An Analysis of Current Supply Chain Best Practices in the Retail Industry with Case Studies of Wal-Mart and Amazon.com

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Abstract

In support of the Supply Chain 2020 Project at MIT, this thesis identifies current best practices in retail industry supply chains, with a specific focus on mass merchandising and internet retailing. Using a survey of current literature for context and industry expert interviews, this thesis assesses the current state of the retail industry and analyzes case studies of Wal-Mart and Amazon.com to illustrate retail supply chain best practices. Topics covered in each case study include supply chain strategy and business strategy linkage, operating models, supply chain design, replenishment and distribution processes, and ongoing supply chain improvement initiatives. Wal-Mart and Amazon.com are found to have very different supply chains in terms of structure and processes, based on their different operating models. However, there are many supply chain themes that are common among the two companies. Both case study companies have supply chain strategies, designs, and processes that clearly support their business strategies. Additionally, these companies tailor processes to fit specific product and demand profiles, collaborate extensively with supply chain partners, invest significantly in information technology, focus on operational efficiency, and leverage scale to facilitate competitive advantage through supply chain management. Based on the common and unique aspects of Wal-Mart and Amazon.com's supply chains, we provide recommendations for the potential transferability of Wal-Mart and Amazon.com practices within the retail industry and to other industries.

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1 Introduction and Motivation

The following chapter provides the foundation for this thesis. It begins with a scope clarification including a definition of the Supply Chain 2020 research initiative, and this thesis' position within that overall project. Additionally, this chapter discusses the motivation and methodology behind this paper as well as provides an outline for future chapters.

1.1 Thesis Scope

The Supply Chain 2020 Project is a multi-year project initiated by the Center for Transportation & Logistics (CTL) at the Massachusetts Institute of Technology (MIT). The major research goal for the Supply Chain 2020 Project is to identify the components that will constitute excellent supply chains in the year 2020. In identifying the strategies, processes, and metrics that will comprise excellent supply chains, Supply Chain 2020 hopes to assist companies in multiple industries in developing strategies to remain competitive in the future.

The academic year 2004-2005 is Phase I of the Supply Chain 2020 Project. The scope of the initiative for Phase I is to identify and research excellent supply chains in the aerospace, apparel, automotive, communications, computer, consumer products, distribution, pharmaceutical, resources, and retail industries.

Specifically, the scope of this thesis is the retail industry. We will focus on the strategies, operating models, network designs, and supply chain processes that constitute an excellent supply chain in the retail industry. In looking at the components listed above, the existing best

practices will be analyzed with respect to how they support and promote the business strategy of the specific companies being analyzed.

The retail industry has an extremely broad scope. Therefore it is necessary to reduce the scope of the analysis to specific segments of retail. This thesis will focus on two segments of the retail industry, mass merchandising and internet retailing. The definition of the following two retailing segments will be explained in the retail industry overview. Additionally, this thesis does not cover grocery, apparel, automotive, or luxury good retailers in detail as they are being analyzed by other Supply Chain 2020 researchers. In order to perform a deep analysis of both general merchandising and internet retailing, the leading company in each of these sub-segments is analyzed. According to annual revenues, the leading general merchandise retailer is Wal-Mart and the leading internet retailer is Amazon.com. This paper analyzes each of these companies.

Wal-Mart and Amazon.com service customers through different distribution channels. Wal-Mart primarily services customers through physical retail locations and Amazon.com services customers through an online storefront with distribution provided by Amazon.com and partner distribution centers, as well as third-party companies. The supply chains that support these different business models inherently require different supply chain strategies, designs, and processes. Thus, this paper is not intended to compare the excellence of Wal-Mart and Amazon's supply chains relative to one another. Rather, the aim of this paper is to identify the key components of excellent supply chains that support physical mass merchandise retailing and online retailing environments. We identify these components through case studies of Wal-Mart and Amazon.com to understand how their supply chains reinforce their competitive business strategies.

1.2 Motivation

Supply Chain 2020 hopes to lay out a qualitative framework that companies can utilize to prepare for the competitive marketplace in the year 2020. The motivation for this year's research on existing supply chain best practices is to provide a foundation for future Supply Chain 2020 research. By understanding existing best practices and their relationship with existing strategies, future researchers and companies can more readily identify logical extensions of strategies as well as compare and contrast innovative processes and technologies of the future to existing capabilities.

Furthermore, the motivation behind the segmentation of retail into mass merchandising and internet retailing is to uncover the different approaches to supply chain strategy, design, planning, and execution within those segments. Identification of best practices in each segment may uncover practices that have transferability within segments of the retail industry as well as transferability to other industries. In this way, the research can assist retailers and companies in other industries in their near-term supply chain initiatives.

1.3 Methodology

Data for this thesis is gathered through a literature review and interviews with industry experts, including consulting firms, technology providers, third-party logistics firms, partner companies, and academic sources. Some companies that provide data for this thesis do not wish to be named due to their close relationships with the case study companies. No interviews with representatives from Wal-Mart and Amazon.com are performed. Wal-Mart and Amazon.com were contacted but declined to be interviewed for this research.

1.4 Outline

Chapter 2 is an introduction to the major concepts that are prevalent in current research on the retail industry. The retail industry is a large, complex, and diverse industry, and as a result academic and mass media literature is abundant. Therefore, Chapter 2 aims to be a review of the major concepts explored in the existing literature, rather than an exhaustive review of all literature on the retail industry. The conceptual review introduces retail and internet retail supply chains and trends, as well as the importance of linking supply chain strategy with business strategy.

Chapter 3 is a comprehensive retail industry overview. Chapter 3, defines the retail industry, the products and services the industry offers, the evolution of the top five companies in the industry, customer segments and sales channels, industry supply chain structure, trends and industry drivers, and supply chain challenges. The overall retail industry is covered, with a specific emphasis on the mass merchandising and internet retailing segments.

Chapter 4 covers Wal-Mart and Amazon.com's positioning in the retail industry and within their retail industry segment. An analysis of company financials, customer segments and sales channels, supply chain challenges, and competitive positioning is performed.

With an understanding of the retail industry and Wal-Mart and Amazon.com's relative positions within it, Chapter 5 analyzes the Wal-Mart and Amazon.com supply chains. Wal-Mart and Amazon.com's operating models, supply chain designs, replenishment and distribution processes, and ongoing supply chain improvement initiatives are discussed.

Chapter 6 builds upon the supply chain information provided in Chapter 5 to discuss how Wal-Mart and Amazon.com's supply chains support their respective business strategies. Chapter 6 states how Wal-Mart and Amazon.com employ supply chain practices that fit and reinforce one

another, and discusses how they leverage their supply chains to build lasting competitive advantage.

Chapter 7 discusses the areas of commonality in Wal-Mart and Amazon.com's supply chain practices. It also discusses the potential transferability of Wal-Mart and Amazon.com supply chain practices within the companies, the retail industry, and across other industries. Finally, potential areas for future research are identified.

2 Retail Industry Conceptual Review

Several sections comprise the review of major concepts in the literature relevant to retail supply chains. The review begins with an inter-industry review linking supply chain practices with business strategy. Then a review of literature concepts specific to retail supply chains is performed. Finally, a specialized review of internet retailing is conducted. Topics covered include alignment of supply chain practices with business strategy, collaboration efforts, use of information technology, and operational effectiveness and innovation.

2.1 Supply Chains and Business Strategy

2.1.1 Operational Effectiveness, Operational Innovation and Strategy

A major concept in supply chain literature is the alignment of supply chain initiatives with the overall business strategy of a company. Porter (1996) differentiates between operational effectiveness and strategy. Porter notes that recent business trends have focused on improving operational effectiveness, which at a generic level involves performing the same activities better than competitors. Conversely, strategic positioning involves performing different activities than competitors or performing the same activities differently. Hammer (2004) defines the use of different or differentiating methodologies to perform activities as operational innovation.

