Business-to-Business E-Marketplaces: Strategic Design Considerations

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E-marketplaces are complex trading arenas. Success depends on their ability to attract and retain multiple stakeholders. Their goals, objectives, and problems should drive the design and execution of these networks. Business managers contemplating establishing business-to-business e-marketplaces must consider multiple strategic design issues and options prior to the technical implementation.

Understanding how some existing e-marketplaces that have been successful in capturing significant value within an industry -- as described in the case studies included here -- can give added perspective on e-marketplace strategy and design.

Introduction

The rapid growth and trillion-plus dollar forecast for business-to-business (B2B) e-commerce has shifted attention from consumer-oriented Internet business models (B2C) to those in the business-to-business sector. Over the past year, while the market capitalization of leading B2C companies such as Amazon.com and AOL have stagnated, firms that enable B2B e-commerce, such as Ariba, Commerce One and i2 have seen their valuations grow five to ten times.

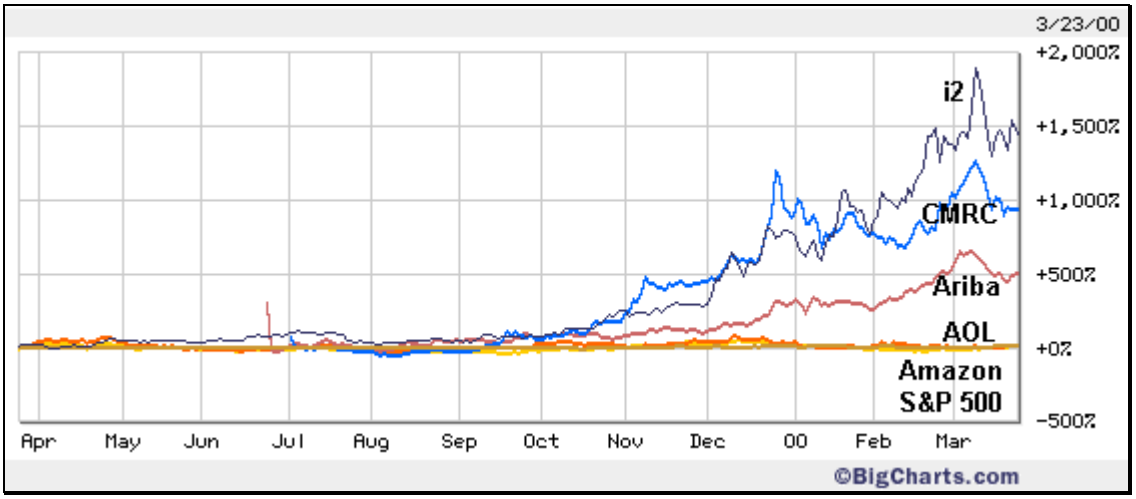

Figure 1: Relative stock price appreciation of selected B2C and B2B companies as compared to the S&P 500 index over the one year period ending March 2000.

Unlike the B2C arena, large incumbent companies from the “old” economy hold strategic control over B2B models because of their large volume of business transactions. We have seen companies such as GM, Ford, and DaimlerChrysler join forces to form a $500 billion electronic marketplace with their suppliers. Fifty food and beverage makers, including Kraft Foods, Proctor

and Gamble, Coca-Cola, General Mills, Nestlé and Unilever announced a single industry-wide e-marketplace for conducting a portion of their $200 billion purchases of goods and services. Sears, Carrefour, Chevron, and Sabre are other recent examples. Even in situations where a new entrant launches an industry e-marketplace, it views the existing industry incumbents as potential partners instead of competitors. e-STEEL, a startup B2B steel exchange has signed up U.S. Steel as one of its sellers as well as an equity stakeholder. These examples highlight the need for companies to develop a B2B e-commerce strategy that includes consideration of creating or joining an e-marketplace.

Electronic marketplaces will play a significant role in B2B e-commerce if they are designed to add value rather than just take advantage of existing market inefficiencies. Dataquest, for instance, expects e-marketplaces take a 20% slice of the B2B e-commerce pie by 2004. Forrester is more optimistic, with a prediction of 45% to 74%, depending on industry, by 2004.

In the past, electronic marketplaces required EDI or other, often proprietary, communication mechanisms, which were expensive to acquire and maintain. That cost prevented many smaller businesses from entering the e-marketplace, reducing its liquidity and value to companies that did take the plunge. But the popularity of the World Wide Web has led to a relatively inexpensive and ubiquitous electronic communication channel that makes economic sense even for small and low-volume businesses. The Web also has fueled software innovations, such as hyper-linked documents, multi-media Web-browsers and personalization, which have increased the ease of using an electronic channel. As a result, Internet-based e-marketplaces have become a feasible way to sell and buy in many industries.

To be successful in an age of inexpensive communications, where suppliers can directly reach a large number of customers (and vice versa) without the need for “middlemen,” e-marketplaces must be designed to deliver value to all players required. The need for a well-defined business strategy prior to launching an e-marketplace is further supported by the observation that initially, buyers will not see value in an e-marketplace without any sellers and sellers will see no value without buyers. The dynamics of an e-marketplace call for an evolving strategy. The initial phase could be designed to attract key players to the e-marketplace to making it attractive for the general mass to follow. Subsequently, the focus may shift towards rapid growth of membership and transactions necessary to achieve the critical mass needed to sustain the e-marketplace. The strategy must finally take into account defending the critical mass and leveraging it to offer value-added services that are hard to imitate.

