

Strategic supply chain choices for multi-channel Internet retailers

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Abstract Multi-channel retailing—selling through multiple, distinct channels—has been a part of the retail industry as long as there have been main street merchants selling through catalogs. Since the mid-1990s, however, multi-channel retailing has increased dramatically due to traditional retailers selling over the Internet. This trend presents considerable operational challenges because Internet and traditional retail have vastly different demand drivers, product variety issues, optimal inventory configurations, cost structures, supply chain structures, and delivery mechanisms. Consequently, the optimal supply chain configuration for Internet delivery differs considerably from the optimal supply chain configuration for a retail store structure, so designing a supply chain system to serve both channels well is difficult. Accordingly, a set of strategic choices and trade-offs must be made. Here, we present some strategic alternatives.

Keywords Typology · Supply chain · Retail · Theory-building · Internet · Multi-channel distribution

1 Multi-channel Internet retailing

Multi-channel retailing historically has referred to companies that sell through a store and a catalog. Over the past decade, this definition has been extended to include Internet sales. Although the Internet is a powerful channel for commerce, and the growth rate of e-commerce sales is large, retail e-com-

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merce or “e-tail” is still small. The US Census Bureau (2006) indicates that e-tail accounts for \$71 billion, or only 2%, of the US retail economy.

However, over 92% of e-commerce retail sales are from non-store retailers (e.g., <http://www.Amazon.com>) or automobile sales, leaving \$6 billion in Internet sales for store-based retailers, or only 0.2% of store-based retail sales. For example, JCPenney was an early leader in Internet retailing, establishing JCPenney.com in 1994, piggybacking off a strong catalog business. Still, only 4% of JCPenney’s annual revenue is from on-line sales (JCPenney 2005). Federated Department Stores (2006)—incorporating Macy’s, Bloomingdale’s, and many other brands—derives 2% of revenue from on-line channels. Other firms offer products for sale over the web, but do not report web business separately in their financial statements, presumably because the business is too small to be material.

But the main area for growth is in multi-channel Internet retail. Robinson (2002) reports that Gartner has found that of 375 retail companies that they surveyed, roughly 75% have or are planning to implement a multi-channel retail strategy. These data would seem to suggest that, eventually every retailer will or should have a multi-channel approach. This has led to many authors offering consistent strategic advice for Internet based retail to partner with firms with physical stores, citing synergies (Carter and Sheehan 2004; Grewel et al. 2004). The rush to multi-channel Internet retail is not universal. Two prominent firms, Dollar General and Family Dollar, with a combined 14,049 stores and \$15 billion in annual revenue, do not sell over the web (<http://www.dollargeneral.com>; <http://www.familydollar.com>). Further, it is not just discount retail companies that are avoiding online sales. Zara, the pioneer of the “fast fashion” concept, also does not sell online (<http://www.zara.com>). In other words, whether to and how to adopt a multi-channel approach depends on the strategic position of the firm.

It is our thesis that moving to a multi-channel Internet purchasing option with an existing physical store network can create significant operational diseconomies of scope. Conventional wisdom would have it that firms that do not sell over the Internet, or have small, financially insignificant operations, simply “don’t get it” about the new economy. Rather, we take the position that these firms are acting rationally to a difficult and costly operational environment. The move to a multi-channel Internet retail strategy requires a move to a multi-channel supply chain strategy, and this may not be in the best interest of the firm. For example, a report from the interactive media in retail group (IMRG 2006) for top UK e-retail strategies highlights respondents’ concerns over “multi-channel integration” and “delivery and fulfillment (45 and 37% of respondents mentioned each of these two, respectively, as top priorities for e-retailing success). This suggests that the retail practitioners are aware of the operational challenges of a multi-channel strategy.

While practitioner oriented articles have discussed some of these difficulties (e.g., Pyke et al. 2001), the academic literature largely ignores them. There have been many articles on dual-channel supply chains, but these articles regard the warehousing systems more as theoretical points that are equivalent

in operational content (e.g., Chiang and Monahan 2005; Yao and Liu 2005; Rabinovich et al. 2003). Further, articles analyzing the success or failure of such firms have not considered the choices described here as variables to consider (Bose and Pal 2006; Forbes et al. 2005).

