

eFulfillment - It's harder than it looks!

David F. Pyke (david.pyke@dartmouth.edu)
Tuck School of Business
Dartmouth College
Hanover, NH 03755

M. Eric Johnson (m.eric.johnson@dartmouth.edu)
Tuck School of Business
Dartmouth College
Hanover, NH 03755

Phil Desmond
Brown Furniture
West Lebanon, NH 03784

November 20, 2000

Forthcoming in *Supply Chain Management Review*

Like a wild roller coaster ride, etailers at their height were trumpeted as the heart of the new consumer economy. Now they are scorned by Wall Street as little more than road kill. Bricks and mortar retailers who were quaking in the boardrooms, unable to keep up with their young competitors, are now seen as savvy second movers as they buy up near-dead dot.coms. While the beginning of the etailing boom was all about flash, order fulfillment became a nightmare for many web sellers. What have we learned about dot.com supply chains? Can etailers, in any segment, build competitive supply chains? Yes they can, but they must pay attention to supply chain fundamentals like managing cost, controlling quality, while maintaining a delicate balance between flexibly and speed. We examine the challenges of fulfillment in the furniture industry and provide lessons for any firm struggling to sell their products on the Web.

*The authors gratefully acknowledge the research assistance of Mary McManus and helpful comments from the participants of the Thought Leaders Roundtable on Supply Chain Management held at Harvard University.

Introduction

The year that just passed witnessed a remarkable increase in on-line shopping. Even the early estimates of online spending, which seemed aggressive at the time, have been well exceeded. Yet with all this success, e-tailers in many segments still struggle with order fulfillment and even with their basic business models. Christmas of 1999 signaled both to consumers and e-tailers that order fulfillment was a critical component of e-commerce. Frustrated consumers faced late deliveries, damaged goods, and messy product return procedures while dot.com managers found fulfillment costs spiraling out of control.

To the casual observer it might seem easy to quickly fulfill orders of books, CDs, and toys. But even these “simple” products have experienced significant order-fulfillment troubles. Amazon has watched its inventories explode and its ability to turn inventory plummet. For physically large consumer products--like furniture, home appliances, and sporting goods such as sailboats, bikes, or canoes--order fulfillment is far more challenging. While many recognized these challenges from the very beginning, euphoria over Internet retailing and the success of firms like Amazon and Dell led many entrepreneurs, investors, and business writers to ignore the significant issues associated with managing virtual supply chains. Only after capital markets stopped funding the seemingly endless red ink, did the issues of e-fulfillment start coming to the forefront.

This article examines e-fulfillment within the context of the Internet furniture industry. It argues that survival is dependent on effective supply chains that enable e-tailers to reduce order-fulfillment cost while delivering unique customer value. We develop a framework for understanding supply chain issues in retailing and use that framework to draw lessons for all e-tailers.

While our analysis concentrates on the supply chain, a significant component of that value-creation process occurs in the buying experience. For many observers, making the sale in a virtual world seemed to be the biggest challenge. But for products like books or toys, e-tailers quickly found that information coupled with technology could create formidable sales tools. The ability to suggest products and quickly browse large selections of product offerings became key competitive weapons. Yet for those products where “touch and feel” are important, e-tailers had to work even harder.

As with any e-tailing business, furniture presents many opportunities and challenges for the buying experience. Replacing the “touch and feel” of buying furniture with technology is not easy. How can an Internet customer flop down on a sofa floor model to see how it feels? Industry insiders were certain that customers would resist buying large, expensive items over the Internet. However, initial customer resistance has been far less than anticipated and it is decreasing daily, as suggested by current and projected online sales figures (see Exhibit 1).

e-Furniture companies have shown that technology can be used to create a virtual showroom with features such as floor layout where customers can design a room of furniture, or virtual reupholstery that lets customers sample different fabrics on the screen

with a simple mouse click. Soon, online customers will be able to view products in 3D using any available fabric. Of course, many e-tailers supplement technology with old-fashioned approaches such as mailing a swatch of upholstery material, which allows customers to feel the fabric and see how it looks in their living room. The touch-and-feel problem will no doubt persist in many market segments, and for some product categories. But it is clear that sizable internet markets exist even for difficult products like furniture.

