TYPE OF PROCUREMENT AND OPERATIONAL PERFORMANCE:

COMPARISON OF E-PROCUREMENT AND OFFLINE PURCHASING

TOWARDS OPERATIONAL PERFORMANCE

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DEDICATION

This book is dedicated to my beloved Seng Hooi,

and my lovely daughters Jing Han and Jing Xun,

for their constant support and encouragement that made this work possible.

ACKNOWLEDGEMENTS

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ABSTRAK

Teknologi termaju telah menjana perubahan dalam meningkatkan prestasi rantaian bekalan untuk bersaing dalam pasaran. Penyelidikan ini mengkaji proses perolehan secara electronik dan prestasi operasi. Data penyelidikan ini dikumpulkan melalui soal-selidik yang telah diedarkan kepada pembekal yang aktif dan pengguna sebuah syarikat X. Keputusan penyelidikan ini mendaptai jenis proses perolehan mempengaruhi operasi prestasi. Pembekal yang menggunakan perolehan elektronik mempunyai prestasi yang tinggi berbanding pembekal yang menggunakan perolehan tradisional. Walau bagaimanapun, hubungan antara jenis proses perolehan dan prestasi operasi dipengaruhi oleh beberapa faktor seperti lokasi pembekal, saiz perniagaan, kepercayaan and kerjasama. Kesimpulan kajian ini ialah pengurus syarikat perlu mengguna pakai perolehan elektronik untuk meningkatkan prestasi operasi dalam rantaian bekalan.

ABSTRACT

Advanced technology has created a change to improve overall performance in supply chain management to compete in market. This study explored the electronic procurement in its relationship with operational performance. Data were collected by means of questionnaire survey distributed to active vendors and end users in company X. The results reflected that type of procurement influences operational performance. E-procurement vendor have better operational performance compared to those in traditional purchasing. However, the relationship between type of procurement and operational performance is moderated by business volume, vendor region, extent of trust and co-operation. No significant moderator effect was identified on the product type. This concluded that, managers should adopt or utilize e-procurement in organization to improve operational performance in supply chain management.

<div align="center">**Chapter 1**</div>

<div align="center">**INTRODUCTION**</div>

1.1   Operational Performance in Supply Chain Management

In the past decade, the increasing emphasis on supply chain management is creating a greater focus on the management of the links in the supply chain. The supply chain " encompasses all activities associated with the flow and transformation of goods from the raw materials stage through to the end user, as well as associated information flows….Supply Chain Management is the integration of these activities through improved supply chain relationships to achieve sustainable competitive advantage" (Handfield & Nichols, 1999).

The complexity of supply chain has increased significantly in recent years. Technology changes the ways companies can plan, synchronize and execute their supply chain plans.   The performance measurement regime to align the supply chain performance is crucial. Few measures are needed to cover the supply chain, such as on time outbound delivery (a measure of customer orders fulfilled, complete and on time, conforming to specification) and on time inbound delivery (a measure of supplier deliveries received, complete and on time, conforming to specification).

Operational performance can be explained as measurements towards the ability in day-to-day technical representation, adherence to developed schedule, ability to avoid complaints and achievement of defect free deliveries (Fisher,1997). There are a few factors influencing the operational performance in organization, such as employees' job satisfaction, teamwork, top management and employee commitment as well as advanced technology.

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In this study, we will explore one of latest technologies, namely e-procurement, in the relationship with operational performance. This focus will become even more intense as firms continue to adopt e-procurement strategies to leverage the competitive advantages of the Internet. As the current economy becomes increasingly competitive, sustaining competitiveness and the resulting profitability depends on product innovation, higher quality, and faster response times, all of which must be delivered, in most cases simultaneously and always at the lowest costs attainable (William 2003). Hence, e-procurement becomes crucial in order to compete in the market.