Here, we focus on delivery and fulfillment operations—the warehousing and distribution choices—to achieve multi-channel integration of the supply chain. We present a typology of strategic warehousing and distribution choices for multi-channel Internet retailers. Four ideal types are developed. We posit a series of strategic contingencies that would cause ample use of all combinations of the warehousing and distribution strategies listed.

This manuscript is organized as follows. First, other service operations typologies are explored. Then, marketing and operational differences between Internet and physical retailers are described. This is followed by a description of ideal warehousing and distribution choices for the cases of an Internet-only firm and a physical store-only firm. Finally, we present a typology of strategies for the multi-channel retailer.

1.1 Service operations typologies

Doty and Glick (1994, p. 243) note that, “typologies are complex theoretical statements developed to predict variance in dependent variables.” Typologies “are a unique form of theory based on a set of ideal types” (p. 235).

Typologies are most useful in emerging fields. Multi-channel retailers have focused on Internet sales, of course, only since the early/mid 1990s. Further, Internet retailing remains both a far faster growing segment than physical retail and the proportion of Internet retailing to physical retail revenue in most firms is currently extremely unbalanced. Empirical studies of warehousing choices for e-tailing retailers have been done (De Koster 2002, 2003). However, because of the newness and growth of e-tailing, and the fact that e-tailing is still relatively small compared to traditional retailing, corporate responses to this issue are likely to be rapidly changing. As noted by Rabinovich and Knemeyer (2006, p. 85), “there is still improvidence and improvisation in the decision-making process followed by some Internet sellers” in their back-office choices.

The typology developed in this manuscript differs from prior service sector typologies in several ways. This typology represents a scheme based on two process dimensions—warehousing and distribution—among the vast field of service operations dimensions. Within that framework, the unit of analysis is the firm rather than entire industries. That is, entire industries are not classified together. Rather, our matrix represents competitive positions that can be taken by multi-channel Internet retailing firms within any industry. The focus of this typology is on how processes could be divided based on firm environment and strategy, and the focus is on back-office processes, rather than the more typical service typologies that focus on the front-office.

The most influential service sector typology has been Chase (1978, 1981) who categorizes service industries by the ratio of customer contact time versus

total service creation time. Many other authors have also proposed service sector typologies and taxonomies (a review is in Metters and Vargas 2000). Usually, the differentiating characteristics of service operations typologies focus on some variant of front-office work. For example, they can take the form of “degree of interaction and customization” (Schmenner 1986), “customer contact time per transaction” (Silvestro et al. 1992), or degree of contact and complexity and divergence (Wemmerlov 1990). Summarizing these efforts, one of the pervading concepts is that of “customer and employee involvement,” focusing on activity in the front-office (Collier and Meyer 1998, p. 1228).

The goal of many typologies is to show that industries should position themselves at a single best point or specific area of a matrix, often on a diagonal of a two-by-two matrix (e.g., Collier and Meyer 1998; Tinnilä and Vepsäläinen 1995). This “diagonal” approach simulates for services the manufacturing typology of Hayes and Wheelwright (1979). Here, a different type of comparison is made: ideal types of warehousing and distribution are described depending upon strategic operational goals. In this manuscript four distinct strategies are developed that firms within an industry can adopt.

The typology here aligns organizational structure with service system strategy. As such, it falls within the strategic research stream known as “contingency theory” or the “strategy and structure” literature (e.g., Chandler 1962; Galbraith and Kazanjian 1986; Galbraith 1995). In general, this literature portrays such managerial options as not being inherently good or bad, but as appropriate or inappropriate based on the fit with overall strategy and the competitive environment. Likewise, this model portrays this decision as one that fits certain strategic objectives and not others.

2 Relevant differences between the electronic and physical environment

Operationally, there are different structures, opportunities, and obstacles for Internet-based and traditional businesses. This in turn makes the design of a multi-channel supply chain system more difficult. Key issues that comprise this distinction are safety stock levels, the number of stocking points, inventory record accuracy, product assortment breadth, and customer product returns.