Our supply chain analysis begins with a customer order.

Supply Chain and e-Fulfillment

Supply chains for web-sellers can be broken into a series of subprocesses under two main process headings: supply management and order fulfillment. Many e-tailers outsource some or even all of these processes depending on their strategy and core competency.

Supply management refers to the activities pertaining to managing the supply and inventory of product, including:

- Supplier management (developing new suppliers and maintaining relationships with existing ones; this also includes internal suppliers).
- Procurement (making purchasing decisions).
- Inventory management (receiving, storing, protecting, and controlling inventory).

Order fulfillment includes all of the activities from the point of a customer's purchase decision until the product is delivered to the customer and he or she is fully satisfied with its quality and functionality. For e-tailers, e-fulfillment comprises five distinct processes that may be performed by the e-tailer or outsourced to other partners.

- Order capture (the process of taking a customer from the point of a buy decision through successful data capture and checkout).
- Order processing (preparing the order for pick and pack including credit checking, pick list creation, invoicing, and address label generation).
- Pick and pack (physically selecting the correct items, inspecting them, and preparing them for shipment).
- Ship (transporting the goods from the warehouse to customer's address).
- After-sales service and returns handling.

When products are customized or made-to-order for the customer, pick and pack may include assembly or customization, which again may be performed by the e-tailer or a

third party. For example, Dell assembles its computers to the customer configuration and then readies them for shipment.

Different strategies for maintaining or outsourcing these sub processes abound. They range from fully outsourced supply and fulfillment, to complete in-house control. For example, Calyx and Corolla (calyxandcorolla.com) outsources order fulfillment to its partner suppliers while carefully managing the supplier relationships and continuously developing new suppliers. eToys started by outsourcing order fulfillment to Fingerhut, but has since built its own warehouses to gain control of these processes. In the recent agreement between Toys R Us and Amazon, Toys R Us will manage the supply processes while Amazon will manage order fulfillment.

To better understand the operational competitiveness of the different supply chain models, we will consider how the e-tailer supply chains in the furniture industry compare to the traditional retail supply chain on key operational objectives of *cost*, *quality*, *flexibility*, and *delivery*. We will show that managing and balancing these objectives are as fundamental to the success of virtual supply chains as they have been to longstanding traditional models. To avoid inconsistencies among operational objectives, managers must carefully *define* their objectives, ensure that they are *measurable*, and *rank* them.

Exhibit 2 suggests some sample definitions and measures for each of the four objectives. Managers should consider all four and focus considerable attention on those that are most critical for competitive success.

Before examining e-fulfillment for furniture, we must first consider the traditional model.

The Traditional Retailer in the Furniture Industry

Furniture manufacturing and distribution are notoriously difficult. Items are bulky and often are handled many times in transit from the factory to the home. The more handoffs in the supply chain, the more likely that items will be damaged or delayed. Returns can be troublesome as well. If a customer does not like a table once she sees it in the house, she may want to return it for another table or for cash. The table usually has to be repackaged, then moved from the home to the truck, and then back to the store.

Small case goods might be relatively easy to ship. And they certainly are easier to visualize on the Internet than, say, an upholstered sofa. Because the challenge is greater with the sofa, we will use it as an example. If a company can develop a viable Internet supply chain for upholstered sofas, other products should be relatively easy.

The supply chain of the traditional bricks-and-mortar retailer starts with the customer. A customer shops in the retail store and sees a sofa that is just right for her living room. In a few cases, she may purchase the sofa directly from the floor. However, in most cases, the show floor model may be the right style, but not have the desired fabric. So, after choosing a fabric from thousands of samples, she places an order with the retailer. Even if the floor model is exactly what the customer wants, it is often unavailable for direct

sale since the showroom models are display items. The retailer takes a deposit and passes the order to the manufacturer. The manufacturer orders the fabric and schedules the product for manufacturing during the next production cycle assigned to that item (assuming the fabric has arrived in time).

After production, the manufacturer ships the sofa, often with many other products, in a full truckload quantity to retailers in that geographic region.

