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Abstract

The big company may spend millions of dollars of expenditure on indirect goods and services. However, much of them may be carried out locally or divisionally, bypassing central guidelines. From a corporate perspective the fragmented procurement resulted in slow and expensive processes and excessive product costs due to poor leverage of buying power. The greater information processing capability achieved through the use of technology, especially Internet-based procurement systems, will enable significant cost improvements and leverage to be obtained through a more strategic approach to management of the typically routine and repetitive tasks with a low unit value, high variety of goods and services, but relatively high frequency. According to the researches, a 10 percent reduction in purchase costs can easily lead to a 50 percent rise in profit margin. This paper addresses the issue of how the Internet-based technologies will impact on the procurement strategy. I believe that the radical change in the Internet will give rise to new marketspaces, which may have the largest impact on procurement. The benefits to aware impacts come not only through direct cost savings but also through the improved efficiency of companies rethinking how they operate.

1. Introduction

Emerging technologies, such as the Internet and Web, are bringing the promises to change the picture of costly, time-consuming, and inefficient procurement processes by enabling major improvements in terms of lower administrative overhead, better service quality, timely location and receiving of products, and increased flexibility. With most organization spending at least one third of their overall budge to purchase goods and services, procurement holds significant business value (Zenz & Thompson, 1994; Killen & Kamauff, 1995). Meanwhile, growing pressures from increasingly competitive markets all around the world reinforce the need to reorganize and streamline inefficient procurement procedures.

IT-based tools have been introduced to support production procurement and supply chain operations. However, procurement activities in the non-production items have long under-estimated on an organizational level as well as with respect to the use of IT. Because of little process standardization and a majority of manual activities, the non-production procurement is often a poorly managed, uncoordinated, and non-valued activity (Croom, 2000; Gebauer & Zagler, 2000). Available IT systems usually do not cover the full process or are very expensive to set up. Internet and Web-based applications promise alternatives that are cheaper and easier to set up. Consequently, procurement function is facing significant reengineering and change management challenges.

This paper addresses the issue of how the Internet-based technologies will impact on the procurement strategy. I believe that the radical change in IT will give rise to new marketspaces, which may have the largest impact on procurement. The benefits to aware impacts come not only through direct cost savings but also through the improved efficiency of companies rethinking how they operate. I will provide an overview of procurement processes and some of the activities that organizations had undertaken to improve performance, then taking a look at currently available Internet- and Web-based technologies, and the opportunities that they open. The impacts and obstacles are also discussed.

2. Research Background

The corporate procurement has traditionally been separated along two dimensions: the direct or production-oriented procurement and indirect or non-production-oriented procurement. Direct procurement generally refers to the purchasing of items that immediately enter a manufacturing process, such as the parts that are assembled into a car or computer. Indirect procurement includes everything that is not covered by direct procurement. In addition to so-called maintenance, repair, and operations (MRO) supplies that are consumed in the production process and required to keep up the manufacturing process, indirect procurement also includes items, as diverse as office supplies, computer equipment, promotional material, travel and other services (Segev, Gebauer, & Farber, 2000). Other researchers also include items in the indirect category such as training materials, accessories, temporary staff, public relationships, entertainment (Croom, 2000) and contract workers and consultants (Moozakis, 2001).

The direct procurement has been emphasized on and treated differently than indirect procurement. Compared to direct procurement, indirect procurement covers a wider range of products and services, typically involved a larger number of buyers (possibly every employee, for example, office supplies), and is much less predictable with respect to buying volume and frequency. Add the fact that it is often not regarded of strategic relevance but rather as a clerical function, and it comes at no surprise that the businesses processes are typically not well standardized, most manual, and as a result inefficient and non transparent (Gebauer & Segev, 2001).