One significant cost advantage that is supposed to accrue to Internet businesses is a reduction in inventory needed for the same level of sales. The potential inventory savings in e-tailing is a prime example of the textbook “square root law.” That is, given N stores, iid demand, and a service level of k standard deviations of demand (denoted by σ), N stores in traditional retail require $k\sigma N$ units of safety stock. In a web business with a single warehouse, only $k\sigma\sqrt{N}$ units of safety stock are necessary.

Maintaining inventory record accuracy is a persistent problem for physical retailers (Fisher et al. 2000). Record inaccuracy stems from customer theft, customer misfiling, and shipment miscounts. The problems can be extreme, with one “very successful retailer... (who is) a leader in information systems”

(Raman 2000, p. 100) finding inaccurate inventory records on 71% of their products. This inventory inaccuracy also leads to “phantom stock-outs,” where goods may be in the store, but due primarily to customer re-shelving, those goods cannot be found. One bookstore chain found that 19% of their stock-outs were of this “phantom” type (Raman 2000). Inventory accuracy is far less of an issue for Internet businesses that have a single facility that does not need to accommodate customers. This is a significant obstacle in one of the common warehousing choices for e-tailing retailers: Using a retail store as the “warehouse” for Internet sales. The customer may see on their computer screen that the firm has inventory a product, even though the firm is stocked out or cannot locate it.

A marketing advantage of Internet retailing that has significant warehousing ramifications is product assortment. The inventory of a physical store is limited due to marketing issues such as ambiance, cost issues such as square footage, and customer in-store distance issues. For example, blockbuster video physical stores typically carry 5,000 movie titles. Blockbuster online carries 50,000 (Evangelist 2006, Personal communication). This promise is described as the ability to serve the “long-tail” of the demand distribution—to sell less of more things (Anderson 2006). The implications to back-office warehousing of this marketing promise are two-fold: products sold on the Internet again cannot be picked from retail stores—as the products are not in the retail assortment—and there is a further issue with returns. A product purchased over the Internet that is merely the wrong size or color cannot be returned to a retail store of the same chain and restocked.

Returns are also a major difference in the supply chain structure. Typical return rates for clothing retailers are in the 2–5% range. The distribution centers are usually one-way—products only flow from manufacturer to retail store. Return rates on Internet sales average an order of magnitude more than traditional stores (Dholakia et al. 2005). Consequently, a reverse supply chain that can be ignored in physical retail is an integral part of Internet retail. This militates against using traditional warehousing facilities for both Internet sales and physical stores.

Collectively, these environmental differences cause operational difficulties that mitigate the advantages of combining “bricks and clicks.”

3 Ideal systems for Internet-only and physical store-only systems

A major cost advantage of the traditional system is in product distribution. The operational differences stem from the basic traditional versus Internet distribution strategies shown in Fig. 1. Traditional retailers usually have an arborescent distribution strategy with truck- or train-loads proceeding from central warehouses to regional facilities, then regional facilities sending pallet loads to retail outlets. Conveniently, customers themselves provide the last link from retail stores to their homes.

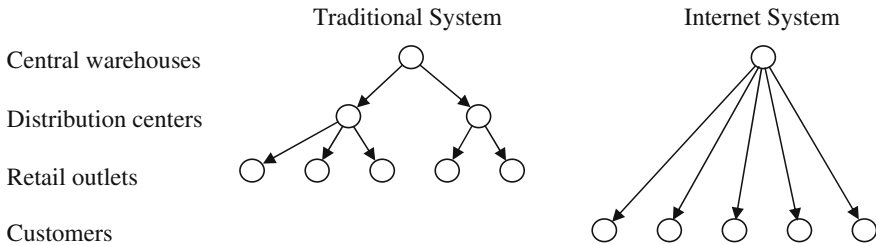


Fig. 1 Traditional versus Internet pure-play distribution strategies

The prototypical Internet/catalog strategy has central facilities that send one-off orders directly to customers. This structure has a severe disadvantage in variable distribution costs. The cost per unit of shipping train car loads of goods to a few hundred different retail store addresses is trivial compared to the cost of delivering individual units to a few hundred million customer addresses.

