

E-PROCUREMENT AT WORK: A CASE STUDY*

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E-PROCUREMENT: CHILD OF THE INTERNET AGE

What Is E-Procurement?

The Internet has had revolutionary effects on corporate purchasing practices. It recently became a major enabler of significant productivity improvements in various businesses. The companies offering so-called e-procurement solutions are positioning themselves as generators of considerable cost savings for those manufacturers consuming the largest share of the economy's tangible inputs. The overall productivity of the manufacturers often depends on their efficiency in purchasing those inputs.

E-procurement sites, also known as business-to-business (B2B) marketplaces, electronic supply chains, trading hubs, or trading communities, are essentially Web-based procurement networks in which one or more companies try to source their suppliers at the lowest costs possible [14]. From a conceptual standpoint, e-procurement does what tendering, its pre-Internet world analogy, has been doing—it helps companies source input products and services at the lowest cost, while ensuring that those inputs meet technical and other (tender) specifications [14]. By making this process Web-based, e-procurement solution providers are changing the process in ways that go far beyond its mere computerization and automation.

The Rise and Future of E-Procurement

The emergence of B2B marketplaces, although not unexpected, has been very fast paced. In the second half of 1999, B2B e-commerce suddenly began to mean much more than end-consumer-oriented online auctions and digital versions of product catalogs. Despite the fact that it is in its infancy, e-procurement managed to reach about \$145 billion in transactions in 1999 [15]. Forrester Research, a consulting firm, predicts that

e-procurement will grow 99% annually, meaning the volume of transactions will reach \$1.3 trillion by 2003 and account for 9.4% of the U.S. B2B market [2]. Goldman Sachs, an investment bank, forecasts that e-procurement transactions will reach \$1.5 trillion by 2004 [2]. The increasing number of B2B marketplaces will accompany the growth of e-procurement transactions volume. There are currently between 600 and 1,000 B2B marketplaces and, according to some estimates, their number will increase to 10,000 by 2003 [2].

The predictions of astounding growth for B2B e-commerce are not simple approximations based on trends. They are backed by the strong attractiveness of e-procurement to U.S. corporate buyers. A study of U.S. companies with revenues greater than \$1 billion undertaken by Deloitte Consulting in the fall of 1999 [18] revealed the following:

- Of the firms that reported using e-procurement solutions extensively, 85% said they were highly satisfied with the resulting benefits.
- More than 90% of firms have incorporated e-procurement into their business plans, and one-third of them have started implementing an initial solution.
- Most of the firms' top e-business objectives relate to procurement and the supply chain.

CHARACTERISTICS OF E-PROCUREMENT

Evolution of B2B Marketplaces

The evolution of e-procurement sites has been so rapid that it prompted some analysts to say that "Charles Darwin never saw anything like this" [2]. Still, there have been several identifiable stages in the fast-forward evolution of B2B marketplaces [10, 14, 16]:

1. Big corporations such as General Electric and Wal-Mart created buying and selling hubs in the Internet designated to cut costs and speed supply procurement.
2. Third-party exchanges appeared, facilitated by independent firms such as PlasticsBIN.com, National Transportation Exchange, and Vertical Net. They brought together many buyers and sellers and created a genuine market in a number of areas (primarily non-production-related goods).

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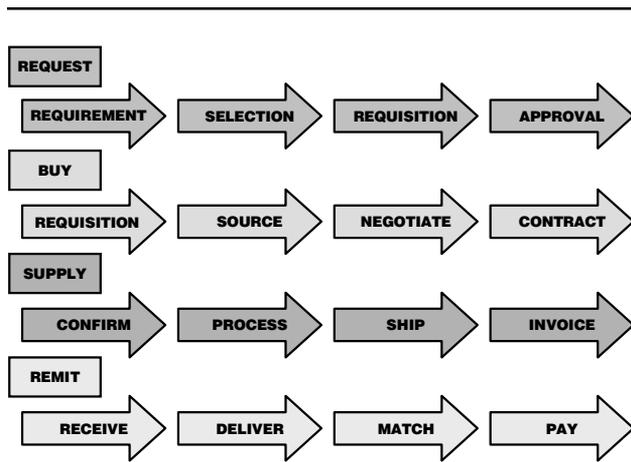


FIGURE 1: Operations included in the process of purchasing

3. Major players of some vertical industries, such as GM, Ford, and DaimlerChrysler, are joining in e-procurement consortiums.

These different marketplace forms coexist although they represent different stages of e-procurement evolution. Whether all of them survive depends on the way the industries whose needs they serve will be structured in the future. Currently, two extreme structures determine the organization of the industries. Some are organized in an asymmetric, “pyramid-shaped” manner, with a limited number of either buyers or sellers; others are “butterfly-shaped,” that is, highly fragmented on both sides [16].