Incidentally, the difference between direct and indirect procurement also shows in organizational charts: direct procurement often reports to a Vice President of Supply Chain Operations (or similar) while indirect procurement might fall into the responsibility of the finance function. The line of management for both areas only meet at the level of the Chief Executive Officer. In the literature, the indirect products and services, variously known as MRO (maintenance, repair, and operation) items, have received little attention, as by far the dominant focus of the purchasing literature has been the management of production item procurement. However, a big company may spend millions of dollars of expenditure on indirect goods and services. Much of them may be carried out locally or divisionally, bypassing central guidelines. For example, a large manufacturer bought office supplies from as many as three hundred suppliers, more or less regularly. Nobody was in control of the overall process and each business unit had its own procedures in place. From a corporate perspective the fragmented procurement resulted in slow and expensive processes and excessive product costs due to poor leverage of buying power (Nelson, Moody, & Stegner, 2001). According to PricewaterhouseCoopers, a 10% reduction in purchase costs can easily lead to a 50% rise in profit margin.

The greater information processing capability achieved through the use of technology, especially Internet-based procurement systems, will enable significant cost improvements and leverage to be obtained through a more strategic approach to management of the typically routine and repetitive tasks with a low unit value, high variety of goods and services that constitute the main category of MRO (maintenance, repair, and operation) items. However, most information processing and communication around procurement in the organizations is still based on paper and telephone (Segev, Gebauer, & Farber, 2000). The new procurement systems (i.e. E-procurement) allow employees to order goods directly from their PCs, either through an Intranet or a website. Orders are automatically channeled to suppliers, often via a hub that acts as a host for their online catalogues. The catalogues hold the companies negotiated prices, as well as authorization rules that ensure the right people buy only what they are allowed to. When employees put the job out to tender, it will come back with a list of three or four suppliers. Operators of procurement hubs will increasingly scour the world for new low-cost suppliers, to offer a better service for their purchasing customers. They will check out these suppliers for quality and integrity, if necessary build catalogues for them, and plug them into their systems.

E-procurement system allows employees to combine catalog from several suppliers, check the availability of items, place and track orders, and initiate payment over the Internet. It does not mean just putting purchasing decisions online, but also means linking suppliers into the purchasing network and broadening the range of employees who can carry out transactions. Therefore, e-procurement is not an example of computerizing the old manual process, but of re-engineering the process itself.

How will the Internet-based technologies impact on procurement strategy? Does Internet mean just doing the same things faster and cheaper? This study attempts to answer those questions. There are also three goals in which this study intends to pursue:

1. Evolve from buying of simple indirect products to sourcing of complex direct products
   Most firms are currently stuck at the first stage of procurement, i.e. simple automation transaction. After starting with non-production related, indirect or MRO (maintenance, repair, and operation) purchases, companies will gradually transfer what they have learned to other parts of the business.
2. Extend from large companies to small or medium-size companies
   Similar to traditional EDI applications, early e-procurement projects have been undertaken by large organizations. In the future, the small companies will also benefit from these new technologies.
3. Increase automation and flexibility
   The companies often experience great difficulties to keep up with the rapidly advancing technological development. Not prepared for the changes, lots of people charged with procurement have little or no experience in buying online (Ramsdell 2000). A number of factors have prevented a shift from focusing on automation to focusing on flexible e-procurement solutions. New systems should be able to increase automation and flexibility to cope with exceptional demands and inexperienced workers.

3. Literature Review

The related literature will be reviewed in this section.

3.1 Procurement vs. Purchasing

Procurement includes all activities involved in obtaining materials, transporting it, and moving it towards the production process (Segev, Gebauer, & Beam, 1998). Purchasing is the act of buying and services, represents a core element of procurement.

Procurement processes take on many different forms in reality. Considering the types, uses, and the value of the goods purchased, three categories of procurement have been distinguished (Hough & Ashley, 1992; Zenz & Thompson, 1994):

- Procurement of raw material and production goods is usually characterized by large quantities, high frequencies, and important and unique specifications; just in time is often critical.
- Procurement of maintenance, repair, and operation (MRO) supplies is characterized by low unit cost and high variety, but relatively high frequency; examples include office supplies.
- Procurement of capital goods means dealing with goods of high value at low frequency (e.g. new factories) and/or procuring items outside the regular

purchasing process, often because of convenience or speed requirements.