This is, however, a best-case description of the typical Internet warehouse. For example, <http://www.Amazon.com> sells several different types of items that are stored in different warehouses located in different parts of the country. While the interface over the computer appears seamless, an individual order may have to be combined from several different warehouses.

There are also structural differences in the physical systems for Internet versus traditional retailers. In the authors' experience with many plant tours, distribution centers for traditional retailers have wide aisles, so forklifts can easily pass, and aisle heights reach as high as the forklift truck forks will go. They move product by the pallet load, where a forklift is most efficient. Packing materials tend to be "palletizers," which rotate large pallets with multiple hundreds of pounds of goods while wrapping plastic wrap around them, then treating the plastic wrap to tighten it. Trucks are then loaded by forklift for delivery to a few stores.

An Internet-based retailer, however, usually runs a "pick-and-pack" operation, where aisles are narrow, since only a human being must enter them, aisles are short in height, since humans reach for items, and items are stored in open boxes, since one item at a time is taken, rather than a pallet load. Packing is for individual items, usually for pick-up by a firm such as UPS. Operationally, these systems can be as simple as having shelves of boxes, with an employee carrying a pick list and a cart.

However, they can also be highly complex. Pick-to-light systems electronically read bar codes of customer orders and engage a light on the product needed to be put in a cart. Warehouse wide conveyer systems can move customer order baskets through an entire warehouse quickly, with each warehouse worker responsible for their own section. Or, "bucket brigade" systems can be employed to optimize such picking operations (e.g., Bartholdi and Eisenstein 1996), where each worker has a roving and variable portion of the warehouse to pick from.

These issues, and a host of others, preclude directly combining pick-and-pack operations with those that focus on delivering pallet-loads of goods.

4 Strategies for mixed traditional and Internet retailers

If the decision of supply chain structure were simply about cost, it would seem clear that a pure Internet merchant would choose the Internet system in Fig. 1 and a pure retailer would choose the traditional system. However, two critical issues make the choice less clear. First, the supply chain structure must reflect corporate strategy, and second, the two systems cannot be integrated easily.

There are several key strategic dimensions on which a retailer can compete, including product mix, reliability or availability, cost and response time. The promise of Internet retailing was to increase the range and availability of the product mix while simultaneously reducing cost and keeping response time to little more than shipping time. Consider, though, the tradeoffs associated with designing a supply chain system to meet all of these strategic dimensions. Traditional retail systems are all too familiar with these tradeoffs and have built supply chain systems to meet the requirements dictated by the retailer's strategy. Hence, Wal-Mart's distribution system is not the same as Zara's because they target different strategic objectives (cost and speed, respectively). Multi-channel Internet retailers must consider their strategic objectives as they determine the most appropriate supply chain configuration.

Two critical back-room choices for multi-channel retailers are how to manage inventory and how to manage shipping to the customer (Fig. 2). Firms can share inventory between their web and traditional retail business

Pooling of Inventory

Integrated	Cost Minimizer <i>Strategic Issues:</i> Lowest systems cost, delivery time disadvantage	Professional Shopper <i>Strategic Issues:</i> Selling price disadvantage, availability
	Transportation Sharing <i>Strategic Issues:</i> Cost savings over "Dedicated Systems", coordination, customer perception	Dedicated System <i>Strategic Issues:</i> Customer perception, coordination, high cost
Segregated		
	Bulk	Single order/item
	<i>Aggregation of Internet Customer Shipping</i>	

Fig. 2 Inventory and shipping strategies for multi-channel Internet retailers

(Integrated) or keep inventory in separate systems (Segregated). For shipping, there is a general choice of shipping in bulk or shipping single items as they are ordered.

4.1 Integrated versus segregated inventory

There are significant operational advantages to be gained by pooling inventory: Reduced safety stock and phantom stock-outs, easier co-ordination, etc. However, there are also strategic reasons to keep the inventory segregated: keeping separate businesses on separate P&L statements, different expertise of the buyers, information technology considerations, etc. JCPenney chose to have entirely separate warehouse and distribution systems for each channel—and separate business units. Home Depot also has a separate Internet business unit. This has allowed them to have different product offerings for each channel. Many other firms, such as Wal-Mart, Macy's, and Bloomingdale's, have taken this segregation strategy a step further and have outsourced all their Internet orders to third party firms. One such outsource service provider is Dot Com Distribution (<http://www.dotcomdist.com>). They describe their business as providing inventory control and management for multi-channel fulfillment operations.