The retailer holds the sofa in inventory just long enough to perform some final assembly steps such as attaching legs to the sofa and to repair any damage. The retailer handles all local shipping and final placement and assembly in the home. The traditional retailer also provides design assistance, catalogs, fabric books, and even floor layouts that give a real-life feel for how the furniture will look in a home. If the customer discovers a problem with the product, the retailer is accountable for fixing it. The retailer also is responsible for handling returns.

Note that it is critical in this industry to include “repair damage” as an explicit stage in the supply chain because so many items require at least minor repair. The people who “delux” and repair incoming furniture are highly skilled and among the highest paid employees in the store. Likewise, it is important to include home assembly because the customer is often not able or willing to do this. Thus, the traditional furniture supply chain looks like this:

Manufacturing → Ship to retail → Inventory at retail → Repair damage → Local shipping → Assembly in home

The Pure e-Tailers

Now let us consider the pure e-tailer--a web seller who does no production and holds no inventory. The clear market leader of the pure e-tailers, until recently, was Furniture.com. Furniture.com closed its virtual doors in early November, 2000. However, other pure e-tailers, including GoodHome.com, are still pursuing this channel. These companies' Web sites offer thousands of products made by hundreds of manufacturers. Most say they do not sell any top brands. The rationale: They want consumers to remember the e-tailer's brand rather than the manufacturer's. In reality, of course, the major manufacturers want to avoid channel conflict. The e-tailers are targeting people just out of college who are more likely to buy over the Internet and who have less long-term interest in the furniture they buy. However, the e-tailers feel that these customers will be repeat buyers when they marry and move into bigger homes.¹

Pure e-tailers hold no inventory and have no warehouses. When a customer shops on their Web site and finds just the right table or sofa, she places the order with a click of the mouse. For non-custom products, the order is transmitted to the supplier who may fulfill demand directly from inventory. In contrast to the book industry, there is no single distributor who can fulfill demand for a vast variety of non-custom goods. When Amazon went online five years ago, distributors like Ingram Book supplied most of the titles--a ready-made supply source. For many industries such as toys or furniture, no

such distributor exists. Thus, e-tailers must develop their sourcing processes much like their bricks-and-mortar counter parts did.

Returning to our special order sofa, the Internet firm processes the order and transmits it to the manufacturer who schedules production exactly as in the traditional retail case. The Internet firm arranges for a third party logistics (3PL) company to coordinate the delivery. The 3PL coordinates the long distance shipping that is provided by partner carriers and often takes possession of the product near the customer's home and makes the final delivery.

Multiple hand-offs often occur because of long distances and heavy LTL shipping volumes--the longhaul trucker delivers the sofa to a transit station where it is loaded on a vehicle for final delivery to the home. The number of logistics providers, such as GeoLogistics, that will deliver to your home is rapidly growing. Many offer "white glove" services where the delivery drivers will carry the furniture into the home unpack and assemble it. As long as the customer is happy with the product and it is undamaged, order fulfillment is complete. However, if the customer is unhappy with product or some repairs are required, the process becomes more complicated.

To summarize, the e-tail furniture supply chain looks like this:

Manufacturing → Long distance shipping → Local shipping → Assembly in home → Damage repair

With the order fulfillment process out on the table, consider how the pure e-tailer compares to the traditional retailer on key measures of supply chain competitiveness. The speed of delivery in both cases is limited primarily by the manufacturer, particularly the delivery time for custom-ordered fabric. So on this measure there is little differentiation.

There is substantial debate over whether the pure e-tailer has a significant cost advantage when it comes to capturing orders. Local stores must maintain facilities and showroom inventories to attract customers and capture orders. Yet the Web sellers, for their part must make large investments in advertising to create awareness and build a brand. They also must invest in web site design and related selling technologies to overcome the "touch and feel" limitations. Many argue that this investment, while large, is scalable--meaning that larger sales volumes will not require proportional investment. At this point it is still too early to tell if web sellers will realize this advantage.

Clearly, e-tailers can provide vast variety with relative ease since they are not constrained by physical showroom floor space. So in terms of flexibility they should be very competitive. While channel conflict issues may prevent e-tailers from offering popular brands, there are few other limits on variety, other than the cost of developing supplier relationships.