Close supplier relationships are particularly relevant for direct procurement (raw materials or production goods) where the quality and availability of suppliers can be of critical importance (Lutz, 2001). Company typically spends several years to establish the relationship and to ensure the supplier meets the high quality standards. The unknown suppliers are unthinkable in this context. For indirect procurement (MRO and capital goods), efforts to consolidate the supply base and to establish relationships with preferred suppliers often consider cost rather than quality and availability (Cousins, 1999). Buying firms expect better product prices and less costs to manage the supplier base.

These three types of procurements also involve in three main categories of costs (Gebauer & Zagler, 2000). In the first category, the cost of procurement of raw materials is the product cost (and quality). To ensure consistent quality, the pre-selection of suppliers and active supplier management are critical activities of the sourcing cycle. The involvement of suppliers in target costing activities and collaborative design has proven useful to limit total project cost. In the second category, the cost of procurement of MRO items is the process cost. In this category, the process costs may equal or even exceed the product cost. Therefore, the price is critical. The third category is the technology cost for capital goods. Typically, the characteristics of capital goods are high complexity, innovation, and strategic relevance. Therefore, the range of available supplies is typically very limited (Brown, 2000).

3.2 Strategic vs. Transactional Tasks

Procurement activities can also be categorized: long-term-oriented strategic and short-term-oriented transactional activities (Segev, Gebauer, & Beam, 1998). Long-term-oriented, strategic tasks include sourcing activities, identifying vendors, and establishing and managing supplier relationships, as well as contract negotiation and management, but also the design and implementation of buying procedures, and financial and asset management. Activities are long-term oriented and the resulting supplier relationships often last for many years. Short-term-oriented transactional tasks are mostly clerical order-related activities.

3.3 Sourcing vs. Buying

Many purchasing organizations distinguish between activities of sourcing and buying tasks (Dobler & Burt, 1996). Sourcing processes cover more than just one or a few individual buying operations and include:

- Market Intelligence
- Demand forecast and planning
- Identification of suppliers
- Requests for quote and bidding
- Negotiation of terms of contract
- Selection of sources and finalizing of contract
- Supplier management

Buying processes typically refer to single transactions only and include activities such as:

- Selection of product and supplier, from catalog or other sources
- Submission of internal requests and management approval
- Submission of purchase orders to pre-approval supplies
- Delivery, payment
- After-sales support and customer service

4. Theoretical Foundations

The benefits to the firms deploying Internet technologies include: increased efficiency of order processing, reduced costs due to just-in-time inventory management, locked in trading partners because of the difficulties competitors faced once a network is in place, and greater ability to customize products and services based upon information arising from the transactions carried by the network (Cash & Konsynski, 1985; Johnston & Vitale, 1988). The internet will also increase the efficiency of supply chain by facilitating inter-organizational information sharing, reduce the length of the supply chain by making it easier to locate suppliers, and help handle situations of unforeseen demands better (Gebauer & Segev, 2001).

4.1 Supply Chain Management

Supply chain management (SCM) has been used to partner with suppliers and to integrate logistics functions and transportation providers to efficiently and effectively manage the value chain. Most of the recent literature on supply chain management focuses on manufacturers' attempts to integrate processes and form alliances with suppliers to more efficiently and effectively manage the purchasing and supply function.

The supply chain management philosophy expands the internally focused integrating activities of logistics by bringing multiple organizations along the supply chain together with the common goals of efficiency and end-consumer satisfaction (Harwick, 1997). SCM creates a virtual organization of independent entities to efficiently and effectively manage the movement and transformation of materials, components, products, and services along the supply chain until final delivery to the end user (Croom, 1998). Thus, SCM integrates a number of key functions, including purchasing, demand management, manufacturing planning, and materials management, throughout the supply chain.

The short-term objective of SCM is primarily to increase productivity and reduce inventory and cycle time. To realize this objective, all strategic partners must recognize that purchasing function is a crucial link between the sources of supply and the organization. Indeed, the origin of SCM can be traced back to efforts to better manage the transportation and logistics function. In this respect, SCM is synonymous with integrated logistics systems that control the movement of goods from the suppliers to end customers without waste (Ellram, 1991; Ellram & Billington, 2001).