At the other end of the spectrum would be inventory systems that fully integrate the inventory for both channels. At CompUSA, a computer and office supply retailer, when an Internet order is placed, a store employee walks the aisles of a retail outlet and picks the order. This style is used by several firms, such as Tesco (Dodd 2001), the Gap (Kaufman 1999), Estee Lauder (Garner 1999), and Ethan Allen (Goldman 1999).

But it is a false dichotomy to think of inventory pooling as either integrated or segregated—there are opportunities to blend these strategies. Multi-channel systems that choose to share inventory can do so at the distribution center level, the retail store level, or both. For example, REI uses the same distribution center to perform order fulfillment for the retail network and perform order fulfillment for individual web orders. This array of choices is shown in Fig. 3. Famous footwear also fulfills retail and direct to consumer orders out of a single distribution center. All incoming inventory is received into the retail side of the distribution center, then at set intervals, cartons are picked from the retail side, and moved to the direct to customer side of the distribution center where individual customer orders are picked. REI and famous footwear are instances of the general fulfillment model that entails having contiguous Internet and traditional retail warehouses.

High segregation					Low segregation
Bulk	Break-bulk	Flagship	Retail	Contiguous	Dedicated
Dist. Ctr.	Dist. Ctr.	Retail Store	Stores	Dist. Ctr.	Dist. Ctr.

Fig. 3 Inventory segregation of Internet and traditional retail: where Internet order picking occurs

Strategically, this dimension of inventory pooling raises several critical strategic tradeoffs. Related to cost, integrating inventory at the distribution center level gives the highest level of inventory cost benefit, but that must be traded off against the fact that warehouses are typically not configured to do both store delivery and individual item pick.

On the other side, integrating inventory at the retail level translates into pricing disadvantages—Internet orders are doomed to be priced at retail plus shipping and handling. Integrating at the retail store level also risks phantom stock-outs. Product substitution is an issue. A picker cannot make the judgment for a customer as to whether that customer would like a close substitute or would prefer to do without the item. This is a real concern in some industries, such as the grocery industry, which averages 8–10% stock-outs (Kurt Salmon Associates 1993). Pooling at the retail store level also limits the product breadth on the Internet to the same as in the retail store, negating one of the basic promises of Internet-based commerce.

Several factors play into deciding an appropriate inventory pooling strategy. Companies that aim at minimizing inventory costs would favor more integrated inventory systems. Companies that stock different items in each channel would favor more segregated inventory systems. If the Internet channel is operated as a separate business unit, segregated inventory systems are favored. On the other hand, companies that must avoid stocking out will choose more integrated systems. Additionally, the cost of integrating the inventories must be considered. For example, the IT infrastructure required to manage inventory in a distribution center is completely different from the IT infrastructure required to serve a pick and pack operation. Fundamentally, there is no “best practice” for integrated versus segregated systems. The choice must be made by understanding the strategic objective of the organization. Though what is clear is that from a customer’s perspective, dealing with the Internet channel should be seamless vis a vis dealing with the traditional retail channel.

4.2 Bulk versus single item/order shipping

The second critical operational choice that multi-channel Internet retailers face is whether to ship product in bulk or in single item/order shipments. Bulk shipping is also called “zone skipping.” It is so-called because large delivery firms, like UPS, break the world into specific zones and charge more for delivery to more distant zones. Utilizing zone-skipping, a firm first segregates its shipments by zone, then transports all the goods to the zone they are to be delivered to first, and then lets a carrier such as UPS make the final delivery to the individual customer. Examples of firms that employ this option include Grolier, Fingerhut, and Dell. This option is cost effective, but it is more time consuming for the customer, as their order must wait for a full truckload of orders to their zone before their order is shipped.

At the other extreme, multi-channel Internet retailers can ship individual orders, or even individual items. For example, famous footwear ships all of its Internet orders directly to the consumer individually via a common carrier. Amazon ships full orders to customers, but also allows the customer to choose an option by which they can either minimize shipments (shipping full order) or they can get it faster (shipping subsets of the order).