When we turn to order-fulfillment costs, the picture is clearer. With regard to transportation and inventory costs, it is hard to find any savings in e-tailing. In fact,

transportation costs in many cases will be higher since items shipped directly to the customer one-at-a-time do not benefit from transportation economies. Here is a critical point: If the geographic density of orders permits a full truckload shipment from the factory to a relatively small geographic region, the shipping cost for the Internet firm could be quite low. There may be only one shipment, from the factory direct to the home, with no handling by the retailer and no second shipment on the retailer's truck. However, if the density is low, the item must be shipped LTL for much of its journey, thereby driving up costs. Likewise, if the shipping distance is long, the items likely will be transferred from one truck to another in route, resulting in possible damage. This leads us to consider quality.

Managing quality may be the pure e-tailers' biggest challenge. For the virtual chain, hand-offs and outsourced delivery can lead to lower control over quality. More importantly, quality failures in the e-chain are visible to the customer. In the theory of quality management, quality failures are distinguished as either internal or external failures. Internal failures are quality defects discovered by the supply chain before they are seen by the customer. These represent the vast majority of failures experienced by the traditional chain. External failures are ones discovered or seen by the customer. These failures are the most expensive both in terms of correcting the defect and regaining the lost goodwill. Unfortunately for e-tailers, external failures are the far more prevalent of the two.

So what happens if the sofa arrives at the store damaged? Traditional retailers typically have in-house repair personnel. And in any case, they would take responsibility to ensure that the repair is done correctly *before* it is delivered. Internet firms do not have a local presence, so they typically outsource repair to a third party such as FurnitureMedic (www.FurnitureMedic.com). FurnitureMedic has 600 locations nationwide and, according to its Web page, the repair will be done by professionals and guaranteed by the e-tailer. Yet, a number of issues remain. For instance, is there a nearby FurnitureMedic location? If not, how long will the repair take? And how much will it cost? Finally, is the third party capable, and will it take the same care as a local retailer whose reputation is on the line?

To overcome customer fears of quality and ordering on the Internet, many e-tailers provide an unconditional guarantee—that is, they will take back any item and replace it with an item of equal value. The critical issue then becomes how often customers will return products. If they rarely do so, e-furniture firms are wise to provide such generous service; customers are happy and fears of losing the touch-and-feel benefits of in-store shopping are reduced. Frequent returns, however, could bankrupt a company in short order because of the high handling and shipping costs involved. For simple products like books and music, e-tailers have found returns to be very manageable--below 1 percent in some cases.

Observers say that the average return rate in the traditional furniture industry runs about 5 percent. Furniture.com reported that its return rate was 10 to 15 percent. Insiders who left that company, however, claim that returns had reached as high as 40 percent. Living.com

reportedly had returns of 30 percent before closing its doors. GoodHome.com's answer to the returns problem is to accept returns within 30 days of delivery on non-custom items, and to not accept any returns of custom items.

Pure e-Tailers with Warehousing

A second model of Internet furniture firms is quite similar to the pure e-tailers, except that these companies have warehouses. Of the two best-known names in this category, Living.com (www.Living.com) and BenchmarkBeHOME (www.BeHOME.com), Living.com has already failed. e-Tailers with warehouses typically stock fast-moving, smaller products that are not customized in any way. An upholstered sofa, for instance, would not be held in inventory at the warehouse; but a lamp would be. If a customer orders a product that is available in the warehouse, the short lead-time allows the e-tailer to compete on speed at the expense of the inventory cost.

For our sofa, however, the lead-time is identical to that of the pure e-tailer. The firm could choose to ship the sofa from the factory to one of its warehouses, and then ship from there to the home. Yet the warehouse might not be anywhere near the home. In such cases, the final shipment could involve long-distance trucking with a transfer to a local trucking company. The supply chain of the pure e-tailer with warehousing model looks like this:

Manufacturing → Ship to warehouse → Inventory at W/H → Repair damage → Local shipping → Assembly in home

These firms face the same issues as the pure e-tailers, with three exceptions.