1.2   E-procurement in supply chain management

E-procurement generally refers to an inter organizational information system that is intended to facilitate business-to-business electronic communication, information exchange and transaction support through a web of either public access or private of forms such as electronic data interchange (EDI), direct link-ups with suppliers, Internet, Intranet, Extranet, electronic catalogue ordering, on-line collaboration through groupware and e-mail (Min & Galle, 2001). Electronic procurement holds the potential to dramatically reengineer and improve purchase-to-order processes for goods and services. Electronic procurement creates virtual electronic markets that can be customized to reflect a buying organization's contracts and business rules and, is globally accessible over the buyer's intranet or extranet. These virtual procurement channels employ a self-service business model and enable the delivery of dynamic content and decision support information at the point of purchase. E-procurement will prove most valuable as catalysts to improve supply chain management processes, particularly corporate

procurement and purchasing processes. Because the purchasing process is often a maze of manual procedures, paperwork, and mystery concerning preferred products and suppliers, it can be a major source of inefficiency and excessive cost within a company. Conversely, improving the way purchasing is done yields major time and productivity savings, plus hard cost savings that drop right to the bottom line. By taking advantage of Web-based technologies, today's e-procurement solutions can simplify indirect purchasing, leading to significant economic benefits. In fact, in typical companies, a 5 percent reduction in purchase costs achieved through e-procurement can result in a 50 percent increase in profit margin (Anonymous, 2001). According to technology research firm Gartner Group (www.gartner.com), there will be a dramatic explosion in B2B E-Commerce, leading to fundamental changes in how businesses deal with and do business with each other. A study by the Boston Consulting Group (www.bcg.com), predicts that the transaction value of B2B E-Commerce done over the Internet will be more than $2 trillion in 2004, with nearly US $800 million in purchases made through Electronic Data Interchange (EDI) (CyberAtlas.com). Furthermore, a recent study by Deloitte Consulting of 200 global firms indicates that 30% have begun implementing at least a basic e-procurement solution whereas 61% are either planning or are considering an implementation (Whyte, 2000).

Looking at the trend of Internet usage, companies are trying to take advantage of the Internet to enter new markets, shrink supply chains, create new value chains, significantly improve operating efficiency, and meet the challenges of increased competition and global markets. Electronic Procurement (e-Procurement) is one of the

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newer and more impressive solutions that have emerged within B2B e-commerce space. (Anonymous, 2000a)

1.3 The Role of E-Procurement in Purchasing Management

1.3.1 Purchasing Management

Purchasing is important because of two factors. First, purchasing plays a key role in achieving the operations planning and control system objectives concerning delivery, flexibility, quality, and cost. Second, the average manufacturing firm spends about 50 percent of its sales revenue on the purchases of goods and services needed to produce its final product (William, 2003). This is further expected to increase with the practice of out-sourcing, which of late is on the increase.

The integration of purchasing in planning and control activities begins in the long range and continues through the execution and postproduction follow-up and control phases. In the long-range resource planning stage, purchasing task is to establish relationships with reliable suppliers that have sufficient capacity to produce good quality parts at reasonable prices and that are able to deliver them on schedule. As the master production schedule and the resulting material requirement plan (MRP) are developed for purchased parts, purchasing task is to communicate the information to suppliers in a timely manner and to verify that they have the capacity to fulfill these requirements.

Therefore, communication with suppliers is essential to adequately integrate suppliers in the production and supply chain. Today, electronic data interchange (EDI) has been widely used in achieving the desired integration.

1.3.2 The Role of E-Procurement

As described above, e-procurement, the application of Internet technology, pervades each major component of the purchasing process. In establishing buying requirements through the specification development process, the concept of e-design has emerged to help facilitate early supplier involvement. Buyer and seller share information in real time to build specifications that add value to the resulting product. This real-time exchange of information is also crucial because of shrinking product life cycles and the competitive advantage that comes from reduced time-to-market (William, 2003). A good example is Adaptec, a provider of data transfer and communications hardware, which managed to reduce design-to-delivery cycle times and saved USD$10 million in inventory reductions by using Web-based collaborative design processes with key suppliers in Hong Kong, Japan, and Taiwan (Andeson & Lee, 2002)

Besides that, the use of the Internet also helps the buying firms in all stages of the supplier selection process, from prequalification of suppliers through the construction of a comprehensive request for proposal to the selection of the final supplier. The application of Internet technology to this step in the purchasing process is known as e-sourcing. For example, FreeMarkets, a pioneer in on-line sourcing through the reverse auction process, is emerging as a leader in this area of e-procurement (William, 2003).