Integrated logistics systems seek to manage inventories through close relationships with suppliers and transportation, distribution, and delivery services. A goal is to replace inventory with frequent communication and sophisticated information systems to provide visibility and coordination. In this way, merchandise can be replenished quickly in small lot size and arrive where and when it is needed (Handfield 1994).

4.2 Strategic Networks

Strategic networks are defined as the long-range, deliberate, cooperative, and goal-oriented organizational forms among distinct but related organizations that enable such network member organizations to sustain competitive advantage vis-à-vis their competitors outside the network (Jarillo, 1993). Wingand, Picot and Reichward (1997) emphasized strategic networks as a distinct organizational form, that is, as being separate from hierarchy and market.

Networks optimize communication, and a more efficient exchange of information becomes possible. As Powell (1990) stated, information passed through networks is thicker than information obtained in the market (since the price mechanism tends to treat information as a commodity and thus tries to make it as scarce as possible) and freer than that communication in a hierarchy (since information is not filtered as clearly through power relationships). Therefore, network organizations combine the advantages of hierarchies, such as better control and coordination of actors, with the advantages of small, independent companies-who has more innovative abilities, tend to be in closer contact with the market, and more flexible, with smaller staffs, fewer intermediaries, and lower overhead.

Malone, Yates, and Benjamin (1987) believe that the development of inter-organizational electronic networks would increase the numbers of buyers and sellers. The use of open information systems may be seen to provide greater levels of information to buyers, thereby opening up greater competitiveness between providers. In addition, they argued that the use of electronic communication links between firms could reduce both the costs of coordinating economic transactions and the costs of coordinating production. As a result, the lowered coordination costs would encourage more outsourcing, enabling firms to buy goods and services less expensively than by producing them in house (Malone, 1987; Malone et al., 1987; Malone et al., 1989).

Existing evidence at the industry level indicates that increases in investment in information technology are associated with a decline in average firm size and a rise in the number of firms (Brynjolffson, Malone, Gurbaxani, & Kambil, 1993). It may be expected that greater information availability will lead firms to increase their level of outsourcing. As a consequence, an increase in the proportion of bought-out goods and services will place an increased strategic emphasis on the purchasing process.

4.3 Transaction Cost Theory

Economists have classified transaction among and within organizations as those that (a) support coordination between multiple buyers and sellers, that is, market transaction, and those (b) supporting coordination within the firm, as well as the industry value chain, i.e. hierarchical transactions (Wigand, 1997). Marketing hierarchy progressing from manufacturer to wholesaler, retailer, and consumer is associated with transaction costs. Transaction costs include the costs of searching, bargaining, coordinating, and monitoring that companies incur when they exchange goods, services, and ideas (Benjamin & Wigand, 1995; Wigand, Picot & Reichwald, 1997).

The major force driving electronic commerce is the ability of networks to reduce transaction costs (Auger & Gallaugher, 1997; Garcia, 1997). Capitalism depends on information to allocate resources efficiently. When business can access the best available information at the most appropriate moment, they can reduce their costs and enhance their productivity. Similarly, when buyers and sellers can easily locate one another and have a good idea of what they can expect in terms of quality and prices, they are more likely to engage in trade. The ever-increasing and innovative use of the Internet or Web to conduct business is clear example of firms' desires to reduce transaction costs. Thanks to information technology, the evolution from separate databases within the firm to linked databases between firms to shared databases between firms, transaction costs are indeed falling rapidly (Wigand, 1997). Malone et al. (1987) also suggested that the communication effect via information technology and a tighter electronic linkage between buyers and sellers may lead to reduced transaction costs.

4.4 Collaborative Commerce

Michael Hammer (2000) defined collaborative commerce as "it is multiple companies working together to achieve better results than they could together" (p.190). Clearly, the Internet is the key enabler of that. The corporate purchasing has been shaken by those collaborative activities. A new category of "buy-side" software from vendors like Ariba and CommerceOne appeared on the scene. This software allows companies to automate and streamline the purchase of indirect, everyday supplies that not used in products. Then came net markets, with their tantalizing promise of even greater cost saving in the purchase of direct products-the raw materials that actually go into a product.