Strategic Design Choices for e-Marketplaces

There are several issues and questions a firm must consider before implementing an e-marketplace:

- *Audience*: Who are the players in the marketplace?
- *Offering*: What does the marketplace offer those players?
- *Revenue Source*: How does the marketplace owner capture value from the marketplace? And from whom?
- *Pricing Mechanism*: How is price determined for items being bought and sold?
- *Access*: What marketplace access restrictions are in place?
- *Control*: Who has strategic and tactical control over the rules and regulations of the marketplace?

Audience—Define Your Value Net

One of the first questions a marketplace developer should ask is, "Whom do we serve? What segments and sub-segments do we address?" A starting point is the construction of a value net for the e-marketplace. As shown in Figure 2, five key constituencies impact any marketplace.

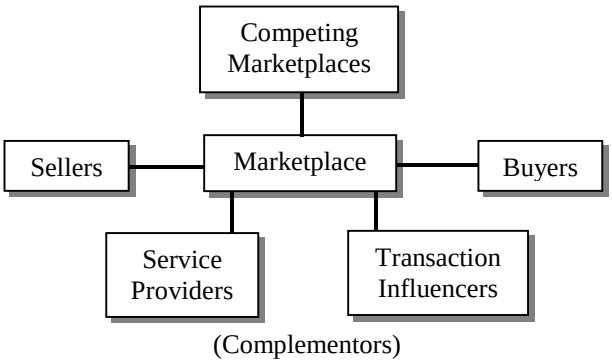

Figure 2: e-marketplace Value Net

Although *sellers* and *buyers* are the primary players in the marketplace, others cannot be ignored. Most established industries already have marketplaces associated with them, or, if not, other means by which buyers and sellers find each other. A successful e-marketplace will offer compelling points that differentiate it from incumbent competitors as well as other potential e-marketplaces.

One source of differentiation is found in the roles of the remaining audiences in the e-marketplace value net, which complement the marketplace's primary task of matching buyers and sellers by performing the associated services required to complete a transaction between buyer and seller. Examples are the provision of information, logistics, order tracking, insurance, and financing. Marketplace designers must identify key services and decide whether to offer some themselves, or develop alliances with *service providers*.

The final value net audience is *transaction influencers,* who help increase liquidity in the marketplace by inducing transactions between buyers and sellers. In financial markets, for instance, business news providers such as Reuters and Bloomberg perform this role. The information they provide causes buyers and sellers to re-evaluate their stock positions and make trades. In B2B markets, influencers often reside within buyer or seller organizations. Buyers' customers also may be key influencers. Identifying influencers and providing for their participation is an important aspect of e-marketplace strategy.

Once players in the marketplace value net are named, the dynamics between them must be understood. To do this, players can be grouped into three key categories: *core mass*, *mass attractors* and *mass followers*. *Core mass* is the primary value-delivering player in the market. In stock markets, for example, they are buyers and sellers of stock. The correct blend of core mass contains enough buyers and sellers to create liquidity in an e-marketplace. A core mass of buyers and sellers generally is pulled into the marketplace by marquee players known as *mass attractors.* In a stock market, those might be well-known blue chip companies whose brand-name stocks attract new traders. *Mass followers* are non-core mass buyers and sellers who join the marketplace once trading has begun, and who are attracted either by liquidity or number of players in the market. Figure 3 describes the loops of causal influences among these member segments.

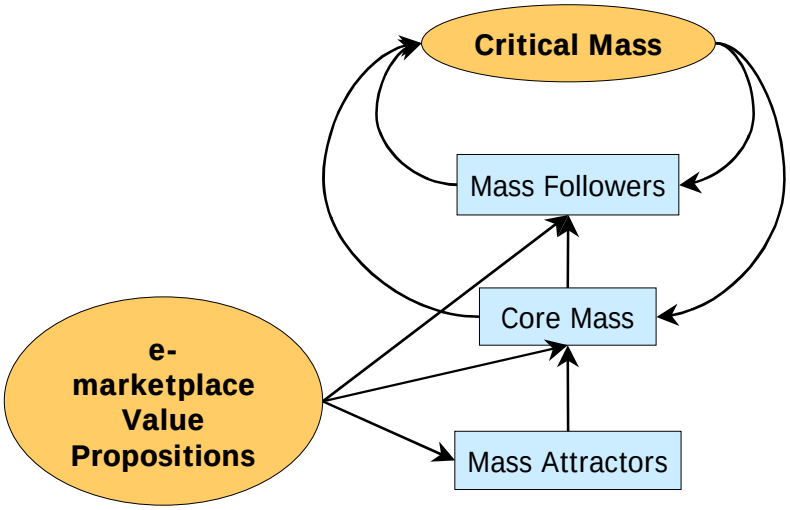

Figure 3: Dynamic influences among members in an e-marketplace and their influence on critical mass.

Categorizing players in this manner helps determine where to focus marketing efforts during the phases of marketplace development. At the startup phase, the marketplace could adopt the strategy of seeking out and attracting the mass attractors by offering them compelling value propositions. Subsequently, the focus could shift to retaining the core mass and using its strength to retain mass attractors. Critical mass is attained when mass followers begin flocking to the marketplace because of the number of core-mass players and the consequent liquidity created in the marketplace. They then become part of the core mass and contribute to increasing marketplace liquidity. Figure 3 illustrates the path to critical mass.

When identifying players in the value net, companies must be aware of different roles within an organization. For example, Chemdex, an e-marketplace for the life sciences industry has to attract not only scientists who make the original purchasing decision, but also purchasing personnel from the buyer organization. It must offer value propositions that appeal to both parties within the organization.