1. They may be able to handle some repair in the warehouse, thereby reducing external quality failures.
2. The warehouses also provide a place where product returns can be processed and resold.
3. For items held in inventory, the warehouse speeds delivery and may also provide some transportation cost efficiencies.

Manufacturer Direct

Manufacturer direct is another interesting alternative for the e-channel. In this case, the manufacturer sells furniture over the Internet much like Dell sells computers. Most major manufacturers have not pursued this option because they need a presence in bricks-and-mortar stores. Channel conflict confronts many manufacturers that have close, established relationships with distributors or retailers. For example, in PCs, Hewlett-Packard, Compaq, and IBM all shunned the direct sales model to protect their retail partners. Selling through a new channel angers existing customers and risks the loss of significant sales volume. In some industries, however, a new player like Dell can force the issue.

Note, however, the many striking differences between furniture and PCs. Product variety in furniture is vast compared with PCs, making it impossible for one manufacturer to cover the possible key products. Also, unlike PCs, there is far less standardization in the furniture industry—there’s no Intel or Windows driving product development in furniture.

One option is for a furniture manufacturer to abandon the existing channel and go whole hog into selling direct. But the risks are so high that some furniture manufacturers state explicitly that they will not sell over the Internet. Furniture Brands International, the nation’s largest manufacturer and maker of Broyhill, Lane and Thomasville, will not allow Internet sales of any of its products. And it will not sell to retailers who do most or all of their business online. Therefore, manufacturers who choose to sell direct--or for that matter to eFurniture companies--typically either are distressed or are niche players. Krause’s Furniture, Inc., for instance, with net losses totaling \$30 million over the last three years, recently received a capital investment designed to move the company toward partnerships with Internet players.²

Another strategy is to try to maintain existing relationships while establishing new channels. Some firms segment the market, and sell to new segments online. Some firms segment the market, and sell to new segments online. A furniture manufacturer in Vermont, for instance, sells second-quality products online and also sells online to geographic regions that are currently not served by their retailers. On the other hand, Dallas-based American Leather is attempted to pursue both traditional retail sales and a partnership with Furniture.com (www.furniture.com). American Leather claims it can turn around a customized sofa in two weeks--a capability nicely suited to Internet sales. However, the company has no way to handle returns, so it has been building partnerships with e-furniture firms.³

Retailers, for their part, are encouraging manufacturers to resist online sales. They do not want to be a “petting zoo,” where customers come to see and touch the items and then disappear to place online orders. Brown Furniture, for example, has adopted the formal Internet vendor policy shown in Exhibit 3. The hybrid “clicks and mortar” approach that we will discuss next may help assuage retailers’ fears, although the jury is still out.

In any case, the supply chain for direct players faces many of the same challenges as the pure e-tailer chain. Manufacturers capture orders and schedule production of the items. When complete, the items are shipped via third party logistics providers to the customers’ home, as shown here:

Manufacturing → Long distance shipping → Local shipping → Assembly in home → Repair damage

Order-fulfillment cost, delivery, and quality issues for the direct players are nearly identical to those faced by e-tailers. When handling returns, manufacturers have an advantage. They can take the item back to the factory and perform the rework for a higher likelihood of quick resale. Of course, manufacturers are certainly far more focused and thus are less flexible to customer demands for product variety.

A variant of the manufacturer-direct model is provided by Bayla.⁴ This firm seeks to control nearly the entire supply chain by developing front end Internet sales while integrating backwards into manufacturing. Bayla's plan is to build three new manufacturing plants with state-of-the-art equipment that will enable the company to deliver made-to-order products quickly.

Our perspective is that firms who choose to compete in this way face two potential obstacles. First, because fabric lead times are so long, they must either limit fabric variety to keep down costs while still providing quick delivery, or increase costs by holding inventory of a wider range of fabrics. Second, even with fabric available, manufacturing lead times can be long. It is clear from fundamental principles of manufacturing that quick turnaround of customized products requires that the manufacturer maintain excess capacity, thereby increasing costs.⁵ The point is that quick delivery is in fact possible; but the firm must compromise on either cost or flexibility/variety.

