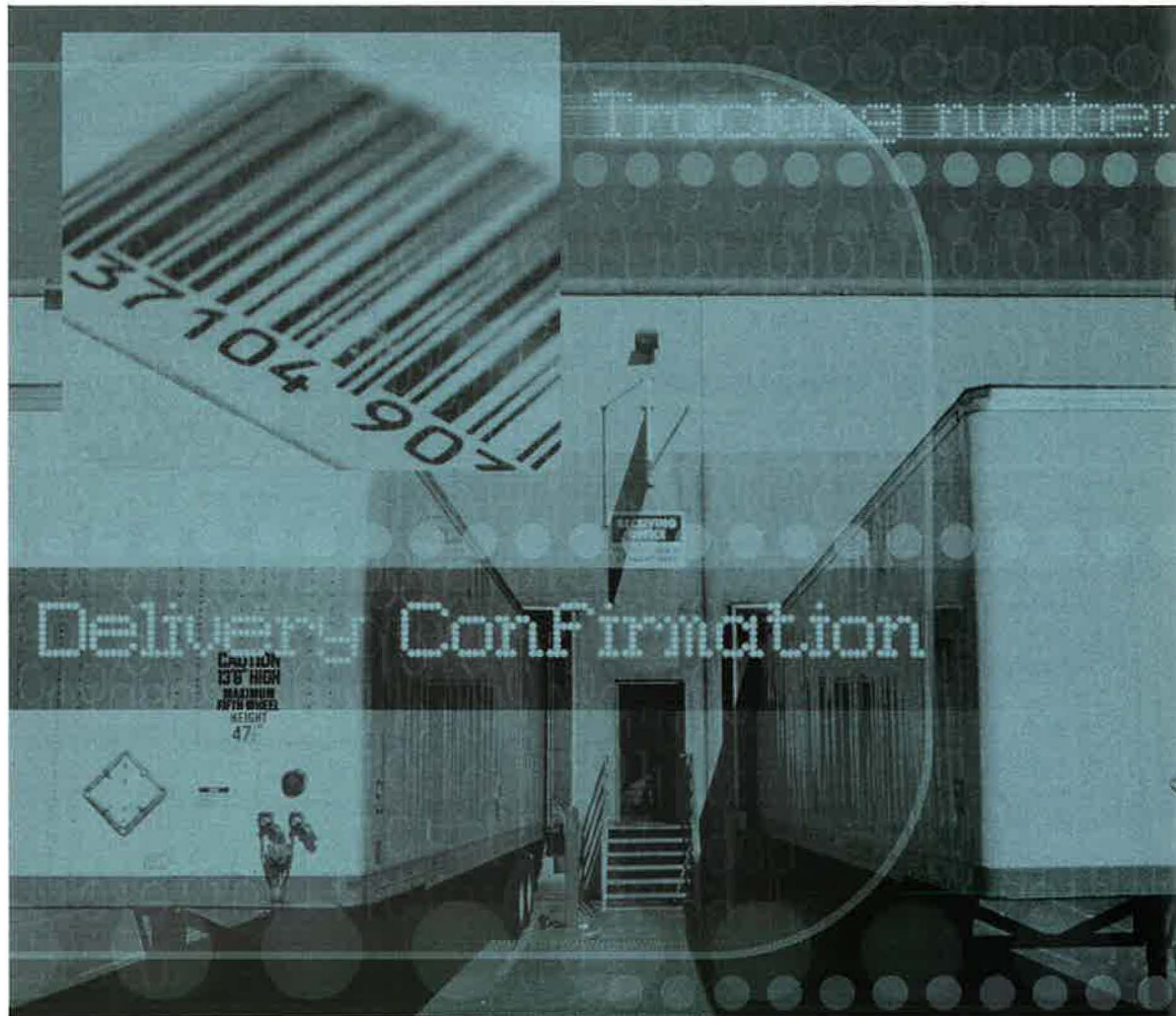


E-Commerce Implications for Warehousing and Distribution

Revolution or Evolution?

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The trend makes sense because

- But is this a revolution or an evolution of distribution channels? Indications are that it is an evolution—e-commerce is the addition of a sales channel for consumers.

For centuries, consumers have traveled to retail stores to select and purchase products. “Brick and mortar” buildings—including stores, big-box retailers, outlets, and club stores—were the first sales channel.

By 1900, 200,000 miles of railroad track spanned the continental United States (1). Postal regulations also were favorable to the catalogues. As “aids in the dissemination of knowledge,” the catalogues qualified for lower postage rates and received further assistance with the introduction of Rural Free Delivery in 1896 (1). Sears, Roebuck & Company is a well-known example of this era’s highly successful mail order retailers.

The development of e-commerce has resembled the development of mail order—e-commerce has developed amid a wave of improved transportation and communications options, changes in consumer needs, and innovative marketing by companies. Integrated carriers—such as Federal Express, United Parcel Service, Airborne, DHL, and others—emerged in

Simultaneously, information and telecommunication technologies produced the Internet. As processing power increased and the range of telecommunications channels grew, a new and convenient way emerged to reach consumers 24 hours a day, 7 days a week.