Hammer notes that operational innovation has been a central component to many great business successes, including Wal-Mart. Wal-Mart has used a steady stream of operational innovation to help support its business strategy of offering consumers lower prices. For example, supply chain innovations such as crossdocking help lower costs which help support price reductions.

Therefore, when looking at supply chain practices, efforts to improve efficiency and cost reduction are not sufficient to differentiate a company from competitors. Operational effectiveness must be aligned within the context of a cohesive business strategy to drive lasting differentiation. One reason that operational effectiveness is not sufficient is that a single best practice in a specific area is easily copied. However, if a set of unique practices are utilized, it is much harder for a competitor to imitate (Porter, 1996). Hammer (2004) supports this point by stating that operational innovation places the company at a higher level than competitors. As competitors strive to raise their performance to the new level, a company that focuses on continual operational innovation can provide lasting differentiation in performance.

Porter (1996) notes that in choosing which activities to perform and which strategy to choose, companies must make and understand tradeoffs. Company image is one reason why tradeoffs arise. For example, if a retailer competes on price, but decides to stock only the highest priced product, there is a conflict. Another reason for tradeoffs is to improve coordination and control of an organization. By explicitly determining which activities are being performed and how they are being performed, the members of the company clearly understand the company's direction and can more productively move towards it.

Another point that Porter makes is that the activities that a company performs need to fit together and reinforce each other. While many companies have been moving to specific success

factors and core competencies, Porter stresses that the fit between all activities is more important to sustainable competitive advantage.

In the context of strategy across all industries Porter reinforces his point that operational effectiveness is not sufficient for differentiation from competitors. Conversely, it is deciding which activities to perform and building a strategic position around that set of activities that has the opportunity to create lasting value. In order to execute the strategy, trade-offs must be made and special attention needs to be paid to ensuring that the set of activities performed fit together and help support that strategy that has been identified. Thus, when analyzing retail supply chains, it is important to consider not only which supply chain activities that companies employ, but also how those activities fit into the company's business strategy.

2.1.2 Supply Chain and Product Fit

Before deciding which specific activities will be employed by a company to improve supply chain performance, one must first determine what type of supply chain is appropriate for a company's products. Fisher (1997) addresses this topic within the scope of two product families: functional and innovative. In both functional and innovative environments, the importance of choosing the appropriate supply chain strategies is evident. The difference lies in which types of strategies should employed to manage functional versus innovative fast-moving items. Functional products have predictable demand and typically have low-margins. An example provided in the paper is Campbell's soup. A supply chain design focused on operational efficiency and cost reduction should be designed to support functional products. Initiatives to improve efficiency, reduce cost, and reduce inventory are appropriate for this type of supply chain. Innovative products by definition do not have predictable demand. Product

differentiation in innovative products typically allows higher margins. Although cost is always an important consideration, the types of costs that should be managed in innovative product supply chains are inherently different than for functional products. A reason for the fundamental shift is that the probability of stocking out and the cost of stocking out are much higher in innovative product environments with more demand uncertainty and higher profit margins. Therefore, a strategy focused on reducing inventory carrying costs could adversely affect company profitability, because the cost of stocking out is much greater than savings that can be achieved by reducing inventory. Therefore, a supply chain design focused on flexibility and responsiveness to demand fluctuation should be designed for innovative products. This entails strategies focused on deploying the correct amount of inventory in specific locations to respond to uncertainty, reducing lead time, and improving collaboration. All of these initiatives increase costs in the short-term but are appropriate when matched to a business strategy tailored towards innovative products.

2.2 Retail Industry Supply Chain Overview

2.2.1 General Retail Trends

The retail industry can be defined generally as the composition of companies that sell merchandise to customers. When studying the supply chain practices of the retail industry, we study the retailer and customer relationship, which in turn drives the activities between retailers and suppliers. In retail supply chains, the network consists of many suppliers that serve multiple retailers, and retailers that are served by multiple suppliers. Between the suppliers and the retailers, wholesalers and other intermediaries often reside and provide the link between retailers

and suppliers. There have been changes in the dynamics of the relationship between these three key players in the supply chain due to the fourth major player that drives these changes, the retail customer. Through their spending habits, retail consumers drive the level of customer service that is expected. The strategy behind each retailer is focused on being able to fulfill that demanded service. Because of recent changes in consumer spending, the focus in the retail supply chain has shifted from handling customer demands through inventory levels to handling customer demand through changes in the trading partner relationship and the use of technology in their supply chain.

Griffith and Krampf (1997) address some of the trends that are driving these changes in the retail industry supply chain by looking at the changes in the way consumers shop. For example, consumers are now shopping in retail stores that appeal to consumer convenience and price sensitivity. The time that consumers spend in certain stores is declining; and therefore, retailers are realizing that on-shelf availability is becoming more critical. Due to the change in consumer spending habits, on which we will elaborate further in this thesis, general merchandise stores that include a wide range of product segments are emerging as revenue leaders in the retail industry. These general or mass merchandisers are creating retail stores that provide all merchandise that a consumer needs in one convenient location. Consumer habit changes are a contributing factor driving retail supply chain changes.

2.2.2 Supplier and Retailer Collaboration

Traditionally, retailers have mitigated the risk of stockouts by carrying buffer inventory for those items with high demand. Because retailers are now realizing the cost of holding these stocks, there has been a shift in supply chain strategy to deal with fast moving inventory.

Retailers and suppliers have become partners in combating the changes in demand variability. The impact of the bullwhip effect, where suppliers receive a disproportionate amount of variability based on retailer consumer demand variability, has helped facilitate collaborative efforts to better respond to demand fluctuations. These initiatives are aimed at reducing costs for both the retailer and supplier.

Ellram, La Londe, and Weber (1999) research the emerging trends in supply chain structure changes in the 1980's. The concept of Quick Response (QR) enables suppliers to forecast what retailers are going to order before the order is actually made through information sharing. QR changes the relationship between the supplier and retailer by connecting the two with new technology. The authors show how point of sale (POS) data and electronic data interchange (EDI) changes the communication level between suppliers and retailers. Point of sale data is increasingly important, allowing suppliers to know the actual consumer demand patterns of fast moving items, which enables suppliers to prepare for the next order before the retailer makes the order. The connection between the two entities electronically through the use of EDI allows for quicker information sharing, which then leads to shorter order cycle times. The major difference between the traditional supply chain and the one emerging during this time is the focus on the interaction between the retailer and supplier, rather than on each entity's supply chain practices within their own organization. For the first time, retailers and suppliers are sharing demand information that was once known only to retailers. Quick Response signifies the beginning of the collaborative effort, although, at the time of the research, retailers were still the ones who made the decision of how much to order and when. The results from these trends led to more strategic changes within the supply chain that were seen 20 years later.

As suppliers and retailers realize that their upstream (towards the source) partners in the supply chain are able to do activities that lead to cost cutting and better service, more responsibilities are being pushed to partners further up the supply chain. This is especially true in retail companies that sell mass merchandise and have increasing buyer power over their suppliers. The change in responsibilities can be seen in Norek's (1997) report on "functional shiftability". In the mass merchandising segment of the retail industry, retailers realize that their suppliers can supply their products in such a way that significantly reduces costs on the retail end. Functional shifts occur when one of the entities in the supply chain partnership has a substantial amount of economic power over the other entities. The more powerful entity is able to push more responsibilities and activities on to the weaker entities, and force the weaker entities to find ways to cut their manufacturing or distribution costs. In Norek's results, the four major activities that retailers are requiring from their suppliers or manufacturers were the storage of raw inventory, various packaging activities, organization of products for delivery, and electronic data interchange. Overall, the initiative is an attempt to participate in global optimization, instead of focusing on local optimization. In global optimization, the retail supply chain is studied as one system that can be optimized through cross-entity functions within the system, to minimize cost and maximize profit for the entire supply chain.