As was true with inventory integration/segregation, the decision of shipping method for the Internet channel is more complex than a simple dichotomy. This is so for two main reasons. First, the choices for delivering web-based orders can also be represented in a spectrum between bulk delivery and the “last mile” delivery to customer homes (see Fig. 4). Second, the shipping method must also reflect whether the order is being shipped from a centralized distribution center or a decentralized retail location. At one extreme, if customer pick-up orders at the same retail establishment that orders were kitted from—a traditional “call-in” option used for years, and an option used by some Internet grocers now—the inventory was essentially delivered in bulk from the distribution center, and no additional delivery charge is needed.

A second type of delivery approach would be for the customer to pick up the Internet order from a decentralized retail store. Many retailers offer this option (e.g., Best Buy, Circuit City, Sears, Lowe’s and JCPenney). JCPenney stores and 7–11 of Japan stores both serve as sites for customer pick-up, Internet orders picked from a centralized distribution center could arrive to the store in the same transportation system as traditional goods, and the customer can pick the order up in that store. Research indicates that 60% of on-line shoppers would use this option (Rabinovich and Knemeyer 2006, p. 107). Delivering goods to the so-called “last mile,” or to the customers’ home, is highly expensive, so transportation sharing systems show promise as a means to tackle this problem. American Eagle Outfitters exemplifies a third approach of shipping in bulk from a centralized distribution center, then using a common carrier like UPS to deliver the Internet order the last mile to the customer’s home.

There are significant strategic tradeoffs embodied in choosing an Internet shipping approach. Shipping in bulk is cheaper, but leads to longer delivery times to the customer. Fulfilling from a central location provides for significant inventory cost savings, but leads to unexpected behavior. For example, approximately 60% of JCPenney’s Internet customers pick up goods ordered online at a JCPenney owned store rather than have them delivered to their

Bulk shipments		Individual shipments	
Customer Pick-up at Retail Store/Retail Store Order Pick	Customer Pick-up at Retail Store/Delivery from Dist. Ctr.	Bulk from Dist. Ctr. to General Area/ Individual Delivery to Home	Shipping Direct to Customer Home

Fig. 4 Options for delivering Internet orders

home. Yet, those goods are still shipped from the Internet division warehouse rather than being pulled from the shelves of the store that hands over the product. This leads to excess shipping and materials handling costs. It also leads to possible customer dissatisfaction. Inevitably an instance will arise when an Internet order is missing an item, but the customer can find that very item on the retailer's shelf, which can damage customer satisfaction. Additionally, companies such as Grolier and Fingerhut have leveraged their ability to use zone-skipping into new business opportunities. Businesses such as Wal-Mart, Macy's, and others outsource their Internet business to them (Kopczak 2001).

The main operational drivers for the decision of Internet shipping strategy revolve around balancing cost and responsiveness. Strategically, serving market segments that are willing to pay for faster delivery does not require seeking operational efficiencies through bulk shipping. On the other hand, for low margin items or for price-sensitive markets devising delivery strategies that save cost can yield a strategic advantage. From another perspective, the weight to value ratio of the product might also influence the shipping approach. For bulky or heavy commodities like a tent from REI, a shipping strategy that takes advantage of the lower bulk shipping rates would be appropriate.

4.3 Prototype multi-channel Internet retail fulfillment strategies

We propose four general types of distribution strategies. Companies that ship bulk orders from an integrated inventory are "cost minimizers." This system takes advantage of inventory pooling to minimize safety stock, and uses bulk shipping to minimize shipping costs. Actual customer delivery might take place at the distribution center or a retail store. The delivery time is limited by the frequency with which orders are delivered from the distribution center to the retail store, which can be a week or more.

The only way to mitigate this long delivery time is to fulfill the customer order from the inventory held at the retail site, but this is no longer a cost minimizing strategy. It is a "professional shopper" strategy. For high size to value ratio items, fulfilling Internet orders from retail stock saves shipping costs. The key risk of the professional shopper approach though is that it is highly susceptible to phantom stock-outs.