The first type of structure tends to generate “biased markets” [16] that “naturally favor one side of the deal flow” [16]. These marketplaces approximately correspond to the first and third model of a B2B marketplace mentioned above. They have the advantage of low cost, associated with persuading the critical mass of users to join the marketplace. And they can be financed and/or owned by market participants without compromising themselves, since small firms are used to the idea of working alongside big ones [16].

The butterfly-shaped markets are “neutral” [16]. They lend themselves to independent, third-party exchanges that are closer to the second model. They have the advantage of being more like true markets such as stock exchanges and, thus, are better able to lower prices and improve liquidity by matching buyers and sellers [16]. The potential for these exchanges is great, but gaining critical mass of users is difficult, which undermines the future of many of the exchanges.

Some authors claim that e-procurement consortiums based on specific vertical industries (but not dominated by a single organization) represent clear progress in the evolution of a B2B marketplace [2, 16]. Such a marketplace brings all participants of a supply chain together in a single location. This may result in cross-pollination of cost-saving and market access effects across the whole supply chain.

Some other classifications of e-procurement sites stress the technical side of their operation. For example, Deloitte Consulting identifies three types of B2B services based on the content and features they offer [17]:

1. Online versions of companies’ catalogs with listed products, prices, specifications, and sale and delivery terms.
2. Online auctions, which can be useful for dumping excess inventory and picking up bargains.
3. Online exchanges, which match buyers and sellers through bids.

It is quite possible and, even likely, that the pool of potential B2B marketplace models is not exhausted, and that in future we shall see new forms of e-procurement services. These new forms will bring new advantages to participants of such marketplaces. However, even today the benefits offered by B2B e-commerce are enormous, and most businesses cannot afford to neglect them.

Advantages of E-Procurement

B2B marketplaces in the Internet could prove to be the most radical innovation in modern business since the assembly line was invented. Like assembly lines in the beginning of the 20th century, e-procurement sites promise significant increases in productivity across many industries of the economy. Their most often quoted advantage is their potential to cut costs of purchased goods and services [8, 13, 14]. The phenomenon of cost saving allowed by e-procurement is based on the new processes that cut all costs associated with purchasing, that is, the cost of goods and services purchased, ordering costs, and holding costs [2, 7, 13].

The availability and generally low cost of information and technology provided by Internet-based purchasing create absolutely different economics characterized by the following:

- Low barriers for market entrance [12, 13].
- Price transparency [2, 13].
- Better opportunities to avoid “maverick buying” and to use preferred supplier networks [13].
- Better balance of power between sellers and buyers [2].

These new economics of purchasing lead to competition that is closer to perfect and, as a result, to goods and services of better quality purchased for lower cost. A survey conducted by Aberdeen Group in November 1998 found that early adopters achieved a 5%–20% reduction in prices paid for operating resources [7].

Reduction in ordering cost, the second area of large cost savings, is associated primarily with the technological advantages of e-procurement. The ordering process, as shown in figure 1, contains four key stages, each with four substages. Costs associated with each of those purchasing process stages are effectively reduced when e-procurement systems are implemented [2]. Estimates made by Goldman Sachs, an investment bank, reveal that the ordering cost savings in manufacturing associated with e-procurement vary between 2% and 39% of the costs of goods and services purchased. The study by Aberdeen Group mentioned above proves the validity of those estimates [7]. The early adopters of e-procurement reached a 70% reduction in administration costs associated with processing a purchase request [7]. Cisco claims that it has already reduced those costs from \$130 to \$25 per order, and Microsoft, from \$60 to \$5 per order [18].

Further, e-procurement, as well as other Internet technologies, provides recently unthinkable opportunities for efficient integration of supply chains [3, 7]. Thanks to their low acquisition and implementation costs, e-procurement technologies outperform similar functions of enterprise resource planning (ERP) applications in the cost of acquisition and speed of implementation, allowing even small businesses and highly fragmented industries to benefit from integrating into supply chains. Supply chains create conditions that stimulate the implementation of modern Just-in-Time (JIT), lean manufacturing technologies. Thus, the far-reaching result of economywide adoption of e-procurement may be lower inventories and, consequently, lower inventory costs. Early adopters of e-procurement already demonstrate 25%–50% cuts in inventory costs [7].

Another important and frequently mentioned result of e-procurement implementation is shorter product development cycles [3]. These are rooted in the following improvements allowed by e-procurement systems [2, 3, 7]:

- Shorter order cycles.
- Significant improvement in project management and team collaboration across supply chains.
- Integrated information sharing across supply chains.

The shortening of product development cycles due to e-procurement practices is already evident in the U.S. automotive industry [2].

But apart from these astonishing opportunities, e-procurement poses a number of disadvantages that may make some of its potential users employ a “wait and see” strategy.