Retailers on the Web

Retailers who add Internet sales to their existing bricks-and-mortar model provide an interesting twist to the story. The case everyone is watching is Ethan Allen—a company with more than 300 stores nationwide, 100 service centers for repair and deluxing, 21 factories, and three sawmills. Ethan Allen owns nearly the entire supply chain. Its foray onto the Web is a fascinating experiment in clicks and mortar. A customer can find the sofa she likes in an Ethan Allen showroom and then order it on the retailer's Web site (www.ethanallen.com). The sofa is manufactured just as in the other scenarios, and then shipped to the Ethan Allen store closest to the customer. The store handles repair, local delivery, and final placement and assembly—just like in the traditional bricks and mortar case, and just as if the customer ordered the sofa at the store. If the customer records the fact that she visited a particular store, that store receives a 25 percent commission. But even if she does not record that fact, the store still receives a 10 percent commission for handling and delivery.

The Ethan Allen supply chain is identical to that of the traditional retailer. However, the clicks-and-mortar model solves some problems faced by retailers—such as convenience of 24-hour shopping or high margins charged by the retailer. And, it solves some problems faced by the Internet firms—local delivery and repair, for instance, or product returns.

Flexibility is one problem faced by Ethan Allen, however. Although the company offers a large selection of products, that selection is still limited to specific styles. If the customer wants a French country sofa, she will have to look elsewhere.

Some retailers who do not own the supply chain are trying a similar strategy. A case in point is Arhaus Furniture, a company with 15 stores in Ohio, New York, and Kentucky that is using the Internet to expand geographically. For sales close to the existing stores, the model is very similar to Ethan Allen clicks and mortar. However, if orders arrive

from distant customers, Arhaus will face the same issues as e-tailers that own warehouses. By using van lines to ship long distances, Arhaus says it will be able to keep shipping costs at 10 percent of the purchase price. As for channel conflict? Arhaus' products are designed and manufactured specifically for the company.

One final twist is a hybrid model. LifeStyle Furnishings International, maker of the Berkline, Drexel Heritage, Lexington, and Henredon brands, plans to use the Internet to answer customer inquiries and to channel customers to existing retail partners. The hope is that retail sales will be enhanced, helping to reduce channel conflict.

FurnitureChannel.com (www.furniturechannel.com) is pursuing a similar model. The company works with local retailers by offering products from many manufacturers on its Web site. Customers interested in a particular item are directed to the closest retail partner. The customer has the convenience of shopping at home, while the store handles local delivery and service. If the customer wants to touch and feel the product before buying, FurnitureChannel will again find the nearest store. The customer can order directly from the store, or from the FurnitureChannel.com site.

This consortium model responds to the delivery and repair challenges faced by the pure e-tailers, much like EthanAllen.com does. However, it allows for a broader product offering than Ethan Allen. One problem with the consortium model is the possible impact on the retailer's reputation. If a lower-end item is purchased online and handled by a retailer, how does that reflect on the retailer's quality reputation? Browns Furniture, for one, balks at the prospect of risking its reputation by joining up. One answer is to carefully choose the manufacturers and retailers in the consortium—an approach being pursued by the startup EasyFurnish.

Evaluating e-Tailer Supply Chains

Using our framework for supply chain competitiveness, it's evident that e-furniture faces some formidable challenges. Order fulfillment costs are high (see Exhibit 4), quality management is more difficult than in traditional models, and there are few real flexibility and delivery advantages. Yet clearly there is a sizeable online market for furniture and some models will survive. We believe that a few pure e-tailers will survive as niche players in the industry. Likewise, niche manufacturers will find the Internet profitable. Yet the supply chain economics indicate there is little chance of an Amazon or Dell appearing in furniture.

Two models hold the greatest promise for success. The first is the clicks-and-mortar approach where bricks and clicks players meld the best of both worlds into competitive strategies. The likely target market is 35 to 45 year-old working couples with relatively high incomes but little spare time. They will be attracted to medium- to high-quality furniture, guaranteed by the local retailer, delivered in competitive time frame--but not at a particularly low cost. The second is what we call the IKEA model, named after that furniture company innovator. In this model, pure e-tailers sell low- to medium-quality products, with returns and repair paid by the customer. Product delivery would be fast,

but variety would be limited. The target market is younger working individuals and couples from 25 to 35.