Some of the earliest e-procurement solutions that emerged about 4 years ago focused on establishing ordering routines that reduced transaction costs associated with operating resource purchasing (typically maintenance, repair, and operating supplies, MRO). One of the leaders in this component of the purchasing process was Ariba Corporation. Through its technology, the processing of MRO transactions from a

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contract established by the buyer with selected suppliers is completely automated from requisitioning to payment. Authorized users are provided access to the system from their desktop computers. Requisitions are generated through the system, approvals are made electronically, an electronic purchase order is created, and the order is sent directly to the supplier (William, 2003).

1.4   E-procurement: Delivering Impressive Results

The benefits of e-procurement can be viewed from two aspects, which are buyer perspective and supplier perspective.

From the buyers' perspective, by taking advantage of the e-procurement technologies, an electronic procurement solution can reduce the administrative expenses associated with the ordering and procurement of required goods and services. It makes it easier for employees to buy from preferred vendors, and provides purchasing with the information necessary to negotiate better rates from suppliers. The goals of e-procurement are to reduce confusion and cost, plus increase efficiency in the procurement process by implementing some or all of the following steps:

1) Simplify the choices of products available through standardized catalogs.

2) Reduce the number of suppliers.

3) Negotiate with a few preferred suppliers to bring down the costs to purchase, as well as the per-unit cost of non-production goods and services.

4) Significantly improve the purchasing cycle time – the time between the original request by the consumer through the delivery and fulfillment, as well as payment for these goods and services.

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5) Place goods and services that are purchased repetitively into an electronic catalog form; then the power of technology makes it easy to turn the ordering process over to the end consumer.

(Anonymous, 2000b)

E-procurement allows companies to leverage the repetitive high-volume buying of both low-value and high-value goods and services that can be easily described or represented in a catalog. Purchasing value-adds in selecting the right suppliers, negotiating contracts, and monitoring supplier performance and customer satisfaction instead of being involved in paper-intensive processes.

From the suppliers' perspective, e-procurement enables prompt delivery to purchase orders. This real time information promotes delivery of dynamic content and decision support information at the point of purchase. Eventually, suppliers improve make-to-order processes for products or services in the dynamic market situation.

1.5   Research Problem

Given the startling benefits of e-procurement, there should be a rush to implement e-procurement. However, implementing it may be wrought with problems. Prior research (Emmelhainz, 1990; Carbone, 1995 & Gupta, 1997) on business-to-business cyber-purchasing has focused on the evaluation of its operating benefits mainly from buyer perspective. Much of these earlier efforts also examined the potential benefits of one form of electronic commerce such as EDI and Internet rather than exploring strategic variables that may affect electronic commerce implementation or performance, especially from supplier's perspective (Min & Galle, 1999).

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Furthermore, e-procurement technologies have been credited with providing significant benefits to companies who venture into them.   These advantages include reducing administrative costs, shortening the order fulfillment cycle time, lowering inventory levels and the price paid for goods, and preparing organizations for increased technological collaboration and planning with business partners (Croom, 2000; Roche, 2001; Gamble, 1999; Greenemeier, 2000 & Murray, 2001).   The relevance of these advantages suggested a rapid migration from traditional to e-based procurement models. However, recent market observations indicate that the adoption and integration of e-procurement technologies into the business mainstream is occurring at a much slower pace than expected.   One of the reasons is the implicit association that investors have made between e-procurement technologies and the business-to-customer (B2C) models responsible for the Internet bubble (Antonio, Mahendra & Richard, 2003).   Companies were jumping onto the e-procurement bandwagon without fully understanding the inter-organizational collaboration and network effects underlying these technology models, the investment required to move the right information from suppliers to customers, and the complexities of integrating these technologies with existing Enterprise Resource Planning systems (Gilbert, 2000). In other words, there are evidences to show that e-procurement is not uniformly more successful than traditional procurement. There are situations or circumstances whereby traditional procurement performs equally if not better than e-procurement.   For instance, companies are uncertain about whether they have the appropriate resources to successfully implement an e-procurement solution, implementing an e-procurement solution requires not only that the system itself successfully performs the purchasing process, but most important, that it integrates with