The e-marketplace must attract a critical mass of both buyers and sellers to be successful. This can be either a vicious or a virtuous circle, depending on whether critical mass has been achieved. Some e-marketplaces may start by attracting a key buyer, who attracts a core mass of sellers, who in turn attract other buyers. Ford and GM started their e-marketplace in this way -- a strategy that makes sense in the auto industry, where there are only a few key buyers (auto manufacturers) and a large number of suppliers. Conversely, the marketplace may first attempt to attract well-known sellers of interest to a core mass of buyers.

Another strategy is for the marketplace operator to attract the core mass first, with a different initial offering such as information. Consumer portals such as Yahoo! leverage their massive numbers of visitors to attract merchants to their e-commerce site. In the B2B space, Vertical Net is adopting that approach as it tries to move its information hubs to e-marketplaces. Another approach to achieving critical mass is to convince traditional brokers/middlemen to be the first to join an e-marketplace. They may do so if they see the potential for cutting transaction costs and

time. For example, one of the equity owners of MetalSite, a steel e-marketplace, is Ryerson Tull, the largest steel distributor (called "service center") in the industry. Ryerson is confident that its role adds value in the steel industry and has invited 60,000 of its own customers to participate in MetalSite.

Service providers are a key audience in the value net. The e-marketplace may profit from establishing an exclusive partnership with a service provider. For example, in a marketplace for perishables such as flowers, food and fish, transportation is a key service. Floraplex, a floral e-marketplace, and FoodUSA, a food and beverages e-marketplace, are forming alliances with refrigerated transportation providers. Exclusive partnerships may prove to be an Achilles' heel for the e-marketplace if buyers and sellers have to pay a higher price for a service they can find for themselves. For that reason, an e-marketplace may choose to ally with another e-marketplace for a related service. FoodUSA is considering NTE as its transportation provider. Consumer automobile e-marketplace AutoByTel switched its financing service from an exclusive provider to LendingTree, a leading online loan marketplace

The decision to develop an exclusive or open relationship with service providers depends on the direct recipient of the service. If the e-marketplace operator receives the service, it may form an exclusive supplier relationship subject to periodic review. However, if the e-marketplace traders are the direct recipients of service – for example, obtaining financing for a purchase – the e-marketplace operator may not be in the best position to monitor the quality of the service. In those situations, a more open relationship with multiple suppliers, perhaps through another e-marketplace, is a more sensible approach.

Offering – Designing Delivered Value

This design point deals with the range of products, services and knowledge that an e-marketplace will offer to the audience and should cause firms to ask: "What are we offering? What value can this e-marketplace deliver to the targeted audience?" When the marketplace is primarily a venue for buying and selling products, adding other services that facilitate the initiation and completion of a sales transaction can be the differentiator against competitors and increase member loyalty. Examples of such services are:

- providing information about the products;
- guaranteeing qualified business partners (for example, rating credit-worthy buyers and suppliers who deliver as promised)
- handling order and financial transactions online;
- splitting a single order from a buyer into orders for multiple suppliers;
- providing logistics services; and
- maintaining an inventory of products in demand.

Such services may be performed directly by the firm, or through alliances with service providers and influencers who are part of the marketplace audience. Deciding whether to provide such services means taking into consideration a firm's core capabilities, time to build and strategic intent.

In markets where time sensitivity is of paramount importance, as in the transportation industry, and/or where products are perishable, as in certain food industries, the e-marketplace must not only match trading partners (who may have never before traded with each other) but also facilitate fast and efficient completion of the transaction. In markets such as utility spot markets -- where products are generic, differentiation is less critical and availability is more important -- an e-marketplace should offer services that deal with trade volume and time needs by splitting or

consolidating orders. In all cases, e-marketplaces have the opportunity to provide e-business enabled information services that improve over existing manual processes by offering more detail in a timely, error-free manner while reducing the cost of the transaction. These services may form the initial value propositions that attract members to a new e-marketplace where liquidity has not yet been established.

When designing a marketplace, it is important to understand which services could be a source of strategic control and seek to perform those tasks directly. In the case of Marshall Industries, which sells electronic parts to component assemblers, providing knowledge, such as interactive training sessions and seminars, helps to keep it from being disintermediated by parts manufacturers selling directly to assemblers. In another example, Chemdex offers not only a catalog of chemicals aggregated from multiple suppliers, but also e-business process integration services, which makes it costly for suppliers and buyers to switch to another e-marketplace.

Increasing switching costs may be a short-term solution for engendering member loyalty. For the longer term sustainability, the marketplace must offer services whose value to the recipients increase as more members participate the e-marketplace. Such positive feedback loops exist in e-bay, the C2C e-marketplace, which provides buyer and seller ratings based on feedback from previous transactions that involved the buyer or seller. The quality of the ratings improves as more transactions are executed, thereby attracting more participants and ultimately, more transactions.