Another supplier and retailer partnership initiative is collaborative planning, forecasting, and replenishment (CPFR). Crum and Palmatier (2004) address the issue of demand collaboration between suppliers and retailers and why the acceptance of collaboration is slow, given that the possible benefits are high. They emphasize the fact that the focal point of reducing uncertainty should be on knowledge of demand. If partners throughout the supply chain have knowledge of demand, then they know what to expect in terms of selling and supplying the

demanded product. This in turn lessens the bullwhip effect that causes high demand variability for partners downstream in the supply chain.

Crum and Palmatier (2004) survey consumer goods suppliers and retailers about the possibility of implementing CPFR by 2003, and only 41% of consumer good suppliers and 25% of retailers had any positive indications of CPFR efforts. The reason for the high level of rejection of CPFR is the fact that suppliers find that they continue to incur much of the risk, even when they do have demand information from retailers. This is partly attributed to the fact that even though retailers have demand information, at the time of order placement, they do not order in the same pattern as demand indicates. The difference between demand information and actual orders force suppliers to fulfill orders that are not expected. Crum and Palmatier indicate that in order for CPFR to be successful, suppliers and retailers must agree on a demand management process and must open communications entirely. Most of the success is based on the trust that the partners have with one another and belief that what is forecasted between the two will be what is ordered to fulfill demand. When partners collaboratively plan for demand the overall effect should be a more cost effective supply chain.

The final retailer supplier collaboration trend that we discuss is the use of vendor managed inventory (VMI). Waller, Johnson, and Davis (1999) maintain that VMI permits cost cutting in the supply chain for both retailers and suppliers, and is also a mechanism that increases customer service level. VMI is an initiative where vendors are responsible for determining retail replenishment levels and managing the amount of inventory that the retailer has on hand. When retailers participate in VMI, they are allowing their suppliers to know the actual demands of their products and provide automatic replenishment at the retailing or distribution facilities. VMI benefits retailers due to more frequent replenishments. This frequency increases the customer

service level due to the increased supply chain flexibility to respond to consumer demand and ensure on-shelf availability. The result is increased retailer sales revenue. The supplier benefits from this process because they have full knowledge of demand and avoid high demand variability caused by orders from retailers. Ultimately, suppliers do their own demand planning and replenishment processes. Because suppliers know in advance the amount of products they need to replenish, they are able to better plan, which then leads to a reduction in inventory levels and a reduction in transportation costs. VMI is only successful when communication and trust is present in the partnership, because both incur risks as a result of sharing sensitive information across companies.

Therefore, research uncovers a trend towards closer partnerships and shifts in responsibilities between retailers and suppliers in a variety of activities within the retail supply chain. The goal for all partners is to globally optimize the supply chain by decreasing the overall costs of supply chain management while maintaining or improving service, and ultimately increasing revenues.

2.2.3 Retail and Technology

Retail industry supply chain partners are increasing their use of information technology to support and improve their supply chain management initiatives. As mentioned earlier, this trend started in the 1980's with electronic data interchange and the use of scanning barcodes to keep more accurate track of sales throughout the industry. With more accurate data and a faster way of transmitting these data, information technology has helped increase the speed of activities within the retail supply chain. The ability to respond to customer changes and other sources of supply chain variability has become more efficient with the use of technology.

The transfer to a supply chain partnership that is more dependent on technology is due to the increasing awareness that information across partners is important to communication and cost cutting efforts. Kent and Mentzer (2003) explain this trend towards a technology-driven supply chain through the concept of interorganizational information technology (IOIT). IOIT facilitates the information sharing process between partners. EDI is an example of this type of technology that has become familiar in supply chains. Kent studies the effect of the perception of investments on IOIT, and how these investments have impacted the relationship between partners. The results of his studies indicate that the perceived investments in IOIT by the partners in the supply chain increase the trust level between the partners. The investment indicates to other partners that there is a commitment present to optimize the channel. If the investment amount is low, then the trust level, as well as commitment level, decreases. Investment in IOIT does not only include the implementation of new data transferring and collecting technology, but also the ability to positively utilize the data to optimize the supply chain.

Additionally, one of the major projects in retail technology is the piloting and implementation of radio frequency identification (RFID) tags. RFID tags are promised to offer several advantages over barcodes including automatic detection, omni-directional data capture, and increased data storage capacity. Some believe that RFID will provide "error-free fulfillment, delivery, and visibility" throughout the supply chain ("RFID: Powering The Supply Chain", 2002). Because RFID tags are able to hold more information than a barcode, as well as hold dynamic information about the product, more detailed item specific information can be stored. The reader that picks up RFID tag information captures data without manual intervention, reducing the need for labor. The article emphasizes one of the major future benefits from RFID

technology will be increased product visibility throughout the supply chain. The increased visibility that RFID tags can provide is promised to provide management with more control over the supply chain. Furthermore, responses to consumer demands and unanticipated events in the supply chain are expected to be faster with the use of RFID.

2.3 Internet Retail Supply Chain Overview

The internet retail industry is a segment of the overall retail industry. The industry consists of existing retailers with physical stores that also sell products over the internet, and companies that do not operate retail stores and utilize only a website to sell products to customers. The retailers that primarily sell product through their network of physical store locations are commonly referred to as "brick-and-mortar" in retail literature. If these traditional retailers sell product through an online channel, that activity is known as "click-and-mortar". "pure-play" internet retailers are companies that only sell through product through an online channel. For example, Wal-Mart is a brick-and-mortar company that also operates a website in which they sell products over the internet. Amazon.com is a pure-play internet retailer that utilizes their website as their storefront. The lack of retail stores in pure-play environments requires a supply chain that can service the needs of customers through a combination of shipping from distribution centers and sourcing from partners. This paper intends to focus on the characteristics of an excellent pure-play internet retailer supply chain. Therefore, research described below will describe the importance of supply chain performance to internet retail success as well as the characteristics of an internet retail supply chain network.

2.3.1 Internet Retail Supply Chain Importance

Maltz, Rabinovich, and Sinha (2004) discuss logistics and supply chain excellence as critical to success in the internet retail industry. A particular area of concentration in the paper is the positioning of inventory in the different echelons of the supply chain. The increased product selection offered by internet retailers presents an array of inventory challenges. First, internet retailers must decide whether to operate their own distribution centers, ship directly from supplier's facilities, or leverage the capabilities of intermediaries and wholesalers. Maltz et al. (2004) discuss Amazon.com's three-echelon inventory system where they maintain their own distribution centers, but also ship product directly from suppliers, and pull inventory from wholesalers to fill orders. Also, the authors discuss the use of consolidated inventory in a few sites and trans-shipment between sites to fulfill demand. The consolidation and trans-shipment approach helps to aggregate demand to reduce variability. However, there is a tradeoff between transportation costs and the inventory carrying costs when deciding how to put together a network and the inventory that is stored at each level.

The effect of catalog management from a supply chain perspective is also discussed by Maltz et al (2004). The paper mentions segregating inventory by the potential margin that inventory could represent and by the velocity of the inventory.

