeably. But the two are vastly different concepts when it comes to business processes and information technology systems. Agility, not flexibility, is the key to business’ abilities to survive and thrive in today’s competitive global marketplace. "Agility is the ability to quickly change a process in order to take advantage of the options. How agile a business is, is how easy it is for them to change their default processes, That is, “To be faster in effectively adding and/or changing capabilities is one dimension of how businesses compete.”

Flexibility, which is defined as the number of capabilities on hand, is also important. However, forward-thinking businesses are embracing agility - the ability to quickly reconfigure their capabilities, as a better measure of their ability to customize products or services to gain competitive edge and customer faith.

In order to adapt in an environment where markets are constantly morphing, technology always evolving, and customers continually making new requests, competitive advantage is all about having the ability to respond quickly to change.

Two levels of agility

In this research work, we define two levels within business-processes agility: process-level agility, which is the speed with which an organization can add new capabilities into its standard processes; and transaction-level agility, which measures how well
companies can customize capabilities for individual customer transactions. A company that can quickly accommodate a new customer requiring XML ordering capability, for example, has *process-level agility*. A company that has many ways to complete a process and encourages their customers to specify their preferences and can deliver that customized experience has *transaction-level agility*. For example, customer who specifies they want to place their orders using XML, wants a bar-code label put on the box, an RFID tag on a certain type of pallet, and wants a paper invoice once a month with bulk billing is testing a company's transaction-level agility.

Companies with low product diversity but strong competition in the market need to excel at process-level agility. Online bookstores, for example, offer largely the same products, so in order to differentiate themselves they need process-level agility to quickly adapt to whatever improvements become available that will help them ship orders faster/better/cheaper than their rivals.

Now, more than ever, it is important for businesses to have agility at the process level because customers require it. And if they don't, their competitors will take a chance to downgrade.

By contrast, companies competing in the electronics industry, where products are highly customized, are well served by building transaction-level agility to capitalize on new processes or technologies that allow them to offer greater levels of customization.

**II. ELECTRONIC PROCUREMENT**

Electronic procurement is defined as the sourcing of goods or services via electronic means, usually through the internet (Schoenherr and Tummala, 2007). Precursors of e-procurement can be seen as early as the 1980s, with the evolution of Material Requirements Planning (MRP) systems into Manufacturing Resource Planning (MRP II) and then into Enterprise Resource Planning (ERP) systems in the mid-1990s. The practice of Electronic procurement has gained popularity over the last ten years, and so has the research on this emerging area, with an identity of its own. E-procurement supports the procurement and sourcing of activities via Internet technologies and enables an efficient negotiation between buyers and vendors. Loosely describing the processes, e-procurement is the purchase and sale of products and services through the Internet using websites, as well as other information and networking systems.

Typically, e-procurement web sites allow buyers and sellers facilitate their transactions. Depending on the business model, buyers or sellers may specify costs or invite bids. Transactions can be initiated and completed. E-procurement systems may make it possible to automate some buying and selling and thus cut down on transaction costs. Companies participating expect to be able to control parts inventories more effectively, reduce purchasing agent overhead, and improve manufacturing cycles.

A major process in the e-procurement decision making is that of vendor selection process. Vendor selection studies have been widely reviewed ever since procurement through traditional processes has been studied, since 1960s. In the real world, the criteria and constraints for such a process are soft in nature. In this study, the criteria for vendor selection, which already have been established empirically, is used and attempt has been made to check the agility level.

**III. LITERATURE REVIEW**

Weele (1994) defines e-procurement as the use of internet technology in the process of providing goods and services and this is one of the first conceptualizations of the terminology. Electronic procurement systems experienced a gradual diffusion in the late 1990s (Puschmann and Alt, 2005) due to the advances and adoption of information technology and the internet, the tremendous potential savings achievable via this tool. According to a study conducted by SAP, e-procurement reduces purchase costs; enhances efficiency at every stage; establishes adaptive, efficient and collaborative vendor relations; monitors and regulates buying behaviors; improves sourcing by discovering more vendors, ensures deliveries on time; frees up skilled employees; reduces training requirement; permits flexible access time; manage contracts; performs content management functions and reduces maverick purchases.