Disadvantages of E-Procurement

One of the greatest impediments to e-procurement’s fast adoption is a gap between the expectations of the two sides of the transaction—suppliers and buyers—about the way B2B marketplaces should affect them.

On one hand, buyers adopting e-procurement are becoming increasingly dependent on suppliers because of the wider adoption of JIT practices, shorter ordering cycles, increased involvement of suppliers in product development, and so on. On the other, suppliers may be reluctant to adopt the idea of e-procurement because of the necessity of dealing with more than one marketplace, high training costs associated with switching to e-procurement, turbulence in this new industry, the high risk of compromising sensitive data, and so on. [5, 6, 13]. Some suppliers will need to initiate a full organizational restructuring associated with technological changes related to e-procurement. Others might not like the idea of substituting mouse clicks for the human contact they are used to [5, 6]. Thus, the usual change management challenges should not be underestimated. Besides, it is probably worth remembering that for B2B commerce, “even in the Internet world it is not what you know, but who you know that matters” [6].

Another great difficulty in adopting B2B e-commerce is the rapidly growing multitude of standards in the industry. It is not clear which e-procurement solution providers (and whose standards) will survive, and which will not. Multiple standards in the industry are already causing confusion and increasing purchasing cost, which undermines the cost savings previously described [12].

E-PROCUREMENT AT WORK AT GENERAL MOTORS

Why General Motors?

General Motors, as a truly representative U.S.–based automobile manufacturer, has several characteristics that make it a perfect fit for e-procurement and a great example of how e-procurement is reshaping U.S. manufacturing.

First, GM is the major part of a large supply chain. The scope of this supply chain and the role of GM in it is reflected in its annual \$63 billion procurement ex-

pense [3]. The cost savings associated with e-procurement will be immense.

Second, GM's ability to push adoption of e-procurement by every link of its supply chain raises the volume of sales through its e-procurement system up to \$300 billion–\$500 billion per year [3, 19]. This will undoubtedly generate further cost savings associated with purchasing across the whole supply chain.

Finally, GM, perhaps because of its familiarity with the benefits of electronic data interchange with its suppliers and its dominant position in the supply chain, was one of the early adopters of e-procurement.

Evolution of E-Procurement at General Motors

Describing the evolution of B2B e-commerce practices at GM is difficult; it has been more of a revolution than a steady, step-by-step development. Perhaps because of the lack of experience in this new area, the "e-procurement division" of the company was often growing beyond its development plans before they were actually implemented.

General Motors started seriously pursuing the idea of e-procurement in 1999, when its technology partners, i2 Technologies and Commerce One, started creating a B2B trading community dubbed *TradeXchange*. i2 Technologies of Irving, Texas, an advance planning software vendor, signed a memorandum of understanding with GM specifying that it would provide supply chain management services and business process expertise [1]. i2 also agreed to provide the components of its Rhythm suite to GM and GM's suppliers [9]. Commerce One of Walnut Creek, California, an e-commerce software vendor, was supposed to lead the *TradeXchange* project. Through the realization of this project, GM together with its Japanese affiliates Isuzu and Suzuki was in a position to gain significant benefits associated with e-procurement [1]. However, soon the opportunity arose to push the expectations of e-procurement even higher.

On February 25, 2000, General Motors Corp., Ford Motor Co., and DaimlerChrysler AG announced they were beginning to work together to create a single Internet-based procurement network [20]. Oracle of Redwood City, California, a database concern and the developer of Ford's B2B marketplace *AutoXchange*, was chosen to be a key technology provider to the new venture, along with Commerce One [15]. The companies' intention behind joining forces in e-procurement was to use their dominance in the industrywide supply chain to lead, control, and benefit from recent and further technological advancements through a single online trading community [9, 11, 20].

Expectations and Results of E-Procurement

Implementation at General Motors

E-procurement technologies gave rise to many expectations at GM:

- Reduction in time and cost of procurement systems development and implementation at the facilities of GM's partners.
- Significant reduction in ordering costs and in the cost per item of goods purchased.
- Quicker information flows and better information sharing throughout GM's supply chain.
- Better forecasting and planning for GM and its suppliers.
- Supply chain optimization.
- Build-to-order capabilities, shorter product development cycles, and better customer service.
- Favorable environment for joint R&D, including product design.

From the technological perspective, a Web-based e-procurement system will require at its lowest end nothing but a simple Web browser. This will not only decrease the time and cost of procurement system implementation across GM's supply chain, but will also destroy many existing technological barriers for entry into the supply chain [3].

GM's supply chain includes thousands of suppliers. The transformation of purchasing into Web-based, software-driven processes of competitive bidding will significantly cut the cost of goods purchased as well as ordering costs for GM [19]. Moreover, having to communicate and source their supplies in an Internet B2B marketplace will make similar cuts in costs possible for GM's suppliers too [11, 15].