Recently, several hundred independent exchange have opened for business and announced plans to build their own Web-based marketplaces. These online markets create new ways of doing business in traditional industries such as papers and chemicals, where the process of buying and selling commodity-like products. Buyers and sellers can meet on a virtual trading floor and transact as quickly and efficiently.

We see that the first wave of Internet-enabled collaboration focused on the supply chain, as companies collaborated with their customers, suppliers, and

intermediaries (Bowles, 2000). But the second wave is extending to enterprises with which a company previously had no relationship. Collaborative commerce is rapidly becoming the norm. Over the next years, increased business process integration will lead companies to a big payoff-a more synchronized supply chain, which yields better customer service, higher quality products, lower inventory and faster delivery.

5. The potential of Internet-based Procurement Systems

With procuring processes typically involving a large amount of information processing and communication, procurement is well suited for IT support and automation throughout all its steps.

Early initiatives to introduce Internet technologies to support procurement concentrated on the automation of highly structured processes. Desktop purchasing systems (DPS) extend traditional EDI systems with user friendly, browser-based interfaces, increased flexibility and automated workflow, well suited to facilitate end-user empowerment and self-service. Based on electronic catalogs as a central data repository, these systems are readily available and well suited to automate highly repetitive activities, as they prevail in the category of process cost oriented procurement (low unit value and high variety items purchased at high frequencies, such as MRO items). In many cases, the operational gains from reduced process costs and lead times allowed procurement departments to reduce their administrative workloads and free time and resources for strategic sourcing activities.

Recent developments are most prevalent in the area of Internet-based exchange, be they horizontal or industry specific (Kaplan & Sawhney, 2000; Phillips & Meeker, 2000). While horizontal exchanges connect market participants of the same function, such as automotive industry, exchanges provide information and services to all members of a particular industry. The other examples of trade exchange include MetalSite, e-STEEL, MetalSpectrum, GlobalNetExchange, WorldWideRetailExchange (retail), and E2Open (electronics). Although the boundaries are usually indistinct, exchanges tend to provide less automation than DPS but cover a wider area of products, typically procured at low frequency with a focus on product cost and quality. Also, solutions oftentimes support only a few aspects of the procurement process, such as supplier identification (supplier directories), or obtaining access to product information.

6. Research Methodology

The first and most important condition for differentiating among various research methodologies is to identify the type of research question being asked (Strauss & Corbin, 1990; Yin, 1994). The primary question of this research is, how will the Internet-based technologies impact on procurement strategy. According to Yin (1994), case studies are preferred when "why" and "how" questions are being posed, when the investigator has little control over events, and when the focus is on contemporary as opposed to historical phenomena (p. 1). This research aims to answer the question of how, and because Internet technologies is a contemporary phenomenon and changes rapidly, the investigator cannot expect any control. Therefore, the case study methodology will be applied in this study.

6.1 Data Collection

The principle of data collection is to use multiple sources of evidences. Any finding or conclusion in a case study is likely to be much more convincing and accurate if it is based on several different sources of information, following a corroboratory mode (Yin, 1994). Evidences in this study will come from three sources: semi-structured interview, Website visits, and document review. Semi-structured interviews and web site visits were the primary vehicle for investigation. Documents, secondary data collection were also applied to support and complement the primary approach. The convergence of results between multiple data collection sources enhances confidence that the results are valid, and weaknesses in one method are compensated by the strengths of another.

Semi-structured interviews were carried out in the fall of 2000. More than one person per firm was interviewed to cross-check for any inconsistencies in interview responses and to strengthen the data reliability. The participants located in Minnesota came from companies' Chief Operation Officers, purchasing managers and e-procurement experts. The interviews employed open-ended questions.

Although on-site interviews can reduce the researcher's distance from the phenomena and provide insights, interviews are subject to problems of bias, poor recall, and poor or inaccurate articulation (Yin, 1994). A reasonable approach is to corroborate interview data with information from other sources. Website visit is the second resource of collecting the original data. It will be undertaken in an attempt to bring about greater understanding of the background and process of procurement. A review of the specialized industry magazines and conferences was also used. Several other sources were reviewed to safeguard the reliability and validity of the secondary data. I coded data from all interview responses using typical content analysis procedures (Lincoln & Guba, 1985; Strauss, 1987; Taylor & Bodgan, 1984).