In addition to network inventory and catalog inventory management, the Maltz et al (2004) paper discusses physical efficiency as a key component to internet retail supply chain success. Tradeoffs can be made to increase economies of scale and scope in physical distribution. These benefits were seen by Amazon.com with its free shipping initiative. The initiative did increase the transportation costs that Amazon.com absorbed, but it also decreased fulfillment costs from 12.8% of sales to 10.6% of sales. The costs decrease due to the efficient

distribution that is allowed from a larger number of orders that are consolidated and wholly filled from facilities.

2.3.2 Network Design and Growth Impact on Supply Chain Performance

To illustrate the importance of network design and physical performance to internet retail success, Rabinovich and Evers (2003) focus on improvements in inventory performance and product release performance. Inventory performance has to do with the efficient execution of orders from on-hand inventory at different echelons in the supply chain. Product release performance has to do with the efficient distribution and transportation of orders. The paper discusses the impact that reducing the number of facilities in the supply chain network and increasing market share have on inventory and product release performance. The analysis is performed with respect to statistical economies, economies of scale, and economies of scope. Statistical economies occur with a reduced number of inventory carrying locations in the supply chain due to the reduction in safety stock. Economies of scale exist when the size and efficiency of larger facilities are able to fulfill orders at a lower cost of orders. Economies of scope involve analyzing the number of entities and coordination between these entities to fill orders. The paper looks at the three-echelon network of suppliers, intermediaries, and internet retail distribution centers.

Results from the paper show that reducing the number of internal facilities in the supply chain and supporting direct distribution helps improve statistical economies and economies of scale by facility. Furthermore, as market share increases, further opportunities for aggregation and consolidation occur which further improve supply chain performance. Therefore, becoming a large internet retailer helps to improve supply chain performance.

2.3.3 Service Windows: Inventory Liquidity and Delivery Tradeoffs

Inventory liquidity is a measure of an organizations ability to fill orders from on-hand inventory and the amount that must be sourced from intermediaries or suppliers. Rabinovich (2004) discusses this concept within the scope of promises that internet retailers offer to customers. Internet retailers make promises regarding shipment and delivery dates to customers during the internet retailing shopping experience. These promises have an impact on sales. There are two components to the promise, the ship date guarantee and the delivery date guarantee. The ship date guarantee is heavily dependent on inventory liquidity. If the internet retailer can not fill the order from their dedicated distribution center, then they must source the order from their partners. This increases the order-to-ship time. The increased order-to-ship time, can be countered by a shortened delivery time. In this way, the overall delivery date guarantee to the customer can be made with a combination of a higher than promised order-to-ship time and a lower than promised ship-to-deliver time.

In the analysis of inventory liquidity and fulfillment guarantees, Rabinovich discovers that the number of items on an order and the price of items on the order both decrease inventory liquidity. In fulfilling an order, a distribution center is less likely to have all of the items to ship the order from that single source as the number of items on an order increases. Furthermore, higher priced items cost more for firms to carry, which reduces the safety stock levels they are willing to carry. These findings lead Rabinovich to suggest that firms promote shortened delivery time options as a tradeoff to increased order-to-ship times for orders with many unique items with high dollar value.

Rabinovich's research is another example where a multi-tier internet retail inventory network, profiling, and service window management can be analyzed to improve internet retail supply chain performance.

2.4 Retail Industry Conceptual Review Summary

The analysis to uncover the key components of an excellent supply chain in the retail industry is multi-faceted. The definition of an excellent supply chain differs by company, and is highly dependent on a particular company's business strategy. The opening portion of this conceptual review focused on the importance of strategy in evaluating a supply chain, including focus and fit on the activities that differentiate a company from competitors. Additionally, when looking at supply chain practices, opportunities for innovation should be addressed as well as opportunities for improved efficiency. These factors, in addition to understanding the functional or innovative nature of the products being sold, illustrate the ideas that will constitute an excellent supply chain that supports a retailer's business strategy.

In analyzing the retail industry and the internet retail segment, many areas are taken into account, including collaboration efforts, use of technology, supply chain design, and operational efficiency. An analysis of the current trends in retail show that collaboration is increasing with initiatives such as collaborative planning, forecasting, and replenishment (CPFR) and vendor managed inventory (VMI). Information technology has enabled these efforts and continues to drive increased communication across all parties in the supply chain. An analysis of internet retail illustrated the importance of supply chain to business survival. An analysis of network design, supply chain echelon coordination, and various inventory and transportation tradeoffs show the complex nature of a supply chain designed to meet internet retail requirements. In

summary, strategy, collaboration, technology, operational innovation and efficiency are all essential to maintaining an excellent supply chain in the retail industry.

3 Retail Industry Overview

The retail industry overview chapter of this paper defines the current state of the retail industry and describes its evolution in recent years. The following overview encompasses the full status of the US retail industry. Therefore, some of the aggregate retail statistics go beyond the scope of our thesis. However, the majority of the information focuses on mass merchandise retailing within traditional and internet channels, where the case study companies reside. The major topics covered for each segment are product lines, current financial conditions, customer segments, sales channels, trends, major drivers, general supply chain structure, and supply chain challenges and opportunities.

3.1 Traditional Retailing

3.1.1 Retail Industry Definition

Generally defined, the retail industry is the composition of retail outlets that sell merchandise to consumers. Retail includes both products and services sold in stores, through catalogs, and through the internet. This definition will be refined through the subsequent subheadings of this chapter focusing on products, sales channels, and financial characteristics.

3.1.2 Products

The scope of the retail industry encompasses products in many different categories. The products that are generally considered part of the retail industry are apparel, consumer product goods (CPG), groceries, entertainment media and other luxury goods such as jewelry and automotives. Retail also includes services, such as after sale automotive services. Two major areas where current industry statistics and news can be found are through Standard and Poor's (S&P) Industry Reports and through the United States Department of Commerce (DoC). Both sources include all the retail channels that companies utilize to sell their merchandise to consumers, which include physical stores, internet, and catalog. S&P uses the US government's definition to more specifically define its product scope. The US government divides products into durable and non-durable goods. Durable goods are products that are not consumed or disposed of relatively quickly. Durable products include automotives and furniture and products that are found in hardware stores. Non-durable goods are general mass merchandise, apparel, and grocery items. The product focus in the S&P Industry Surveys will be mostly on non-durable goods, and some durables that are sold in general merchandise outlets.

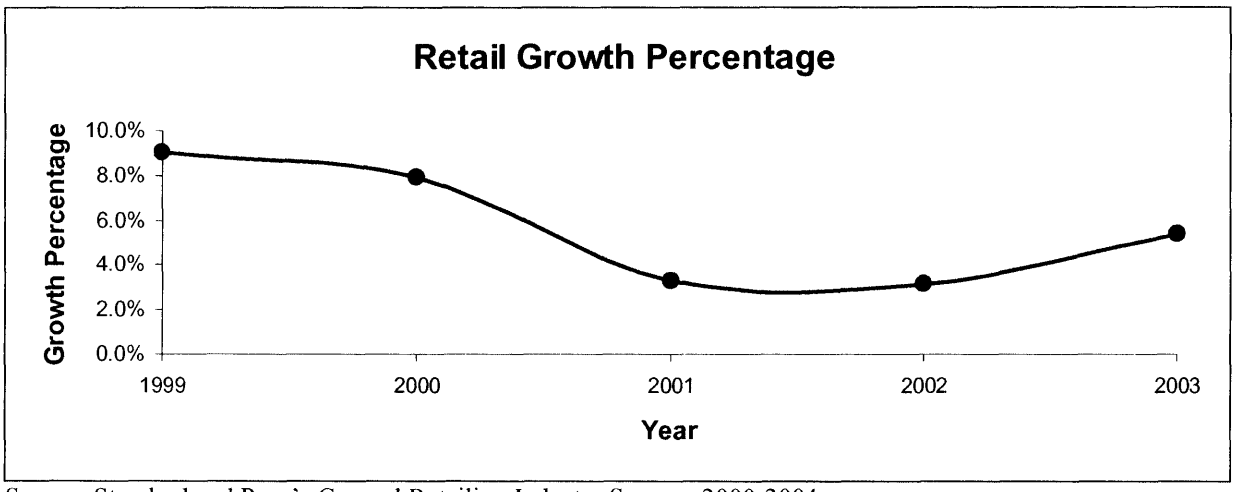
Although the focus of this thesis is on general mass merchandise goods that include consumer product goods and entertainment media, the following is an overview of the retail industry as defined by Standard and Poor's (S&P). The industry overview will include all products that are sold in the following retail outlets: Department Stores, General Merchandise Stores, Hypermarkets and Supermarkets, and Specialty Stores. The retail outlets can also be divided into high-end retail, moderate retail, and deeply discounted retail.