E-procurement will lead to extensive information sharing and quicker information flows across the supply chain [4]. This will result in significant improvements in the quality of forecasting and planning for GM and its suppliers. Eventually, the need to buffer inventories at all tiers of the supply chain will diminish and the inventory turns will increase, leading to a further lowering of costs [4, 20]. In other words, the traditional supply chain with buffer inventories at every tier will gradually turn into a lean supply chain.

The Web-based nature of e-procurement ensures increased product customization and develops build-to-order capabilities at GM. The company is already predicting that it will be possible in the foreseeable future to deliver customized cars to end-users in 5 to 15 days after an order is received from a customer [19].

Finally, the capabilities of exchanging rich information fostered by e-procurement create excellent condi-

tions for collaboration among GM divisions and their suppliers in areas such as R&D, including product design and planning [20].

GM's alliance with Ford and DaimlerChrysler in its e-procurement initiatives results in further benefits associated primarily with economies of scale (and scope) offered by such an alliance. The benefit most frequently mentioned by suppliers and industry analysts is the ability to deal with a single system with common protocols versus multiple buying networks within the same industry [20].

GM and its B2B partners are testing the benefits of e-procurement. In the brief period between the launch of TradeXchange and March 2000, GM purchased more than \$4 million of MRO supplies from the catalogs of five suppliers enrolled in the network [4]. In late January 2000 the company sold seven presses worth \$1.8 million in an online auction [19]. It also bought \$1.7 million of materials in another auction. Before a joint e-procurement initiative, Ford also led its first auction. The auction for an undisclosed but mainstream car part resulted in double-digit savings on the \$78 million supply deal [19].

Potential Stumbling Blocks

There are several reasons the adoption of e-procurement at GM may not be as fast and effective as many analysts predict. One is contradiction of the requirement of stable relationships between GM and its suppliers traditional to the automotive industry, and the competitive bidding (or tender) model that seems to be incorporated in the idea of a B2B marketplace. How GM will deal with this contradiction remains largely unclear for now.

GM should carefully tackle the problem of distributing power between itself and its suppliers to ensure the fast and effective adoption of e-procurement. If GM (or the consortium of original equipment manufacturers [OEMs]) as a controlling member of the supply chain absorbs all the benefits, there will be little incentive for other members of the chain to participate [11]. Thus, the ability to establish and maintain cooperative strategic relationships with suppliers is very important for success. Fear of the abuse of bargaining power by OEMs has already led to efforts by first-tier suppliers of automotive manufacturers to examine and develop their own e-commerce initiatives. Major first-tier suppliers such as Dana, Bosch, and TRW have developed their own e-commerce sites [3]. Moreover, Delphi Automotive, Dana, Eaton, TRW, Motorola, and France's Valeo have started to examine the possibility of developing joint e-procurement strategies. First-tier

suppliers may be against the adoption of e-procurement and, consequently, slow in its adoption, simply because the way e-procurement structures OEMs' procurement allows for greater competition from outsiders and the possibility of making sensitive information on pricing and supply deals available to competitors [15, 20].

A similar issue arises with GM's, as well as Ford's and DaimlerChrysler's, attempt to develop industry-wide standards of e-procurement. Key to the success of a single e-procurement network for the U.S. automotive industry, a goal pursued by GM, Ford, and DaimlerChrysler in their joint venture, is involving other leading automakers. Most Japanese automotive manufacturers have been contacted to discuss possible cooperation. Their response remains unclear, however [15]. If the industrywide standards are not worked out through transformation of the Big 3's e-procurement alliance into a truly multilateral alliance, a major part of its potential benefits will remain unrealized. If GM and its current e-procurement partners succeed in developing the industrywide standards, there still remains a systems integration issue. Currently, for example, Ford and GM are running two separate e-procurement systems. The complexity of the task of integration will only increase with the other OEMs becoming members of the industrywide e-procurement network.

Still another concern about developing full-scale e-procurement solutions arises from the largely raw, untested nature of the technology that is at its core. Competition is exerting a strong impetus to implement new e-business technologies, including e-procurement, in the automotive industry. These technologies bring great benefits that have the advantage of affecting the bottom line, even in the short run. However, as the experience with Y2K shows, neither government nor business, with all the resources available to them, are 100% ensured against major technological traps. Rapid implementation of e-procurement technology may result in significant waste of resources for an early adopter like GM.

Finally, the benefits of e-procurement will have a flip side too. Diminishing inventory at each stage of the supply chain, for example, will require higher levels of responsiveness in each link. Higher responsiveness will soon demand increased delivery flexibility and generally better logistics, pushing inventory management to new limits [11]. Logistics will have to do everything faster and cheaper than in the past. The removal of some stages of the supply chain (mainly distributors) will occur at the same time [3].

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