The types of services described above are summarized in Figure 4. An e-marketplace consider the following classes of services:

- those that attract members
- those that induce members to buy or sell
- those that make use of data gathered from past transactions to offer increasing value to members

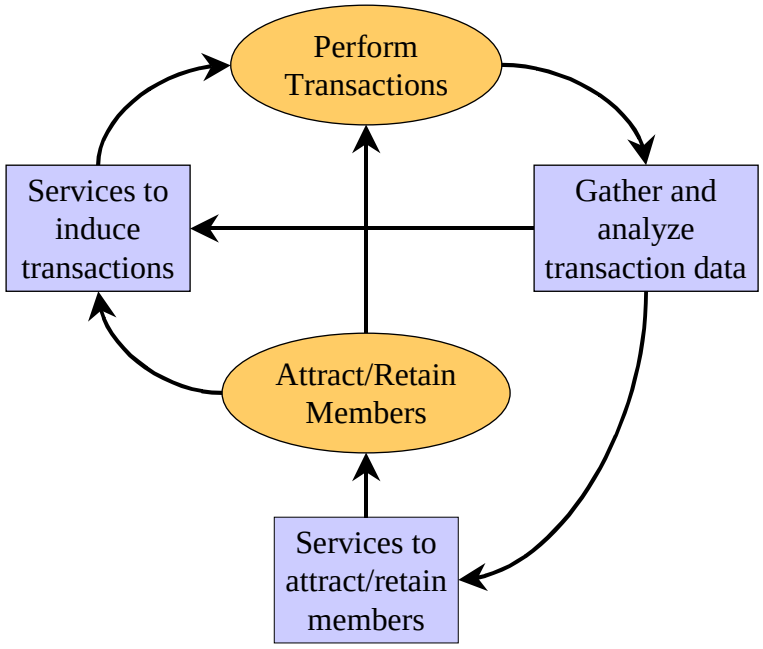

Figure 4: Positioning of services to aid the primary marketplace activites of attracting, retaining members and performing transactions

Revenue Source – Choices Based on Strategic Objectives

The revenue provider may be one or more of the players in the marketplace value net. Or, revenue might be provided not by the parties directly involved in a transaction, but by a third party who may have interests in selling high-value products or services in conjunction with the original transaction.

A firm can capture value in the form of immediate revenue or future revenue. The designer of an e-marketplace may choose to defer revenue capture in favor of developing a critical mass of traders and transactions. Proxies for potential future revenue include the number of members (both sellers and buyers), transaction volume, number of product types, scope for expansion into related industries, scope for vertical integration and number of Web site page views.

Immediate revenue sources derived from matching buyers and sellers are the *spread* (the price difference between the buying and selling price), *percentage of sales* and *fixed transaction fee*. Firms also may charge *listing* and *membership fees* (one-time or ongoing). Other revenue sources arise from providing services that complement transactions. Firms that mediate the financial transaction, for instance, may make money on the float. The firm also may receive *commissions* or referral fees from service providers who receive business from the marketplace. Finally, *advertising revenue*, the mainstay of consumer portals, also can be a significant source of income in the B2B world.

When a marketplace receives revenue only after the completion of a transaction, it is signaling to members that it will try to make the market as liquid as possible. This can be an important value proposition for members, who have little to lose even if they do not end up transacting in the marketplace, and in industries where the conventional marketplace is not very liquid.

If revenue is in the form of a percentage of sales, buyers may consider it to be in the marketplace's interest to execute a sale at the highest possible price and therefore expect the market to cater more to sellers' interests. If the marketplace cost to execute a transaction is independent of the sales amount, the better option may be to make revenue from a price difference or a fixed transaction fee. Price-difference revenue is generated when the marketplace determines the transaction prices, and these prices are different for the buyer and the seller. The magnitude of the difference generally depends on the difficulty in finding a match due to lack of liquidity.

A marketplace will charge membership fees when the financial benefit to members is well known and undeniable. If members pay a fixed membership fee, the task of inducing transactions shifts from the marketplace to members, who will use the marketplace as often as possible to justify the cost. One-time membership fees may be charged when there is an incremental cost to the marketplace for each new member, as in the case of NTE, where training and software integration costs are incurred when a new member joins.

A marketplace also may generate supplementary revenue from advertising. However, Web sites designed to maximize advertising revenue do so by increasing page views per visitor, and that may be at cross purposes with Web sites designed to maximize commerce transactions, where the emphasis is on making online transactions as efficient and fast as possible.

Pricing Mechanism – Based on Understanding Seller and Buyer Needs

One of the key characteristics of a marketplace is the manner in which the sales price is determined. The options for setting the price of transactions between a seller and a buyer in the e-marketplace are *posted price*, *negotiation*, and *auction (straight, reverse, or double)*.

A *posted price* is openly posted in a catalog and does not vary as a function of individual trades. Various sellers compete mostly on brand name and features. The price may be volume-sensitive, where the price-per-unit goes down with the purchase of increasing quantities as the seller achieves economies of scale. Pricing, and therefore the catalog, may be customized for a specific buyer, and may represent special terms prearranged between the seller and the buyer.

Negotiated prices are suitable when sellers may not want to expose their inventory to everyone else in the market. They are selective about the buyers they wish to deal with. Similarly, buyers also may wish to be selective about the firms from which they purchase. When the price is negotiable, buyers and sellers communicate privately to agree on a price, taking advantage of the communication efficiencies of the online medium. E-steel provides an online channel for a buyer and seller to privately negotiate their price, in accordance with traditional relationship-based transactions in the steel industry. The e-marketplace simply makes the process more cost- and time-efficient.

The marketplace also may play a role in determining the price: various types of *auctions* may be used to sell a product to the buyer with the most attractive bid. Buyers send bids and sellers send offers to the exchange, which then determines a clearing price based on the prices and quantities in the bids and offers. Reverse auctions give the seller with the most attractive offer the opportunity to meet a buyer's demand. The exchange or double auction mechanism is used to determine volatile commodity prices.