3.1.3 Historical Revenues, Margins, and Employees

Based on the S&P General Retail Industry report that was released in May 2004, retail sales in 2003 equated to $3.40 trillion. The industry experienced a 5.4% growth from 2002, which was associated mostly with the growth in sales of luxury goods and discounted goods. The National Retail Federation (2004) states that the retail industry had more than 23 million employees in 2004. This represents approximately 20% of the total US workforce. The retail industry makes up 31% of the US Gross Domestic Product (GDP), and thus is very important to the US economy.

US retail industry growth has been slowing in recent years, although positive growth persists in all years. In 1999, the US Retail Industry saw a 9% growth from 1998, but since then there has been much slower growth from year to year. 2000 to 2002 only saw a slight change in percentage difference. It was not until 2002 to 2003 did the percentage growth begin to rise again. The graph on the follow page depicts the changes in percentage growth from 1999 to 2003 for the US Retail Industry ("Mission Statement", 2004).

Figure 3-1



Source: Standard and Poor's General Retailing Industry Surveys 2000-2004

Retail Industry growth from 2002 to 2003 can be attributed to two distinct product categories. Those two product categories are luxury goods and goods that are sold in general merchandising or discounted stores. Luxury goods include designer apparel and jewelry in high-end department stores and niche specific stores with strong name brands. S&P correlates the growth in sales for luxury goods to the increase in consumer spending capabilities. The increase in luxury spending is attributed to the general improvement in the economy in 2003 in relation to the economic downturn of 2001 to 2002. In addition to luxury goods, the general merchandise and discounted product groups have also experienced major growth in the past year that is comparable to luxury sales growth. In 2003, the rift widened between consumers with more expendable income versus more cost conscious consumers. Due to the weak economy from 2001 to 2003, price competitive products offered in discount stores appealed more to consumers. These discount outlets, which are also known as mass merchandisers, include stores like Wal-Mart, Target, and Big Lots. The overall growth of the economy has led to retail industry growth. S&P expects retail industry growth to be higher than 5.4% from 2003 to 2004. Moderate department stores, which fall in between discounters and high-end luxury retailers, are experiencing the slowest growth in the industry. The department stores include Federated Department Stores, Inc. as well as other well known department stores such as Kohl's and Sears. The slow growth in moderate retail outlets can be attributed to the lack of variety in products as well as customer service levels that do not meet customer expectations.

3.1.4 Customer Segments

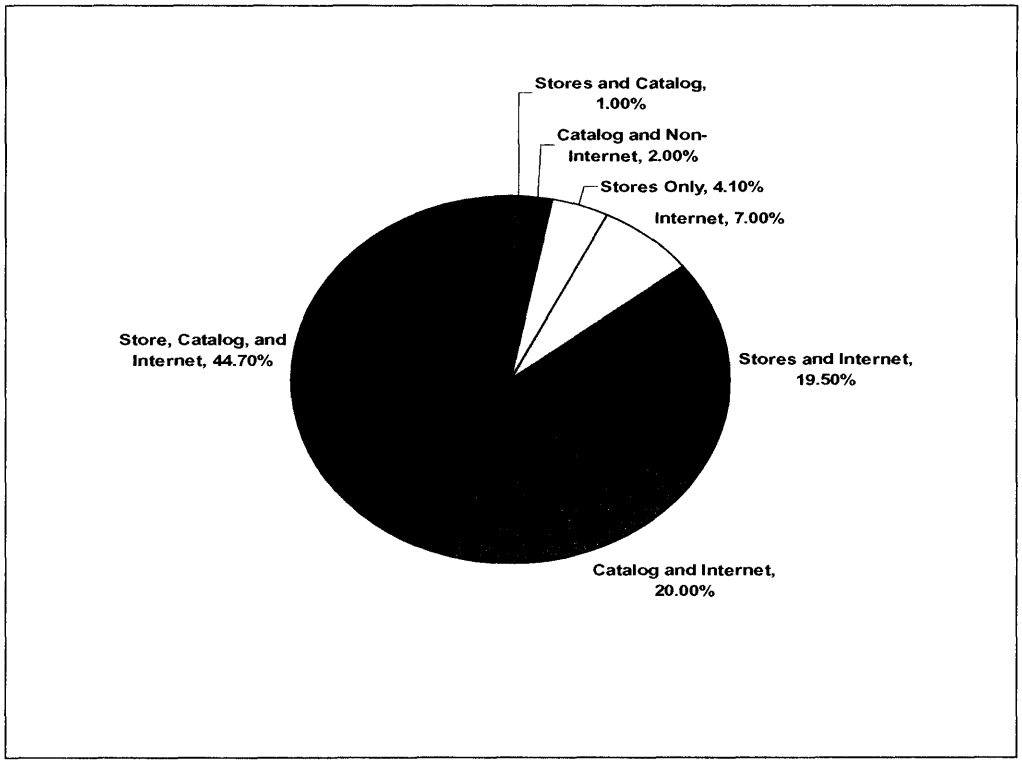
Understanding what customers demand and having those products available are vital components of retailing. The S&P Industry Survey for the Retail Industry includes a section

entitled "Deciphering demographics." By having a grasp on population growth patterns and customer segmentation, retailers can determine the spending patterns of their customers and adjust their inventory and selling models accordingly. For the most part, consumers born before 1976 have become weaker drivers in the retail industry as most of their spending is geared towards investments in their children's education and their own healthcare. This group includes what S&P calls "Seniors" (above 65 years), "The baby boom" (1946 - 1964), and "The baby bust" (1964 - 1976). The population segment that has become the most important driver in the retail industry is the group born between 1977 and 1996. This age group has the most expendable income and independence to spend their money. Understanding which population segment to which to target products is an important competitive advantage to retailers.

3.1.5 Retail Channels

Multi-channel retailing has existed for many years, but has become more prevalent recently with the introduction of internet retailing. Multi-channel retailing can be defined as using multiple channels, including stores, catalog, or the internet, to sell products. The following chart shows the percentage breakdown of retailers using single and various multiple channel combinations to sell their products. According to information extracted from eMarketer, Inc. for multi-channeling in 2004, 88.9% of retailers sell their products through multiple channels. Only 4.1% of companies only sell their product in stores, and only 7% of companies only sell through the internet.

Figure 3-2 Single and Multi-Channel Retailers by Percentage



Source: eMarketer, Inc., "Multi-Channel Retailing is a Must." (2004, August 30).

As most companies operate stores as well as online channels, this thesis analyzes those two channels through case studies. Capturing both categories helps gain an understanding of the best practices that exist to support those channels.