The growth in using the Internet for purchases is astonishing. According to one Internet research company, 34.3 million consumers visited retail sites each week during the 2000 holiday season, an increase of more than 30 percent over the 1999 holiday season (2).

Interviews and discussions during the BER Project revealed that some retailers leverage the advantages of each sales channel to support the other two. For example, Eddie Bauer, Best Buys, and Restoration Hardware allow returns of website purchases to their retail stores, improving customer service and drawing buyers into the stores, potentially generating new purchases.

Changes in freight movement and warehousing in the past 20 years also have supported the growth in e-commerce. As shown in Figure 1, goods traditionally were produced at manufacturing plants, moved by a variety of transportation modes to warehouses, stored and sorted for use, and finally delivered to stores for consumers to purchase.

In the late 1980s and 1990s, distribution channel strategies changed. Bar codes and checkout scanners enabled stores and companies to monitor product sales trends more closely. The analysis of daily sales patterns, combined with the use of sophisticated computer and telecommunications systems, allowed stores to reorder products automatically. Instead of



Sears, Roebuck & Company is an example of a successful mail order giant now branching into e-commerce. *Top*: first Sears catalogue, 1896; *below*: Sears website, 2001.

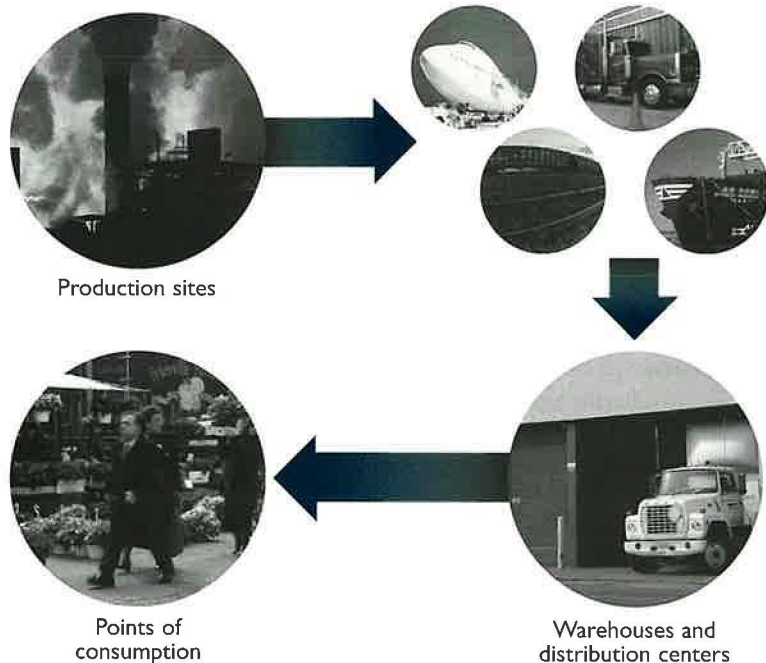
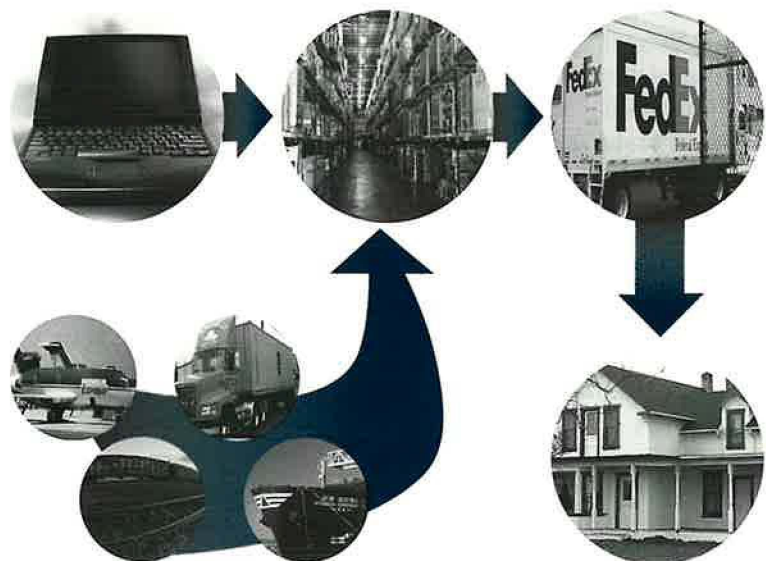


FIGURE 1
Traditional
distribution.

“pushing” products through the supply chain, “real-time demand” analyses enabled retailers to “pull” goods through the distribution channel.

Real-time demand requires that products be on the shelves and available at customer request. If a product is not available, a sale is lost. The pull strategy therefore requires precise movement and tracking of products through the freight transportation system. Other changes in freight transportation requirements include on-time performance, meeting specific delivery parameters, and providing in-transit visibility and flexibility.