Auctions are suitable when the product has different value to different parties. As in negotiated pricing, the products often are non-standard. Auctions are appropriate if several buyers are available and interested in buying the same item, but perhaps with different valuations of the item. Generating liquidity by attracting buyers becomes the responsibility of the e-marketplace. Auctions also can be appropriate for perishable products, where matches between buyer and seller must be made as quickly as possible. Reverse auctions, where sellers bid to satisfy a buyer's demand, work best when there is a surplus of the product available, and when product from different suppliers is indistinguishable.

Finally, exchanges are suitable when a number of buyers and sellers simultaneously are interested in purchasing and selling commodity items. Price is the only differentiator, and is determined by matching received bids and offers. The mechanism works best when there are enough buyers and sellers, which the e-marketplace is responsible for attracting. Volatility in product availability and demand is another attribute. Table 1 summarizes the influence of various industry and product characteristics on the price setting mechanism used.

Table 1: Industry and product characteristics that influence the price-setting mechanism

Pricing Mechanism	Industry Characteristics	Product Characteristics	e-marketplace Responsibilities
Posted Price	▪ Demand and supply does not vary unexpectedly	▪ Competition on brand name and features ▪ Prices too low to justify negotiation	▪ Aggregate catalog from multiple vendors ▪ Provide multi-supplier product comparisons (by features)
Negotiated Price	▪ Terms and conditions open to negotiation ▪ Price differentiation	▪ Nonstandard products ▪ Prices high enough to justify negotiation	▪ Secure electronic communication channels for members ▪ Workflow tools
Auction	▪ Products valued differently by different buyers	▪ Surplus items ▪ Must be sold within a deadline	▪ Create liquidity: attract large numbers of buyers for items to be auctioned
Double Auction (Exchange)	▪ Both demand and supply vary unpredictably	▪ Commodity items	▪ Create liquidity: attract both buyers and sellers ▪ Neutral to both parties

Marketplace Access – Determining the Players

This design point allows the marketplace to control access and build the type of traffic it desires. *Open access* allows anyone with Internet access to participate in the marketplace, an option generally acceptable if the marketplace is in a business that involves low transaction values, or if prior screening is not expected. But in cases where the value of goods is high (as expected in B2B cases) or where the e-marketplace brand name is tightly coupled with that of its players, some sort of screening may be needed to address trust concerns. In that case, a *restricted access* policy is called for. Restricted access does not necessarily have to be just at the entry level, where membership or entry is screened. It is possible to have an e-marketplace with open access at entry level, but with additional access control, managed by each player for each transaction.

Such control enables players to choose with whom they play, and to customize each of their transactions. In addition to access control, an e-marketplace could further restrict transacting parties' identities by not revealing them until after the trade is completed, or keeping the parties forever anonymous. Such access control makes it possible for a player to sell surplus or off-grade material without letting competitors or premium customers know about it in the open market.

In industries where trade involves huge volumes or high dollar amounts, prior screening should be used to restrict access and ensure that only reliable parties are engaged. Also, in industries where firms are participating in e-marketplaces to get rid of surplus or excess capacity, companies fearing brand erosion may be sensitive to whom and when their identities are revealed. Restricted access may be the solution. E-marketplaces considering restricted access will have to identify key members and sign parties one at a time – a process that could slow momentum and the building of critical mass. In cases where low volume or low dollar amount is involved, open access would allow spot decision-makers to trade without undue restrictions. Care should be taken, though, not to let an e-marketplace's brand erode due to faltering membership. Open

access also would open doors to competitors and e-marketplace substitutes, and has the potential to diminish the impact of a firm's traditional agendas.

Control Structure – Defining Whose Interests Take Priority

Should one player in the value net control an e-marketplace? Whose interests take priority in a transaction? Choices for control structure include *seller-controlled*, *neutral* and *buyer-controlled*.[1] Control may be active, where the controlling party is involved in day-to-day operations of the marketplace, or passive, where governance is handed over to a third party. A buyer-controlled marketplace often acts as a purchasing agent for its members, performing tasks such as refining buyers' needs and seeking the best deal on their behalf. Seller-controlled marketplaces often provide additional services that help to identify surplus or off-grade inventory among controlling members and efficiently find buyers without eroding existing customer relationships. e-marketplaces controlled by buyers or sellers need not provide benefits only to the controlling party. Table 2 identifies benefits both buyers and sellers may receive from biased e-marketplaces.

Table 2: Potential benefits to buyers and sellers in biased marketplaces

Control Type	Benefits to Buyers	Benefits to Sellers
Buyer controlled	▪ Obtain best prices by aggregating demand (from smaller buyers) ▪ Act as (outsourced) purchasing agent ▪ Single point of access to a range of complementary products (across industries) that fulfill a buyer need	▪ Ability to reach a larger number of buyers with lower sales and marketing costs ▪ Qualified sales leads
Seller controlled	▪ Single point of access to a range of complementary products from an industry ▪ Single point of access to comparable / competitive products from multiple suppliers	▪ Ability to find buyers for off-grade or surplus inventory ▪ Ability for smaller suppliers to consolidate supply for large buyers ▪ Act as (outsourced) sales and marketing agent

In fragmented and inefficient markets, where there are multiple search, transaction and fulfillment activities, neutral e-marketplaces tend to capture significant value due to their ability to unbundle and rebundle traditional activities. Such neutral marketplaces are then free to form strategic alliances, without traditional roadblocks, and with only one thing in mind: optimizing sub-markets. When brand name, differentiation, key skills or knowledge are valued, seller-controlled e-marketplaces could be successful. However, achieving critical mass often means sellers must engage in 'co-opetition' with traditional competitors. In building an e-marketplace, firms should re-examine relationships with traditional competitors to see how they might achieve increased returns by redefining their relationships.