Shoenbachler and Gordon (2002) discuss the importance of multi-channel retailing for the survival of retailers. Studies have shown that multi-channel retailers, who first had a traditional retail outlet and then established a web presence, acquired double the consumer click rate of retailers who were only internet-based. Shoenbachler and Gordon observe that pure-play internet retailers on average spent more on internet marketing and advertising than multi-channel retailers, as a percentage of revenue. Despite the difference in marketing and advertising spending, 62% of the revenue for online retailing in 1999 was made by multi-channel retailers. This development shows the importance of establishing a brand name with consumers through

traditional retail outlets and then making products available through other retail channels to increase sales and brand name presence.

Shoenbachler and Gordon state that the focus of multi-channel retailers should be on the customer and not on the specific channel used to sell the products to the customer. It is more important to observe the behavior of the customer and make sure that the different channels can accommodate what the customer demands. Due to increased customer knowledge regarding pricing and product variety through the internet, retailers need to be more aware of customer expectations. Multi-channel retailing has become a way retailers can exploit their products and brand names through different avenues.

3.1.6 Top 5 Retail Companies

The top five US retail companies are determined by their revenue in 2004 from eMarketer, Inc. With 2004 sales of over $256 billion, Wal-Mart Stores Inc. is by far the largest retailer in the US and the world. The other four top US retailers are Home Depot, Kroger Company, Target Corporations, and Costco Wholesale. Below is a list of the top retailers in the world based on sales revenue in 2004. The figure gives an idea of where the top five US retailers (highlighted) stand in comparison to other international companies.

Table 3-1

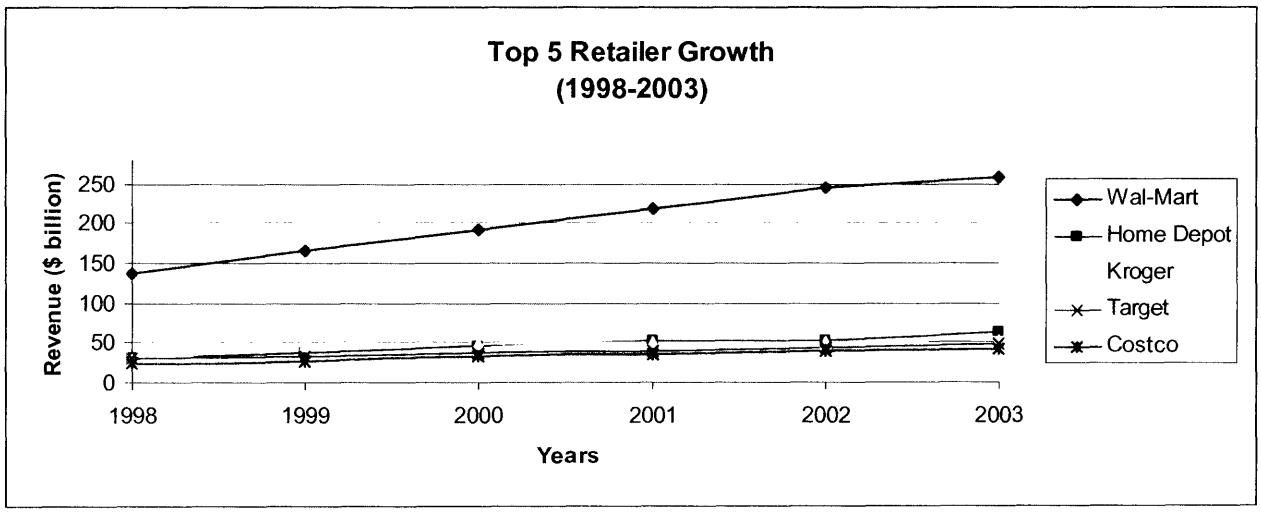
Top 20 Retailers Worldwide, Ranked by Sales in 2004 (in millions)				
	Company		**Sales**	**Country**
1	Wal-Mart Stores Inc.	$	256,329	US
2	Carrefour SA	$	79,653	France
3	The Home Depot Inc.	$	64,816	US
4	Royal Ahold N.V.	$	63,360	Netherlands
5	Metro AG	$	60,565	Germany
6	Kroger Co.	$	53,791	US
7	Tesco PLC	$	50,342	UK
8	Target Corp.	$	48,163	US
9	Rewe Group	$	44,275	Germany
10	ITM Enterprises	$	43,394	France
11	Costco Wholesale Corp.	$	42,546	US
12	Sears, Roebuck and Co.	$	41,124	US
13	Aldi Group	$	36,000	Germany
14	Safeway	$	35,552	US
15	Alberston's Inc.	$	35,436	US
16	Ito-Yokaido Co, Ltd.	$	33,854	Japan
17	Walgreen Co.	$	32,505	US
18	Auchan	$	32,439	France
19	Lowe's Cos.	$	30,838	US
20	E.Leclerc	$	30,737	France

Source: eMarketer, Inc. "Top 20 Retailers Worldwide, Ranked by Sales in 2004 (in millions)." (2004)

Although not seen on the list, Kmart is also a direct competitor of Wal-Mart and Target. In recent news, Albright (2004) reports the acquisition of Sears by Kmart for $11 billion on November 2004. After the merger Kmart will become the third largest retailer in the US in terms of revenue. The completion of the merger will not take place until mid-2005.

Wal-Mart's revenues are much higher than any other US or worldwide retailer. The graph below shows the growth of the top 5 US retailers in comparison to each other from 1998 to 2003. In general the growth of all retailers has been consistent over the past six years.

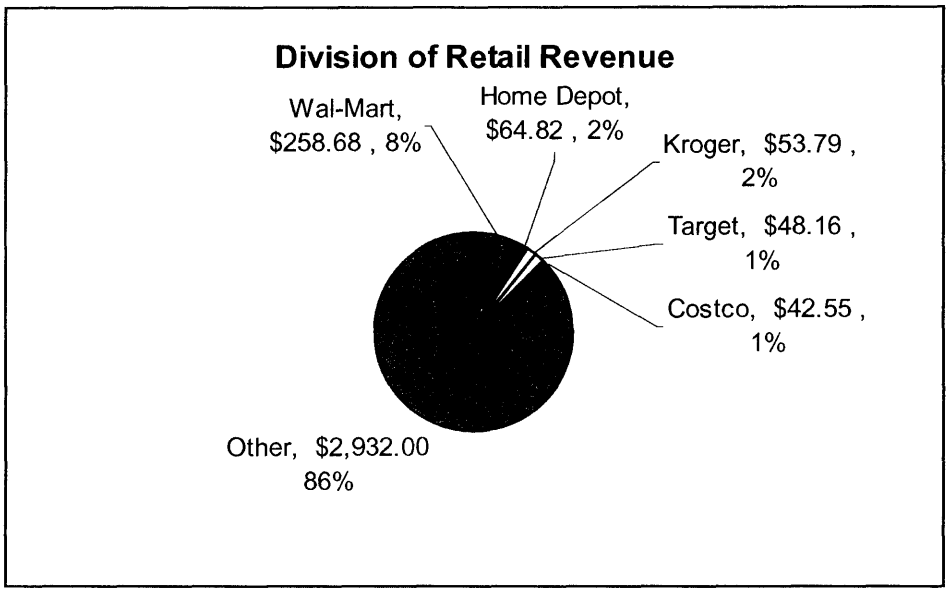
Figure 3-3



Source: Standard & Poor's Industry Surveys Retailing: General (2004)

Figure 3-4

The pie chart below illustrates where the top 5 retail companies stand in overall revenues in billions and as a percentage share of overall retail revenue.