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the existing information infrastructure. This internal information infrastructure includes systems such as accounting, human resources, asset management, inventory management, accounts payable, production planning, and cash management systems. Failure to integrate creates duplicative work steps and jeopardizes the reliability of organizational information.

Looking at the limitation of the earlier studies, which focus only on buyer perspective and the slower trend of e-procurement adoption, this study focuses on the comparison of operational performance between online purchasing (e-procurement) and offline purchasing (traditional procurement) from supplier perspective.

1.6   Research Objectives

This research focuses on the comparison of operational performance between E-procurement and traditional procurement and also moderator factors, which will influence the relationship between type of procurement and operational performance. The purpose of this research is to identify whether there is a difference in operational performance from vendor perspective between e-procurement and traditional procurement in wafer fabrication supply chain. Furthermore, we would like to explore whether e-procurement always performs better than traditional purchasing under various conditions.

1.7   Research Questions

In order to achieve the objectives, this study endeavor to seek answers to the following questions:

1) Does operational (supply) performance of suppliers who participate in e-procurement program differ from those in traditional procurement model?

2) Does product type moderate the differences in performance of the two type of procurement?

3) Does the location of supplier moderate the differences in performance of the two type of procurement?

4) Does business volume moderate the differences in performance of the two type of procurement?

5) Does trust moderate the differences in performance of the two type of procurement?

6) Does co-operation moderate the differences in performance of the two type of procurement?

1.8   Scope of Research

The population of this research includes all suppliers to a company located in Kulim (which for confidentiality reasons, will be referred to as Company X, from hereon). Company X is a wafer fabrication company in Malaysia. It is a premier semiconductor wafer foundry offering customers major foundry compatibles 0.25μm, 0.22μm and 0.18μm CMOS logic, high-voltage and mixed-signal technologies. The company was a winner of Semiconductor International's 2002 Top Fab Award.

This research examines data gathered from active vendors in this company. There are two groups of suppliers, which are e-procurement vendor and traditional procurement vendor.

1.9   Significance of Research

This study is to explore whether there is improvement in terms of operational performance in e-procurement than those in traditional procurement from vendor perspective.

Although more companies are turning to e-procurement (Callahan 1999; Lancioni, Smith, & Oliva 2000), some firms fail to gain the benefits of logging on to the Internet for tasks conveniently accomplished by phone (Weber 1999). Other concerns about security, the risks associated with sharing information, and the costs associated with switching from another system, e.g. EDI (Carter, Monezka, Slaight & Swan, 2000; Sheth 1981 & Wenninger, 1999). Yet the potential for dramatic cost savings and productivity improvements suggest that firms would benefit from increased use of e-Procurement for corporate-related purchasing activities (Hill, 1999 & Weber, 1999).

Looking at the nature of wafer fabrication foundry business, it is crucial to adopt E-procurement as strategic tool to improve the purchasing process, reduce the administrative cost and improve vendor operational performance. Developing effective strategies for using e-procurement requires an understanding of the factors that moderate the relationship among type of procurement and operational performance (Dawn, Aric, Rebecca & Catherine, 2001).

1.10   Outline of Report

This paper begins with an overview of e-procurement, the research problem, the research objectives and scope of the study. Chapter 2 will cover the related literature; focus on the

independent and dependent variables. The discussion then turns to the theoretical framework, hypothesis building, design and methodological of the study. The paper ends with a discussion of the findings, conclusion of the study and implications as well as limitations of research.

Chapter 2

LITERATURE REVIEW

2.1 Introduction

The literature review will cover types of procurement, procurement performance and moderator factors which will impact the relationships within type of procurement and operational performance.