An example is MetalSite.net, which is owned by a group of domestic steel producers and service centers. Buyer-controlled marketplaces, like GE TPN, work well when a major player already is conducting business and other players want to profit from economies of scale. Such a structure

[1]Kenneth Berryman, Lorraine Harrington, Dennis Layton-Rodin, and Vincent Rerolle, Current Research: Electronic commerce: Three emerging strategies, *The McKinsey Quarterly*, 1998 Number 1, pp. 152—159.

not only reduces the cost of transaction for smaller players, but also cuts the cost of setting up an infrastructure and the time it takes to enter an e-marketplace.

Conclusion

B2B e-marketplace should be designed to challenge some industry practices while adopting others. The designers require expertise in the industry in order to identify which practices are considered "problems" by various segments in the industry. These practices must be targeted with well-articulated value propositions developed in advance as part of the strategy for and design of the marketplace. Examples of industry problems that have given rise to e-marketplaces are:

- Industry dominated by a few large players that wish to reduce transaction costs by installing an e-marketplace (e.g., General Motors, Ford, and DaimlerChrysler in the automotive industry).
- A fragmented industry with a large number of small buyers and sellers where middlemen or distributors capture a large portion of the margin (e.g., Chemdex in the life sciences industry).
- Industries with unpredictable supply or demand, which require the liquidity of a large marketplace and the ability to dynamically adjust prices based on supply and demand (e.g., MetalSite in the surplus and secondary steel industry).
- The product is a commodity with low margins (e.g., NTE in the road carrier industry). Commodities have standardized descriptions, making it easier to organize a marketplace around them. The low margins make reducing transactions costs and increasing the size of the market critical factors.
- The product is perishable, requiring fast and efficient market clearance and dynamic pricing that can change with time (e.g., NTE in the road carrier industry; Floraplex in the flower industry).

At the same time, for the e-marketplace to be adopted by businesses, it must be designed to be consistent with the norms and practices that are accepted in that industry. For example, e-steel has been careful to adopt a design that makes it possible for member firms to continue their relationship-based business practices.

The key design choices that must be made in order to address industry problems or adopt industry practices are of great strategic significance because e-marketplaces can be either blessed or cursed with network effects. In other words, e-marketplaces with poor initial design will attract few members, which will become the reason for not attracting more members. In contrast, a good strategic design will attract enough members to achieve a critical momentum that will cause others to join. Only a handful of e-marketplaces are expected to survive in each industry. Their strategic design will be a critical success factor.

Appendix: Case Studies

The large number of strategic design choices open for consideration presents a crucial challenge to the developer of an e-marketplace. Fortunately, a lot can be learned from the experience of early adopters. By looking closely at some early implementers of B2B e-marketplaces we can see how successful e-marketplaces dealt with:

- the nature of opportunities or problems in the industry being addressed by the e-marketplace;
- what value propositions the e-marketplace offers to seize opportunities or resolve problems; and
- incorporating key industry issues and value propositions in e-marketplace design choices.

e-Steel

What is the business problem?

The steel industry, with $700 billion in sales in 1998, is the largest to have no organized marketplace. Unlike commodity metals, such as aluminum and gold, there are no standards for describing various types of steel, making it difficult to form a global marketplace for it. The largest player accounts for no more than 10 percent of sales. Transactions have been based mostly on paper and fax. Product information is typically mass-faxed to potential buyers – a time-consuming, paper-based process for both buyers and sellers. Transactions often are simplified by relying on existing relationships developed between buyers and sellers. Sellers often set different prices for different customers and wish to keep that information confidential. Change in business activities does not happen easily in such industries.

A specific business problem involves secondary, non-prime steel. Steel producers often have steel products that do not meet quality standards set by customers in the primary market. To reduce such inventory, manufacturers sell it to service centers that take the risk and reward of finding buyers. Service centers usually have strategic control over valuable information about specific buyers' production demands and where excess steel of a particular quality can be found. Manufacturers don't collaborate directly with other manufacturers so as not to let competitors in on sensitive information like non-prime product inventory. In short, no efficient mechanism existed to link suppliers wishing to sell excess, secondary and non-prime steel to buyers who could use it.

Manufacturing capacity optimization and lack of production coordination between buyers and sellers often leads to throughput that does not exactly meet customer demand requirements. In cases of shortfall or mill outages, manufacturers often buy steel from foreign producers through brokers. To keep up with fluctuations in demand and factory production schedules, buyers often have to pay a premium to secure steel that meets certain specifications. The spot market represents 50 percent of steel sales in the United States, Japan and the European Union.

What value propositions did e-Steel offer to solve the problem?

e-steel is an online exchange that makes buying and selling of steel easier and faster by eliminating excessive time and effort spent on faxes and phone calls. The immediate benefit to both parties is cost savings from reduced paperwork and errors. Sellers can clear their inventory faster than before. In addition, efficient communication among trading parties, especially about future demand and capacity, helps develop tighter inventory controls.

The online, Internet-accessible nature of the marketplace makes it possible for buyers and sellers from across the globe to participate more efficiently than ever before. At the same time, the low cost of access makes it feasible for smaller players to participate, too. Developing a large community of buyers and sellers increases the value of the marketplace to all participants by making it more likely that any of them will successfully complete a desired transaction at a competitive price. At the same time, a high standard of integrity is maintained by requiring credit checks and other qualification criteria.