A third strategy reflects the strategic desire to run "dedicated systems" like JCPenney does. This approach does not take advantage of inventory pooling, but also does not require integrating the information systems of two separate business units that are using two fundamentally different processes to target different customer needs.

Finally, "transportation sharing," allows for centrally picked orders to be bulk shipped to decentralized retail outlets for final customer delivery. The key strategic benefit for this strategy is that it leverages the company's existing store network to overcome the last mile delivery problem.

5 Applications of the typology to three businesses

5.1 Sainsbury's Grocery stores

Sainsbury's is one of the leading grocery retailers in England, and has implemented different multi-channel Internet supply chain systems that reflect its strategic needs. London has a high population density that allows for a centralized inventory approach. The English countryside, on the other hand does not have such a population density. Strategically, there is no single system that could effectively serve both markets.

If one were to consider the type of supply chain model that would be best serve a high population density market, one would end up with Webvan's approach. Webvan built dedicated distribution centers to serve each city it targeted. It picked and packed all of its Internet orders from these centralized distribution centers. Serving this market would require keeping Internet channel inventory segregated from the retail inventory. A centralized Internet channel distribution center would receive bulk orders, from which individual Internet orders would be picked. When the orders are picked, they would be sent to the customer as a full order. In the language of our typology, this would be a "dedicated systems" approach to serving the multi-channel Internet orders.

If one were to serve a less population-dense market, one would design a completely different approach. Both Albertson's and Safeway fulfill Internet orders from the inventory in a retail store. In this instance, the velocity of orders is lower, so it would be appropriate to pool the inventory of both channels. When an Internet order comes in, in-store picking is used. An employee walks the aisles of the grocery store and fills a cart to complete the order. We refer to this approach as a "professional shopper" approach.

In fact, this is how Sainsbury's executes its multi-channel Internet supply chain strategy. In London, Sainsbury's uses a dedicated system to fill Internet orders. In the rest of the country, they use a professional shopper model to fill Internet orders. Sainsbury's has recognized the impact of the strategic needs of the company on the multi-channel Internet supply chain design.

5.2 Blockbuster video and blockbuster online

Blockbuster video physical stores are operated on a strategy of locational convenience: essentially a response time strategy. Blockbuster online competes on product variety, carrying an order of magnitude more titles than a physical store. Seifert et al. (2006) "proved" that an integrated strategy is superior to a dedicated system strategy—but that work implicitly assumed both channels had the same product assortment. Because the two channels of blockbuster compete on different customer priorities, the physical stores and the online operation have "dedicated systems." The businesses do not share inventory.

5.3 CompUSA

Although anyone can order over the web from CompUSA, the customers they seek to attract from their web business are local businesses that wish delivery, rather than individuals. So, their web orders are relatively larger and more frequent than if individuals were ordering, but response time is more important for the business customer. Consequently, CompUSA has restricted its web offerings to the same set of products it offers in its retail stores, and uses a “professional shopper” strategy where delivery is usually made by CompUSA employees.

6 Future directions and conclusion

We have described four basic types for supply chain strategies for multi-channel Internet retailers. Unlike other classification schemes, there is no “best” type, no type that the market is evolving towards, or is there a diagonal that constitutes best practice. Each of the types has operational and strategic advantages and disadvantages and should be adopted by businesses based on their strategic intent.

There is little doubt that the supply chain strategies of multi-channel Internet retailers are still in a transitional phase. With the annual growth rate of retail e-commerce at 25% (US Census Bureau 2006), the e-commerce portion of business will emerge as an important strategic player in firms in the future. Perhaps supply chain choices are now made simply because an existing system is in place. However, these choices will soon become more of a strategic challenge for traditional retailers.

This leads to what will be a fruitful research area. Many companies are searching for best practices in supply chain strategies for multi-channel Internet retailing. Several companies that are currently implementing new supply chain systems for the multi-channel market have begun to benchmark off of each other, even though all three of them are just beginning their efforts. From both a theoretical and practical perspective, extending the model we have developed in this paper would add significant value. Possible extensions include refining the four-prototypical strategies we have proposed, clarifying the strategic drivers of each strategy or extending the operational challenges and tradeoffs associated with each strategy.

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