2.2 ~~E~~ Procurement

Procurement encompasses all activities involved in obtaining material and services and managing their inflow into an organization toward the end user (Zenz & Thompson, 1994). In other words, procurement includes all of the activities involved in acquiring goods or services and managing their flow from the supplier to the company (Hough & Ashley, 1992). Hence, procurement is one of the important elements in the whole supply chain.
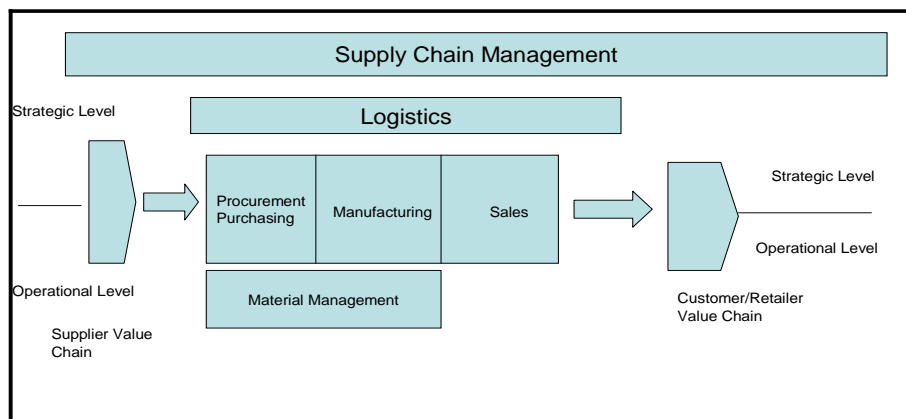
Figure 2.1 Supply Chain Management (Enholzer & Hunziker, 2000)

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Procurement is positioning itself as a "middle man" between an organization's internal customers and external parties (suppliers), as shown in Figure 2.1. This function has to bridge multiple gaps in order to simultaneously manage external and internal relationships, and to balance each parties (end users and suppliers) different expectations or goals.

According to Enholzer and Hunziker (2000), procurement is defined as being broader in scope than "purchasing" and includes activities of strategic relevance, such as sourcing, negotiating with suppliers and coordination with R&D. On the other hand, purchasing describes the rather operational and administrative tasks that are carried out more or less by one department, namely the purchasing department (Enholzer & Hunziker, 2000).

Procurement can be divided into 3 major components, which consist of sourcing, negotiation, and settlement (Zenz & Thompson, 1994).

1) *Sourcing.* This activity involves cross-functional team whereby end users identify materials, which are needed in manufacturing. The prospective buyers will then find and choose the right suppliers for a product by evaluating potential sources to fulfill organization requirements, gathering information about market conditions, products and sellers.

2) *Negotiation.* Buyers and suppliers start to interact and determine the specifications, prices and availability of goods and services as well as delivery terms.

3) *Settlement.* The terms of the contracts are carried out and goods and services are transferred in exchange for money or other forms of compensations.

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Procurement function currently plays a significant role in company to meet company revenue, with the condition that the selling price of finished goods is unchanged. For example, Mercedes Benz showed that a 10 percent increase in turnover had the same effect on the operating result as a reduction in material costs of 0.518 percent (Enholzer & Hunziker, 2000).

Looking at the significant role played by procurement, leveraging the supply chain as a strategic operating resource becomes crucial. In the past, most organizations want to manage procurement with the lowest possible level of risk and investment while still ensuring adequate quality, avoiding duplication and waste, and sustaining the organization's competitive position and outside image (Perlman, 1990; Zenz & Thompson, 1994). However, with procurement processes involving a large amount of information processing and communication, information technology support and automation throughout all its process demonstrate a significant improvement in the whole procurement process.

A large array of literature (Williamson, 1975; Malone, Yates, & Benjamin, 1989) has focused upon the strategic use of information technology to encourage electronic markets between buyers and sellers. Information systems linking different organizations (inter-organizational information system) can create economic value as well as being used as strategic weapons in industrial competition (Yannis, 1991). According to Yannis, inter-organizational information systems (IOS) are systems based on information technology that crosses organizational boundaries.