One problem in dealing with a large number of buyers or sellers is the need to maintain separate interaction interfaces with each of them. The e-steel exchange provides a uniform interface and process for trading, and frees steel buyers and sellers from the need to invest in individual advanced e-commerce platforms. Instead, they use the online e-steel exchange.

e-steel allows companies to service their existing trading relationships by giving them control over who can see their product information and pricing, benefits that appeal not only to buyers and sellers but also to service centers, which serve the role of intermediaries.

What design choices did e-Steel make?

e-steel is not affiliated with any of the participants in its exchange and highlights that neutrality as an advantage over its competitor, MetalSite, which was started with the help of three steel makers. MetalSite also claims to provide a neutral marketplace and prominently displays an Arthur Andersen report affirming that MetalSite policies and practices are structured to provide an unbiased and fair market environment.

The trading-partner selection mechanism in the e-steel exchange is designed to fit current industry practices. Either a buyer or a seller may initiate a trade and specify that inquiry or offer information and price (offered or asked) can be viewed by one, some or all members of the exchange. This makes it possible for a member to set partner-specific conditions to the trade, an approach similar to existing relationship-based transactions except for greater order-processing efficiency due to online transactions.

The price-setting mechanism also has been designed to suit existing practices. Steel is not perceived as a commodity, and single or double auctions are not suitable because they assume the value of the product to the buyer is independent of the seller. In the case of steel, the buyer can offer, or the seller can ask, different prices depending on the identity of the other party. Accordingly, in the e-steel exchange, interested parties can negotiate a price using private online channels. Again, the firms benefit from efficient communications through the Internet, compared to telephones and faxes.

e-steel gets its revenue by charging sellers 0.875 percent of transactions completed through the exchange, roughly the cost of holding steel in inventory for one month and a reasonable deal for sellers who have steel in inventory. By providing a free service to buyers, e-steel hopes to make it easy for them to join the exchange. Unlike a membership-fee-based model, buyers do not have to immediately realize value from being a member. About 400 qualified and approved members have joined in the few months e-steel has been open for business, a base that can be used as an asset to attract sellers who don't have to pay until they receive value from completing a transaction through the exchange. In this way, e-steel expects to start the positive feedback loop where buyers and sellers attract each other to the marketplace.

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Chemdex (Ventro)

What is the business problem?

The life sciences industry is very fragmented, with around 15,000 suppliers and largest supplier holding about 15 percent of the market. Most suppliers are small, with sales of $10 million or less. The number of buyers also is large (about 300,000), distributed throughout universities, hospitals, biotechnology and pharmaceutical companies. The industry is characterized by a large variety of product types, with a growing number of suppliers who sell only specialty products.

The purchase of life sciences products requires a large amount of information, which sellers distribute through the mail to buyers. New products or changes in product information require printing and distribution of revised catalogs.

Buyers are scientists who get information about products and make purchasing decisions using the catalogs. Obtaining information on a few products often requires time-consuming and tedious paging through catalogs from various suppliers, which is not the best use of scientists' time. In addition, there is virtually no incentive for the scientist to search for the lowest product price. The market is inefficient, with the average price difference between identical products from different suppliers at more than 100 percent.

Once suppliers are selected, buyers have to fill out product requisition forms for each supplier, and the ordering mechanism may vary with each supplier. This makes it difficult for even large buyers to build a custom-designed electronic procurement system. Products have a high value-to-weight ratio and usually are shipped to buyers from seller warehouses. Buyers already are accustomed to a few days delay between ordering and receipt. Tracking ordered products is cumbersome and different for each supplier.

What value propositions did Chemdex offer to solve the problem?

The marketplace involves three types of players:

- end customers, usually scientists working in universities, hospitals or pharmaceutical or biotech companies;
- purchasing department personnel; and
- supplier firms.

Chemdex offers value to all three segments through its e-marketplace.

To scientists, Chemdex acts as an aggregator – combining detailed product information from a large number of suppliers into an online catalog of hundreds of thousands of products. Products from multiple suppliers can be searched using advanced but easy-to-use online search engines. These save a lot of time compared to searching paper catalogs from different suppliers.

Unlike paper catalogs, the online catalog always has current information and prices, making it easier to compare prices from multiple suppliers. Once products and their suppliers are selected, they can be combined into a single order, which is sent online to Chemdex. Chemdex fulfills the order by transacting with various suppliers who ship directly to the customer. Throughout the process, customers can track an entire order from the Chemdex site, which also allows them to set up personal favorite lists for fast, easy reordering.

Chemdex allows purchasing personnel to set up contract pricing with multiple suppliers and create customized lists of suppliers for the end customer to choose from. Workflow for obtaining approval within the buyer's organization, including enforcement of spending limits and ordering guidelines, can be set up through Chemdex. Instead of forcing customers to deal with the ordering systems of various suppliers, Chemdex offers standard and streamlined ordering, billing, tracking, shipping and reordering processes. If a buying organization needs to integrate its ERP system, it's is simpler to do it with Chemdex rather than with multiple suppliers, many of which may be too small to offer such integration. Finally, because the ordering solution is hosted by Chemdex and only requires a web browser to access, the total cost of ownership and participation is minimal for the buying organization.