Source: Standard and Poor's Industry Surveys Retailing: General (2004)

Of the top five retailers, Wal-Mart and Target are direct competitors and are both considered discounters. Their products are mass merchandised products, like consumer product goods and basic apparel, and are also priced competitively. But despite the similarities in each company, their business strategies are very different. Wal-Mart prides itself in being the low

cost leader for all of its products, while Target attempts to provide consumers with higher quality fashionable goods at a competitive price. The Home Depot focuses on selling home improvement products and has become a leader in that retail category. Most of the products found in Home Depot stores are what S&P defines as durable products. Kroger concentrates on groceries and is a top retailer of food products in the US. Kroger, like many other retailers, manufacturers private label goods for sales in its stores. Wal-Mart has become a major competitor of Kroger through its introduction of Supercenters in 1988 (Wal-Mart Stores Inc. 10-K Form, 2004), which include a full line of grocery along with general merchandise sold in discount stores. With the volume of groceries commanded from Wal-Mart's size, Wal-Mart has replaced Kroger as the grocery retail leader in the US. Finally, Costco has emerged as a leader in hypermarkets, which are warehouse-like retail outlets that sell general merchandise in bulk quantities as well as grocery. Costco competes directly with Wal-Mart's hypermarket Sam's Club. Overall, the top retailers all compete with Wal-Mart in some way, due to Wal-Mart's product variety.

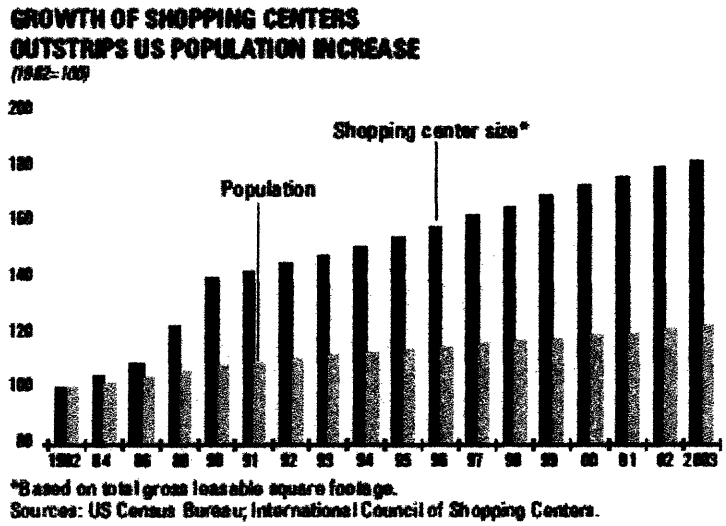
3.1.7 Consumer Spending Trends

Consumer spending habits have evolved to become more value-centric since the economic downtown of 2001. The S&P Industry Report defines value as both the combination of price and quality. Consumers are thus spending more money in retail outlets that offer products with the most value, meaning the best quality for the lowest price. Discount retail outlets are the natural places where consumers would find such products. Also consumers expect to find a convenient shopping experience in these outlets. Because of the convenience

expectation, major discounters have expanded their retail stores to hold a larger selection of merchandise.

Figure 3-5

As seen in the graph below sizes of retail outlets have grown at a greater rate than the increase in population, indicating a consumer desire for larger stores.



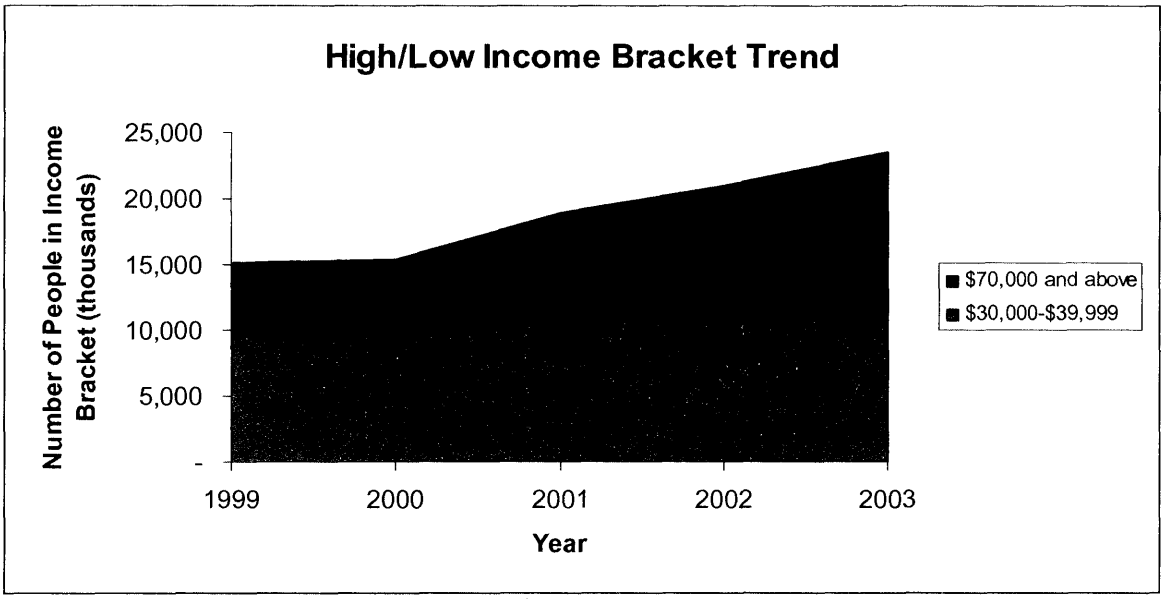
Source: Standard and Poor's Industry Surveys Retailing: General (2004)

With the introduction of hypermarkets and supercenters in recent years, consumers can find grocery products as well as mass merchandised products in a single retail outlet. Consumers have benefited from the idea of "one stop shopping" through these retail outlets.

Another developing retail consumer trend is high-end retail outlet consumers also spending money in major discounters. As reported by the Department of Labor's Consumer Expenditure Reports, the difference in the number of people who make between $30,000 to $39,999 and $70,000 and above has grown from 1999 to 2003.

Figure 3-6

The image below depicts graphically the growth in the number of people in the two income brackets and how that rift between the two has widened. These two income brackets were chosen because the majority of consumers that shop at major discounters make between $30,000 and $39,999 and those that purchase luxury goods typically make well above $70,000.



Source: Department of Labor, Consumer Expenditure Reports 1999-2003

Although there has been a rift financially in consumer spending capabilities that continues to grow, those that have the ability to spend money on luxury goods are still cost conscious when it comes to general retail merchandise.

Furthermore, consumers are beginning to buy "fashion-basic merchandise" products in discounter retail outlets. As defined by S&P, "fashion-basic merchandise" is a mixture of "fashion merchandise," which are products that follow fashion trends, and "basic merchandise," which are products that do not necessarily change with time and have very predictable demand. Consumers expect to find merchandise that is fairly in line with current fashion trends. Major discounters like Target have been doing this through partnerships with major designers. Wal-Mart is also following suit through introduction of a new line of apparel.