2.3 Procurement Type

2.3.1 Traditional Procurement

In traditional procurement, purchaser performs all procurement activities from sourcing till processing the requisition to purchase order manually or using hard copy. The purchasing process within most large enterprises often remains the last bastion of paper-dominated processes. Unfortunately, these slow, paper-based processes create major problems as the purchasing function attempts to operate effectively in a fast-changing, constantly evolving landscape of prices, products, and policies. In addition, multiple disconnected processes can exist, making it difficult or impossible to capture all buying activities for increased control, leverage, and analysis of enterprise spending. Typical problems include the following:

1) Too many suppliers make it difficult to find the best source for each purchase,

2) Out-of-date catalogs waste time and cause confusion,

3) Too many part numbers and options make it confusing to order the right products,

4) Searching through multiple catalogs is tedious and time-consuming,

5) Getting up-to-date prices and availability is difficult,

6) Internal approval process is cumbersome,

7) Product and price comparisons are hard to make, and

8) Purchasing professionals are spending too much time on transaction processing and not enough time on value-added activities. (Anonymous 2001b)

2.3.2 E-Procurement

E-Procurement has been identified as "the ~~the"...~~most important element of e-business operational excellence for large corporations" (Barua, Konana, Whinston & Yin, 2001). An e-procurement technology is defined as any technology designed to facilitate the acquisition of goods by a commercial or a government organization over the Internet (Antonio, Mahendra & Richard, 2003). According to Antonio et al., e-Procurement technologies ~~including e-Procurement software, B2B market exchanges, and purchasing consortia are~~ focus~~ed~~ on automating ~~Companies are using the Internet to enter new markets, shrink supply chains, create new value chains, significantly improve operating efficiency, and meet the challenges of increased competition and global markets. (Anonymous 2001b)E-commerce is often divided into two segments: Business-to-business (B2B) and business to consumer (B2C). While the B2C segment is perhaps the most publicly visible with the success of online retailers such as Amazon.com, the B2B segment is the area that will experience the most dramatic growth. Electronic procurement or "e-procurement," is one of the newer and more impressive solutions that have emerged within the business to business e-commerce space. (Anonymous 2001b)~~

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(Anonymous 2001b)

It is no surprise, then, that a major goal of purchasing managers worldwide is to control off contract buying to save money of the organization. Today, technology offers an excellent way to achieve this goal through the implementation of an e-procurement solution. (Anonymous 2001b) work flows, consolidating and leveraging organizational spending power, and identifying new sourcing opportunities through the Internet. (Antonio et.al., 2003).

E-procurement is one of the inter-organizational information systems, which has been used widely in organizations to improve the procurement performance. Based on Croom (2000), organizations are well aware of the opportunities provided by information technology to streamline the procurement process through the adoption of e-procurement.

It cannot be denied that e-procurement is the subset of e-commerce. E-commerce is often divided into two segments: Business-to business (B2B) and business-to-consumer

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(B2C). While the B2C segment is ~~perhaps~~ the most publicly visible with the success of online retailers such as Amazon.com, the B2B segment is the area that will experience the most dramatic growth. Electronic procurement or "e-procurement," is one of the newer and more impressive solutions that have emerged within the business-to-business e-commerce space (Anonymous, 2001b). In other words, e-procurement mainly involves business to business (B2B) electronic commerce. It is currently the fastest growing area of B2B e-commerce (Arthur, 2000). ~~Furthermore,~~ E-procurement has brought a new perspective to traditional procurement practices.

~~E~~ The e-p

~~Based on figure 2,~~ rocurement solution employs a few online systems to streamline the purchasing process as per Table 2.1 below. With this new e-procurement solution, on line catalogs and on line requisitions are applied to streamline paper-intensive tasks within procurement process.