Purchasing is the primary point of contact with most supply-chain partners and thus among the most important activities. At the strategic level, the firm must define the corporate, manufacturing and sourcing strategies and identify the products and services that should be acquired from outside (Croxford, García -Dastugue et al. 2001). And, at the operational level, all the procurement activities, such as to review vendors, to identify opportunities, and to develop and implement product or service agreements, should be developed and controlled team in the next “Identification and pre-qualification of vendors” stage. The team is then responsible for the “Definition of contract agreements” and subsequently the “Evaluation and rating of vendors” phases, which encompass generating and evaluating requests for
proposals, and assessing vendors’ performance against a set of relevant criteria. Among the others, the vendor selection process, from pre-qualification to final selection is deeply influenced by the adoption of e-procurement programs. As this study indicates when e-procurement solutions are adopted, qualitative and quantitative performance data required for pre-qualifying, pondering and ranking viable vendors may differ significantly from traditional ones, and new important skills and capabilities might need to be added. Traditional research in e-procurement has been classified into four separate areas based on the themes they address broadly, as per a study done by Schoenherr and Tummala (2007). These broad areas are decision support studies, adoption factors, prescriptions and current state of e-procurement implementation in firms. Studies in prescriptions focus on factors for successful purchasing and best practices, including implementation experiences, outcomes and the impact on performance. Studies focusing on the current state of practice provided general overviews and introductions to the topic, as well as implementation frameworks. Other studies focus on the factors influencing the adoption of e-procurement, its subsequent success, and differences between adopters and non-adopters of electronic procurement. Rest of the studies has been classified as under decision support, which tries to optimize the processes involved in e-procurement. As Schoenherr and Tummala indicate in their study, although the studies in decision support have been many, in the area, it is still an evolving area of study with a huge scope in adding value to the existing body of literature. It has been established by Swaminathan and Tayur (2003) that firms can apply analytical models to previous data and obtain important information to make better decisions. In current times, most of the firms have more than one vendor supplying the same product, especially in an e-procurement scenario. Now, multiple vendors may be equally suitable for supplying a certain product.

In this paper, we proposed the web-enabled e-procurement processes and reviewed with a focus on its improving operational efficiency and checking its agility level. Thus the decisions taken at the purchasing stage can have a great impact on the overall supply-chain and production planning processes and on their overall performance. As a result, many organizations are attempting to redesign and streamline their procurement processes, the performances of which is optimized using web enablement or as termed popularly, e.procurement. Presutti (2003) stated that the adoption of new e-procurement processes have a tremendous impact over the traditional purchasing cycle. The author divides the processes involved into 4 distinct phases. The first phase is the “Definition of buying requirements”, where based on final customer’s demand, a team of buyers, as decision makers, are involved in this stage. Potential vendors are then identified and short-listed by the buying .Following figure shows the acceptance factor of e-procurement system.
In the existing method, the purchase manager selects the vendors from the available database from their existing ERP software and creates the ‘Request For Quotation’ (RFQ) for different vendors and prints a hard copy for vendors to be dispatched instead of using electronic means. The current method faces many limitations including it being time consuming. There is a lot of scope of having an e-procurement method to replace the traditional procurement process with a dynamic procurement benefiting by which business processes can be more agile.

IV. PROPOSED METHOD:

As a part of reengineering effort aimed at enhancing overall efficiency, there is a need to automate the manual processes, thereby increasing agility and reducing cost. It is necessary to follow a particular type of workflow while implementing procurement process. Technology is a key driver which can be used to check agility level. Technology is an enabler to business-process agility; it enables us to reconfigure our process capabilities -- either by adding new capabilities to the process, or by modifying existing capabilities.