Our framework for the furniture industry can readily be applied to any product or industry to evaluate competitiveness and understand supply chain weaknesses. For example, the toy industry also faces long leadtimes—in this case, from suppliers in Asia. Since customization is not an issue, both traditional and virtual retailers maintain inventory to compete on speed. Interestingly, no one distributor supports the toy industry like Ingram Books does for publishing. Thus, eToys was forced to develop sourcing strategies and bear inventory risk just like Kbkids and Toys R Us. Bad inventory bets on hot products mean stockouts just as in the traditional model. Many investors missed this key trade-off between supply chain delivery and cost and euphorically bet that Toysmart and eToys could replicate the book model for toys--a big mistake.

What have we learned about dot.com supply chains? Can e-tailers, in the furniture industry--or any business segment--build competitive supply chains? Yes they can. But they must pay attention to supply chain fundamentals like managing cost, controlling quality, while maintaining a delicate balance between flexibility and speed.

Endnotes

1. Buchanan, L. "Leader of the Pack? Furniture.com is Emerging as the Market Leader in the Online Furniture Retailing Market," *High Points*, January 2000.
2. Bluth, A. "Investment to Fuel Brea-Calif.-Based Custom-Furniture Maker's Expansion," *The Orange County Register/KRTBN*, Jan. 13. 2000.
3. Karpinski, R. "Levi's Pulls Plug on E-Sales, But Retreat May Not Be Total," *Internet Week*, Nov. 8, 1999.
4. Warner, M. "Bayla's Plea: Put Your Money Where Your Mouth Is," *Fortune*, Aug. 14, 2000.
5. Silver, E. A., Pyke, D. F., and Peterson, R. *Inventory Management and Production Planning and Scheduling* (3rd ed.). New York: John Wiley & Sons, 1998.

Exhibit 1: Online Furniture Sales (Source: Forrester Research)



Exhibit 2: Definitions and measures of four key supply chain objectives

Objective	Definitions	Measures
Cost	<p>Lowest cost in the industry</p> <p>Cost competitive with our closest competitors</p> <p>Cost is relatively unimportant because we hold the patent and can charge a premium</p>	<p>\$ per unit</p> <p>Labor hours per unit</p> <p>Inventory turnover</p> <p>\$ per unit delivered to the customer</p>
Quality	<p>Performance</p> <p>Conformance</p> <p>Durability</p> <p>Reliability</p> <p>Serviceability</p> <p>Features</p> <p>Aesthetics</p> <p>Image</p>	<p>Parts per million defective</p> <p>Warranty dollars spent</p> <p>Percent returns</p> <p>Results from satisfaction surveys</p> <p>Internal yield rate</p>
Delivery	<p>Speed</p> <p>Reliability</p>	<p>Percent of demand met from the shelf</p> <p>Percent on time to the customers home</p> <p>Number of days late</p> <p>Cycle time from order to receipt</p>
Flexibility	<p>New product introduction</p> <p>Ability to customize</p> <p>Breadth of product mix</p>	<p>Time to market</p> <p>Number of new product introductions per year</p> <p>Number of stock-keeping units in the catalogue</p> <p>Variety offered</p>

Exhibit 3: Brown Furniture's Internet Vendor Policy

- **Brown Furniture will review the Internet distribution policies of all existing and potential vendors. We will not add new vendors who sell products through distribution channels that utilize the Internet.**
- **Existing vendors will be monitored ... We will monitor various Web sites to determine if products from existing vendors are available.**
- **Retail sales will be monitored. If Brown Furniture determines that a customer has shopped our store and purchases the products through the Internet, the manufacturer will be contacted and the vendor will lose one display of floor space for each lost transaction.**

Exhibit 4: A relative comparison of order fulfillment costs.

Channel	Relative cost of Returns	Cost of Inventory	Cost of Repair	Cost of Shipping	Cost of Order Capture	Cost of Quality
Traditional retailer	L	M	L	L	H	L
Pure etailer	H	L	H	H	M	H
Etailer with warehouses	H	M	M	M	M	M
Retailer on the Web	L	M	L	L	H	M

Low (L), Medium (M), or High (H) in each cell.