Table 2.1

Scope of E-Procurement (Anonymous 2000b)

Request	Source	Order	Receive	Pay
On line Catalogs.	Online Catalogs	Online Catalogs	EC from Supplier	Electronic Funds
On line Requisitions	Online Bidding/	PO Bundling	EC to/from Logistics	Tansfer
Supplier Web Site	Auctioning	EC to supplier	Provider.	Evaluated Receipt
EC to/from suppliers	Third-Party	Workflow (consult &	Deskside Receiving	Settlement
	Networks	approve)		Accounts Payable
	EC to/from suppliers	Inter-company		Integration
		document routing		Project Accounting,
				P-Card

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Automated purchasing processes E-business implementations have clearly shown that e-procurement – applications that automate enterprise purchasing processes – is one of the areas of e-commerce that is delivering rapid and quantifiable results. This unique opportunity to ddirectly impact a company bottom line by substantially reducing order processing and other costs makes of e-procurement a key element of any e-business strategy. (Anonymous, 2001a). The electronic connection of business operations to customer, suppliers, and partners via e-commerce is rapidly transforming business, as enterprises of all sizes join the Internet economy. Furthermore, e-procurement has emerged as one of the major areas for companies to gain a competitive edge.

E-procurement technologies have been credited with providing significant benefits to companies who venture into them. These advantages include reducing administrative costs, shortening the order fulfillment cycle time, lowering inventory levels and the price paid for goods, and preparing organizations for increased technological collaboration and planning with business partners (Croom, 2000; Roche, 2001; Gamble, 1999; Greenemeier, 2000 and Murray, 2001).

Z-axis
"Internal Issues"
Strength of
Structure

Organization
Technology
Collaboration

Product Development

Procurement

Operations

Marketing & Sales

Distribution

Customer Service

SpeedSCAL SpeedSCALE SCOPE SCOPE

Y-axis
"Desired benefit"
Driving Forces

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X-axis
"e-opportunities"
Inefficiencies Along
The Value Chain

Figure 2.2 Nucleus Of E-Procurement (Venuprasad, 2001)

Issues involved in successfully building an e-procurement platform are "Internal Issues" or strength of structure of the organization, "Desired Benefit" or driving forces for success and maximizing "E-Opportunities" or analyzing the inefficiencies along the supply chain and determining how web-based applications are best exploited (Venuprasad, 2001). To take full advantage of e-procurement applications for competitive advantage, a strategic framework for e-procurement based on these three components are needed. In general, a strategic framework for e-procurement consists of 3 dimensions, Speed, Scope and Scale as shown in Figure 2.2 (Venuprasad, 2001).

Accordingly to Eyholzer and Hunziker (2000), there are 3 models of e-procurement solutions as stated in Figure 2.3. The organization may install Buyer Centric Model, which includes a certain number of catalogs from various suppliers (Eyholzer & Hunziker, 2000). In the Buyer-Centric model, the purchasing organization takes an active role in selecting the suppliers with whom the company will do business. These chosen suppliers provide an electronic version of their catalogs to the purchasing organization. The catalogs are loaded onto a software product running inside the customer firewall. These buyer-side solutions deliver catalogs of predetermined items from selected suppliers to the end consumer. End consumers access the catalog from a

Web browser, select the items they wish to purchase, and initiate the order. The requisition is processed to the next level approver (if required) through workflow. Orders then flow directly to the supplier for fulfillment or are passed as approved requisitions to the legacy purchasing system. Consumers benefit by having one logon and pricing, and have access to all the ordering information inside the firewall. The major challenge is associated with managing the content of the catalogs.

Alternatively, organization can choose the Supplier Centric Model of e-procurement. In this model, a company directly order and surf through the Internet /web site of different suppliers.