Chemdex also offers compelling value propositions to product suppliers, including a complete, scalable and secure e-commerce solution with no start-up costs. Increased market reach also allows suppliers to enhance their sales opportunities. By distributing product information through Chemdex's online catalog, they can provide more detailed information without increasing publishing costs. In addition, new products can be introduced to the market as soon as they become available, rather than waiting for the next catalog to be printed and distributed. Chemdex also provides ancillary sales services such as locating and tracking orders in the system, reducing the cost to suppliers.

What design choices did Chemdex make?

Chemdex has not altered underlying product selection, price setting and ordering processes, except to make them more efficient from both buyers' and sellers' perspectives. It consolidates product information from multiple vendors into an online catalog and provides a single, standard ordering interface to buyers. By being the aggregator, Chemdex helps to alleviate the problems of a fragmented marketplace. Pricing remains fixed, consistent with past industry practice, and appropriate to the nature of the transactions, which are frequent and for small amounts of money. By handling ordering and payments on behalf of suppliers, Chemdex addresses the problem that results from a lack of standards in the presence of a large number of small suppliers.

Chemdex also has chosen to allow direct shipment of products from suppliers to end customers, limiting inventory. The practice is acceptable to customers because they aren't accustomed to instant fulfillment as is common in consumer markets. Aggregators like Chemdex but attempting to provide consumer items, have to compete with physical stores that offer instant fulfillment. Chemdex acts as a neutral market maker with revenue only from sales commissions, which ensures its commitment to enabling sales on behalf of suppliers. Unlike other online merchants, Chemdex offers free catalog setup for an unlimited number of product types, which induces suppliers to offer all their wares (not just the best-selling products), increasing the breadth of online choices for buyers.

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National Transportation Exchange (NTE)

What is the business problem?

The motor carrier (surface transportation) industry suffers from underutilization of their transportation capacity in the range of 30 to 50 percent, resulting in an annual cost of $31 billion. There are two major reasons for this underutilization. First, it can be difficult to find cargo for a "back haul," the trip a truck as to make to return to its home base. The second reason affects even the outbound journey. Shippers often purchase full truckload service when their shipment exceeds 10,000 pounds but still isn't enough to fill the truck. This is due to current pricing policy in the industry, where the price for less-than-truckload service is higher for shipments exceeding 10,000 pounds. Because full truckload service is purchased, carriers often have the misconception that their trucks are completely full. The unused capacity of the truck remains invisible to the carrier and the extent of underutilization remains under-reported. Carriers could potentially increase their profit margins by monitoring the excess capacities and filling them with smaller shipments with very high profit margins.

Current carrier profitability runs around 2-4 percent and is not likely to improve even with cost reductions in equipment, fuel, insurance or wages. Nor are price increases likely. The most promising way to increased margins is through better capacity utilization. Carrier space is a time-sensitive "product," which requires a fast market matching and clearing process. However, the traditional process is very inefficient, requiring multiple rounds of phone calls and price negotiations.

From the shippers' perspective, about 10 percent of shipping is unplanned, making it difficult to find a carrier at an acceptable cost. Also, some shippers have loads that are too small to be considered by carriers. At the other end of the range, large shippers would like to consolidate all their shipping and realize greater savings. Small but more frequent shipments, even from larger shippers, are trending up as a result of efforts to reduce inventory expense in supply chains.

What value propositions did NTE offer to solve the problem?

The primary benefit offered by NTE to shippers and consignees is 15-30 percent savings on transportation expenses for less-than-truckload freight. Rates are driven by shippers' demand and the supply of unused capacity. Shippers also can benefit through direct service from origin dock to destination dock with no interim handling, reducing the possibility of loss or damage. By not paying a penalty for smaller shipments, shippers and consignees can adopt policies such as continuous replenishment, resulting in lower inventory in the supply chain. NTE also pre-qualifies member carriers to ensure quality, and monitors their performance on each shipment, reducing the cost of searching for quality carriers. NTE handles financial transactions electronically through the Internet or EDI, cutting transaction costs and speeding up the process. Online order tracking and tracing also is available to shippers and consignees, further reducing their costs.

NTE offers carriers the opportunity to fill unused space in trucks that already have been assigned for shipment. It ensures that the additional shipment is on the assigned route for the truck, so as not to delay a carrier's original shipment. Additional shipments are priced to guarantee profitability for the carrier. The entire transaction occurs electronically, taking advantage of the carrier's existing dispatch systems. NTE handles the financial transaction, which generally means quicker payments to the carrier. And by going through NTE, the carrier does not have to worry about the creditworthiness of shippers. By participating in the NTE exchange, carriers have improved their yield management.

What design choices did NTE make?

NTE has modeled its exchange along the lines of the stock market. Carriers send in their current capacity information, and shippers send in their freight information. The exchange then matches freight with available capacity and determines a minimum price based on market conditions. Like the stock market, NTE makes its money on the spread between the “buy” and “sell” price.

NTE acts as a clearinghouse for financial transactions and provides shipment tracking and activity reports, all performed electronically through the Internet or EDI at reduced cost for all parties. By supporting the complete transaction, from initial matchmaking to final activity reporting, NTE gives shippers the opportunity to consolidate their shipping requirements, a service especially valuable for those who need to ship less than full truckloads of freight. They save not only in the transaction costs, but in the shipping charges (between 15 percent and 30 percent).

Electronic communications between members and the exchange originally were designed for EDI. NTE added Internet connectivity as soon as it became popular with businesses, and it supports carriers who already have invested in dispatch software by implementing the interface to the exchange as a module that can be easily integrated with dispatch software from various vendors. NTE charges members an initial fee to perform integration and on-site training. No other fees are charged.

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