7. Impacts

The impacts are examined as below.

7.1 Role Change in Purchasing Department

There are changes to business practices and organizational structures over the next years as e-commerce solution becomes more mature and more widespread. As a general development we see the role change between end users and purchasing department, i.e. new procurement system will continue to either automate purchasing operations or help push them down to the end

user, allowing the purchasing department to concentrate more on strategic and managerial tasks, such as partnership relationships, long-term supply contract. Since employees can purchase directly through their Web access, purchasers no longer need to process orders, invoices, or chase delivery. As a result, purchasing department will become composed of mostly managers, and less of clerks, secretarial staff, and administrative support. Additionally, the determining factor of geography will reduce, freeing organizations to obtain the best deal and the most appropriate products from anywhere on the globe.

7.2 Convergence between Direct and Indirect Goods

The division between direct and indirect goods will be blurred. E-procurement encourages commoditisation (brand details are often stripped from the catalogues), which means they will be ideal for standard production items (nuts, bolts, paper clips, and so on), as well as non-production indirect goods. The real distinction will be between purchases that can be commoditised, and those that cannot.

7.3 Supply Base Reduction

Small supplier bases could go into reverse. This will not happen for critical components, where the need for ever-closer collaboration will continue to shrink supplier numbers. But if you are buying paper clips, why not cast your search as wide as possible? Reverse auctions will allow you to spread the net far more widely, and the Internet is excellent at handling complexity. This is not to say that the end buyer will necessarily deal with more suppliers-but he will be dealing with a bigger supplier base. The consolidation of suppliers will appear.

7.4 Increased Procurement Control

The variety of MRO items consider difficulty in terms of developing specialist knowledge regarding product and service technical characteristics, and supply market conditions. The ability to consolidate and categorize suppliers, services, and MRO goods is seen as an enabler in the move toward greater professional contribution to MRO procurement. In addition, the centralized purchasing function was able to exert greater control over sources of supply, purchase price, and inventory policy. Organizations will be able to manage their MRO low-value and high variety items in a more strategic manner through such action as the establishment of single-source arrangements, consolidation of commodities and services, and increased buying power over the supply base.

7.5 E-auction

The new generation MRO, electronic auctions might start to play an important role. A prospective purchaser could dial in and see the spot price of paper, chairs, or office supplies and determine whether to purchase. In the future, next generation auctions will also feature more complex items and allow matching of supply and demand not only with respect to price, but also for features such as service, quality, or speed of delivery.

7.6 E-bidding

Writing up an electronic Request for Quote and submitting it to the electronic marketspace will become easy for buying organizations. Suppliers would be able to electronic contact each other, negotiate a team-based approach, and automatically respond to the Request for Quote.

8. Obstacles

The following obstacles are discussed.

8.1 Security Concerns

The issue of security is a major concern, especially in the context of electronic payments. The capability of any system to provide secure data transfer was regarded as a major criterion for both existing and potential users of e-procurement systems.

8.2 Inefficiencies in Locating Information

This lack of interoperability and the lack of standards make it difficult to pull all buyers and suppliers together into a single protocol or a few marketspaces for buying and selling. Despite its steady growth, the current use of Internet-based technologies has not yet reached critical mass.

8.3 Staff Resistance

Sometimes, the purchasing staff will resist online solution because, not unreasonable, they detect a threat to their job security. In fact, their roles do change dramatically because they are freed from burdensome clerical labour which takes up 70 percents of their time in manual systems and allowed to put their real skills into practice by negotiating contracts and monitoring supplier performance. Also, organizations used to rely extensively on interpersonal communication (telephone, face-to-face negotiation, or fax, etc.). The habits are hard to change. The staff resistance will increase.

8.4 Lack of Top Management Support and Vision

This is understandable, because not even researchers and market analysts are yet sure of the exact direction electronic purchasing will move. There is a long road from the friction-free e-procurement to the reality. However, the successful e-procurement is a top-down process that requires a champion and a visionary at the boardroom table who can grasp the strategic potential of the procurement issue.

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