FIGURE 2
Filling an
Internet
order.



Adding Value

The role of warehousing and distribution centers also has changed. Instead of serving only for storage, warehouses have become sites for value-added activity and customer service. Many retailers and manufacturers apply exacting standards to product packaging, labeling, ticketing, and delivery. As a result, warehouses are becoming the final stage in the production line for many goods that are customized, assembled, and prepared for retailer shelves in response to customer requirements transmitted directly to the warehouse. In addition, warehouses increasingly handle customer returns, a practice called “reverse logistics.”

Adding value is a key activity at warehouses and is a major source of employment. Warehouses may have hundreds of employees, sometimes in two shifts, for value-added activities, including

- ◆ Assembly and customization—for example: private labeling and packaging of stereo components shipped in bulk to the warehouse; assembly of knife sets from individual knives shipped in bulk to the warehouse; production of gourmet gift packages that combine products from several sources; assembly of product displays; and furniture assembly.

- ◆ Packaging and ticketing—for example: blister packing of kitchen gadgets; stuffing and preparation of handbags and luggage; individual book picking and packing to replenish stores and fill Internet orders; pressing and hanging garments; and adding tickets and price labels according to customer specifications.

- ◆ Product repair—for example, removing broken liquor bottles from cartons and removing damaged paper from the outer layers of paper rolls.

As one industry executive noted during the BER interviews, “Value-added activities previously would have been classified as manufacturing. Instead, the last portion of manufacturing is deferred to the warehouse.” This warehouse activity gains importance when the production lines are overseas. Products can be customized in the United States, closer to the consumer markets, enabling quick response to varying customer demands and requirements.

Storage and Supply

Storage is still required. The size of the production run often determines product costs, and optimizing production runs can result in the need for storage.

Warehouse executives generally do not see e-commerce as significantly different from other retail order fulfillment, particularly mail orders. One industry executive noted in the BER interviews, “E-commerce is only the last 100 yards in the supply chain.”

Filling an Internet order illustrates the fundamental change in the function of warehouses and illustrates the pull strategy in action. As shown in Figure 2, an order placed on a website initiates demand and is transmitted to the warehouse for fulfillment. The warehouse is supplied through the freight transportation system, ensuring that goods are available on demand. Orders are picked in the warehouse, packaged, and then usually handed over to integrated carriers for delivery directly to the customers.

New Considerations

E-commerce and similar direct-to-the-customer order fulfillment create specific considerations for warehouses and distribution centers, including

- ◆ **Shipment size**—shipments are much smaller, but there are more individual shipments. Instead of a full pallet or a truckload, a shipment to an individual consumer may consist of a single box.

- ◆ **Speed**—customers want orders fulfilled and delivered at the same speed that they placed the order on the website.

- ◆ **Shipment destinations**—e-commerce and similar direct-to-customer order fulfillment mean that shipments are going to a wider range of addresses than business-to-business shipments.

- ◆ **Freight services**—with smaller shipments and more unique destinations, the integrated carriers and USPS generally are the choice for delivery. For warehouses and distribution centers, this may mean different packaging or labeling requirements, direct pick-up by integrated carriers, or arranging for transportation companies to pick up direct-to-customer orders for transfer to integrated carriers. Freight services also are improving ways to fulfill international e-commerce orders.

- ◆ **Automation**—a range of technologies transmits the orders to the warehouse, tracks inventory, moves goods through the building, and ensures that orders are filled correctly. For example, completed orders can be weighed in shipment boxes on the conveyor belt. If the weight matches the correct weight for the shipment—determined by the warehouse computer—then the box continues to the shipping station. Otherwise, the box is shunted to a side conveyor to be checked for errors.

- ◆ **Location**—increased use of integrated carriers can create a need to locate closer to carrier hubs. For example, if the warehouse relies on expedited air carrier service, location within a certain travel time to the cargo carrier airport hub is beneficial—the closer to the airport, the later the cut-off time to catch the last daily flights.



bn.com is the e-commerce division of Barnes and Noble, the nation's largest bookseller. The New Jersey distribution center, a 345,000 square-foot facility, is highly automated, has 850 employees, and holds 16 million books.

E-Commerce Evolution

E-commerce is the newest sales channel to consumers. Like the mail order catalogue, e-commerce has grown through increased customer demand, enhancements in the nation's transportation and telecommunications systems, and use by companies with vision.

Although e-commerce can replace the need for some mail order catalogues and retail stores, many companies have found that using all three sales channels is most effective in reaching the largest number of customers. Nevertheless, the growth in e-commerce and direct-to-customer fulfillment has changed transportation requirements, reducing shipment sizes, increasing the use of integrated carriers, and generating demand for precise transportation.

E-commerce is not a fad or a revolution, but an evolution, reflecting technological advances and consumer needs. E-commerce also demonstrates the changes and directions necessary for the nation's transportation and telecommunications systems to meet the changing demands of consumers and businesses.

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