Having the right technology, however, is even more important. What qualifies as the "right" technology to spur business-process agility may be the topic of a debate rumbling within the IT community. Some experts question whether enterprise resource planning (ERP) systems, which have been the technological backbone of large organizations for years, are the right tool to help companies achieve agility. By their nature, ERP systems are large, complex, and efficient at managing a wide range of internal functions when used in a relatively stable environment. They are not as good, however, at managing fast-changing processes and transactions. ERP systems are flexible enough offering the ability to take orders in numerous different ways. But because of the size of ERP systems, companies using them may be hard-pressed to meet the need for agility ERP can be customized in terms of speed in reconfiguring their processes or adding capabilities. Companies get their ERP systems configured so that everything works, but when they want to change [processes or transactions] to accommodate a customer request, or the next best practice, it takes a long time to do it because they have to test everything throughout the whole organization.

For some companies, the solution is to add additional layers of software to their existing systems as a way to increase business-process agility without having to dump their ERP and start over. One can use Siebel application for increasing customer resource management capability. Ariba’s e-Marketplace can be e-procurement option. Using middleware, they can integrate these systems seamlessly into existing ERP solutions which can enable companies to increase their agility.

But every company need an entirely new approach to software to sate the demand for agility. The new approach is "on-demand" computing, software solutions that firms can access a la carte via the Internet. Featured in the ubiquitous IBM commercials, on-demand solutions hone in on specific capabilities that businesses need to build value and respond rapidly to change.
It consists of several sub-systems as described below:

1. e-Procurement Agent: The e-Procurement agent is a software component implemented in Web services. It serves as a middle-tier component to handle the interactions with the Web Services Registry and with the trading partners' Web services. It consumes Web services provided by the Supplier Web Services Registry and Web services provided by suppliers. The e-Procurement Agent is implemented as Web services to be consumed by the front-end user interface applications.

2. The User Interface (UI) Subsystem: Since the e-Procurement agent is implemented in Web services, the e-Procurement UI subsystem can be easily implemented using various user interface components that are capable of consuming Web services including:
   a. A GUI client running on desktop computers. GUI-based applications provide rich user interface elements and interactions. It is often used by purchasing personnel working from their desktop inside a company.
   b. A browser-based application. Web presentation layer components are web programs running on the server-side. These Web presentation layer programs can consume Web services and provide easy access to the e-Procurement system wherever there is Internet access.
   c. Mobile clients. Mobile device such as cell phones, personal digital assistants (PDAs) can consume Web services. Special micro-browsers can be used to get access a server-side Web program. The mobile web programs need to render Web pages in formats such as WML or cHTML that are appropriate for the requesting mobile devices.

3. Supplier Web Service Registry Subsystem: The public UDDI is too generic to be useful for the proposed e-Procurement System. It does not provide adequate information from an e-Procurement viewpoint. Therefore a private Web services registry is developed to store product and supplier information as well as Web addresses of Web Services Description Language (WSDL) (W3C, 2001a) files of Web services provided by all participating suppliers for various Web operations required for the e-Procurement application. The registry’s database stores all qualified suppliers information including their capability, quality, as well as WSDLs for various interactions (e.g. price quote and order) require to complete an e-Procurement transaction. The Registry subsystem plays a key role in enabling the dynamic nature of the procurement process as it expands the list of potential suppliers, an important feature especially for the expedited purchases which the standard suppliers may not be able to fill. e-Procurement agent uses a set of Web operations published by the Registry Subsystem to access information of suppliers’ Web services.

4. Registry Management Subsystem: Strategic sourcing personnel uses this subsystem to maintain the supplier data and their Web services entries. Potential suppliers are evaluated to determine whether these suppliers should be registered in the private Web Services Registry. New suppliers and their Web services entries can be continuously identified and updated by accessing the public Universal Directory, Discovery, and Integration (UDDI) Business Registries or directories of other public exchanges (UDDI.com, 2003).

5. Web Services by Suppliers: In our current design, suppliers who want to join the e-Procurement system need to implement Web services required by the e-Procurement system according a set of Web operations based specific defined by a published WSDL file. The internal implementations of these Web operations are insignificant. However, all suppliers need to support identical signatures for these Web operations, i.e. for the same operation from different suppliers, the operation name, the numbers of parameters and parameters’ data types have to be the same. These Web services are considered as an extended and integral part of the e-Procurement system. Having these Web services available enables the supplier to “assess and submit quotes” in real time such that little or no human intervention is required to respond to a customer request.