The third alternative is the use of electronic marketplace or sometimes referred to as the Hybrid Model. A hybrid model represents the next generation of e-procurement on the web. Here, the buying side of the equation stays essentially the same as in the Buyer-Centric Model. The difference in the Hybrid Model is that this model introduces a third party as either a portal operator or market maker, who provides value-added services to both the buyers and suppliers. These value-added services could include catalog content scrubbing or normalizing and classifying so that the customer receives clean data in an acceptable format. It could also involve providing a portal or hub through which the buyer passes purchase order transactions and the supplier passes ship notices and invoices. Supplier content is cleaned once so that when any new customer comes along and wants to purchase from the same supplier can benefit from previous work done for other customers. This Hybrid Model also supports additional innovative services, such as auctioning and request for proposal management (Anonymous, 2000a).
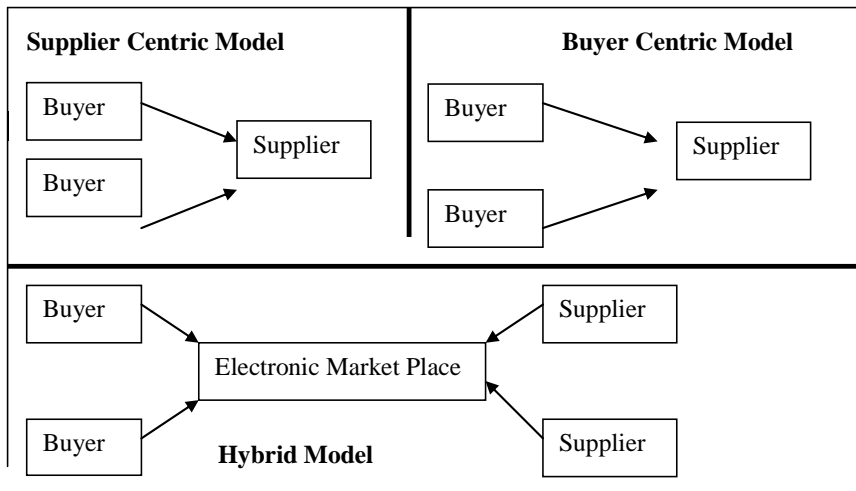
Figure 2.3 Models of E-Procurement (Eyholzer and Hunziker, 2000)

The introduction of e-procurement into organization progresses in phases. Most companies implement e-procurement in maintenance, repair and operating (MRO) purchase transactions and indirect purchases first before moving to core business purchases. Indeed, e-procurement technologies are expected to offer the greatest long-run benefit to organizations through their application to the supply chain (Antonio, Mahendra & Richard, 2003).

E-Procurement has enhanced the two fundamental aspects of the procurement process: (1) Communication Aspects (the accessing, sharing, and archiving of procurement-relevant information and data); and (2) Transaction Aspects (the buying-selling activities directly involved in supporting and consummating particular purchases (Talai, Daniel & David, 2002).

Indeed, e-procurement is an integrated value system. Value system integration can be defined as the process by which multiple parties within a shared market segment

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collaboratively plan, implement and manage the flow of goods, services and information along the value system in a way that increase customer-perceived value and optimizes the efficiency of the chain (Dobbs, 1998). The concept of integrated system is expected to have major impact, allowing companies and ultimately customers, to benefit from reduced inventories, cost savings, improved value added goods and services to customers, and tighter links with business partners (Michael, Piet & Aphrodite, 2000).

Companies that use e-procurement technologies report savings of 42 per cent in purchasing transaction costs. This cost reduction is associated with less paperwork, which translates into fewer mistakes and a more efficient purchasing process. The simplification of the purchasing process that e-procurement technologies are credited with also has a favorable impact on the purchasing cycle time. While not directly quantifiable into dollars, faster cycle time provides increased flexibility and more up-to-date information at the time of placing a purchasing order. E-Procurement technologies users also report a reduction in the number of suppliers - with the associated cost benefits of lower managerial complexity, lower prices, and a headcount reduction in the purchasing process. It shows that cost savings is the primary rationale for investment across all technology platforms, though the manner in which these savings are delivered varies (Antonio, Mahendra & Richard, 2003). The recent Aberdeen Group survey of MRO (maintenance, repair and operating supplies) buyers indicated that the conversion of paper-based purchasing to EC-based purchasing resulted in an average of 5-10 percent reduction in purchasing price, 25-50 percent reduction in the inventory level, 5-days reduction in cycle time and a US$77 saving per requisition in administrative cost (Brack, 2000). Another recent e-procurement study conducted by Deloitte Consulting reported