As disruptions occur and items need to be acquired in short lead time, a Web service enabled e-Procurement system is able to quickly prepare a “quote request” so that a number of suppliers can respond with availability, price, and delivery, followed by a “quote evaluation” that awards and then transacts the order with the selected supplier(s). The e-Procurement System enables the buying organization to purchase supplies in real-time with close to fully automated transactions processing.

**Effective Implementation**

1. Start with non-critical items. An initial e-procurement system should slim the amount of paperwork needed for purchasing and reduce order complexity by standardizing the exchange process between supplier and buyer. Use your intranet to bring all internal stake-holders on board with your new procurement process and to establish internal customer behavior. Streamline, map, test, troubleshoot and improve the process before expanding it to external suppliers. Work with a favored supplier to test the system.
2. Leverage your system once it’s running. Exploit your full purchasing power by using reverse auctions. Invite new suppliers to participate once the system has proven itself.

3. Aggregate buyers within your organization to increase your purchasing power and gain better pricing.

4. Use a portfolio approach to expand your system. It is not possible to have uniform relationships with all suppliers nor are all purchasing requirements the same. Sort purchasing needs into groups that can use a similar process and a similar template.

V. RESULT

Saving time:

Also, e-procurement saves time. Buyers do not need to leave their desks or make phone calls to suppliers in order to place orders; they simply go through the Internet. And, because suppliers receive the order almost immediately, they can also fulfill and ship it much faster than with the traditional procurement methods.

Benefits of Adoption

The main benefit of adopting an e-procurement system is the ability to consolidate multiple information systems in a single place, while establishing a standardized way to conduct purchases and interface with suppliers. XML-based Web services have streamlined this process, making adaptation cheaper than it was a few years ago.

Those who make the switch to e-procurement often find that they smooth out relationship glitches with preferred suppliers, often establishing a relationship which if better long-term pricing. E-procurement establishes pricing controls and buying controls, often meeting goals set by Chief Financial Officers for establishing who can authorize purchases and spend money.

Future of E-Procurement Adoption

The growth trend should resume sometime in 2006. The first area that’s likely to see an increase in spending is online auction and reverse auction systems followed closely by applications that tie these auction systems into SRM and inventory systems.

One surprise is that the much-touted public online marketplaces of the late 1990s failed to catch on, other than a few exceptions such as eBay and comparison systems like Shopping.com. Most companies preferred to install their own private systems allowing them to interface with approved suppliers.

VI. CONCLUSION

e-Procurement has been in existence for a substantial period. To achieve cost and time efficiency, several enterprises and governments now consider it a crucial cog in the wheel of their procurement processes. With recessionary winds blowing across the globe and a growing need to rationalize spends while sustaining optimum levels of productivity, enterprises big and small will further leverage the e-Procurement model to achieve greater savings and deliver enhanced value. Advances in Internet and media technologies, now require a revisit of the traditional methods of e-Procurement. As the current market conditions tighten, e-Procurement facilitator companies need to reinvent themselves and devise newer methods, so as to achieve far greater reach with greater process simplicity and usability.

Additionally, we summarize research addressing benefits gained from earlier information technologies, and we see that a broad set of benefits are likely to be realized in the supply chain because of the enhancements afforded by Web services. Certainly, empirical research is needed to better understand these benefits, along with research that addresses the barriers to implementation and the development of business processes that take specific advantage of Web services unique characteristics. This paper proposes an alternative design and implementation complementing current UDDI registry functions. It may accelerate the development of industry specific vertical Web services registries to support industry specific vertical marketplaces.

The use of advanced technologies such as Data Envelopment Analysis and best practices such as Total Cost of Ownership for selecting suppliers and possibly for allocating purchase quantities become more viable as Web services provide additional data and processing capabilities. Also, the impact of Web services on specific attributes of supply chain performance needs to be further investigated as well.
REFERENCE