3.1.8 Retail Supply Chain Trends

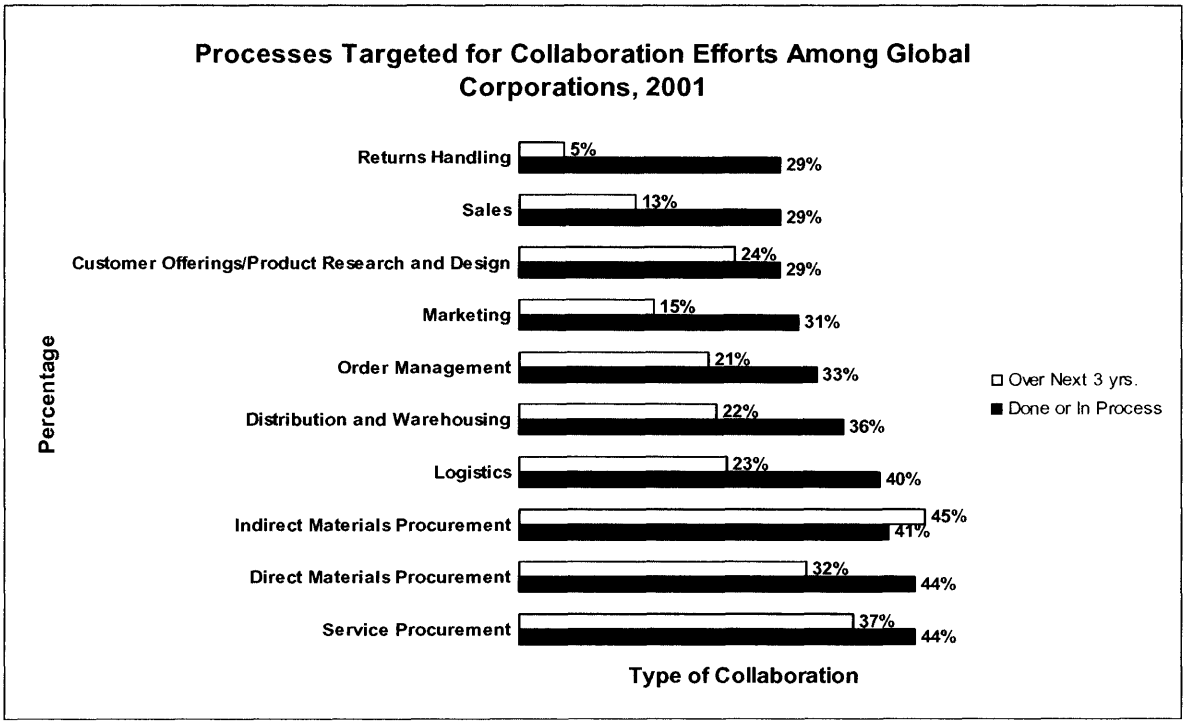
Retail industry supply chain trends are primarily associated with inventory management and supplier and retailer relationships. The increasing competitiveness of the retailing environment, especially for mass merchandisers, has created an environment with very low profit margins. According to Wal-Mart's annual financial summaries for 2004, the industry average profit margin for discounters was 3.2%.

As indicated by S&P, discounters are trying to increase their profit margins by strategically setting initial prices before markdowns and also lowering supply chain costs. Designing more efficient operations as well as lowering inventory levels aid in cutting overall supply chain costs. In a study done by Skolnik (2001), the profitability of discount retail companies was observed from 1981 to 1998 in conjunction with the efficiencies of their supply chains. One of the main metrics used in order to determine supply chain efficiency improvement was the change in inventory turnover rate. Throughout the study period of this paper, it was noted that the average inventory turnover rate increased by 37% for discount retailers. In spite of the increase in supply chain efficiencies, the profitability of this sector of the retail industry did not increase as expected. This lack of change in profitability was due to lower prices being passed on to the consumers. Therefore, consumers are the real beneficiaries from more efficient supply chains.

In addition to inventory management, supplier retailer partnerships have become more important in lowering costs and improving supply chain efficiency. As mentioned in the review of retail literature concepts, collaborative efforts have become a higher priority in all areas of the retailing business.

Figure 3-7

The following table modified from eMarketer, Inc. shows how collaborative efforts have been implemented or will be implemented in the next 3 years by various companies as of 2001.



Source: eMarketer.com, Inc.: "Processes Targeted for Collaboration Efforts Among Global Corporations, 2001" (2001)

Another retail industry trend is pushing cost out of the supply chain through continuous improvements and emphasis in efficiency. With more cost-conscience customers, offering the best price to the customer is important to increasing sales volume. In order to offer the most competitive price, retail companies, especially mass merchandisers, are using their supply chains competitively to reduce costs to the company itself and price to the final consumer.

3.1.9 Retail Industry Drivers

Ellram, La Londe, and Weber (1999) state that an increase in retailer competition is one of the major drivers in the retail industry. As a result of decreasing profit margins, discounters have been trying to distinguish themselves from their competitors. Areas of focus include

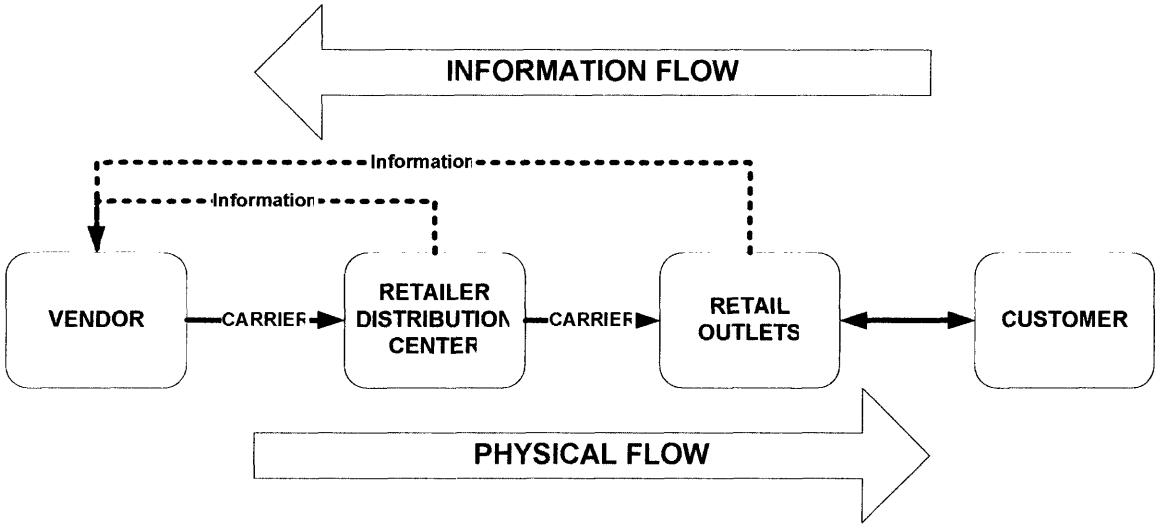
customer service, product variety, and product prices. Ellram et al. (1999) link high customer service with an efficient supply chain. In order to have products available for customers, synchronized cooperation must take place along the supply chain from sourcing through store delivery.

Another driver that is linked to competition within the retail industry is customer expectation. Through the internet, prices have become increasingly transparent to consumers. Companies have become aware that meeting customer expectations is important through price points and product variety. According to the S&P General Retailing 2003 Industry Survey, consumers are expecting more from discounters in terms of product variety and fashion awareness. The bottom line is that consumer preferences and activity drive the retail industry.

3.1.10 Retail Supply Chain Structure

Below is a diagram of a traditional retail supply chain. Vendors supply products to their retail customer's distribution centers as well as operate their own network of distribution centers. Retail supply chains vary in complexity, and this structure can include any number of manufacturers, vendors, distribution centers, and retail locations.

Figure 3-8 Traditional Retail Supply Chain Structure



Source: Modified from Ellram, La Londe, and Weber. (1999).

A retail supply chain consists of vendors that supply various products. These products are delivered to distribution centers. At the distribution center, products are consolidated with other products and shipped to retail outlets. A distinguishing component of retail supply chains is that retailers have store outlets through which consumers purchase products. This is in contrast to some business-to-business supply chains, where product is delivered directly from the supplier to the customer. For example, in manufacturing supply chains, raw materials suppliers often ship directly to their manufacturing customer, who then may ship finished goods directly to another manufacturer or customer.

In between each entity, various carriers are used to transport these goods. Depending on the agreement between the different partners in the supply chain, the inventory ownership and ownership transfer varies. For most traditional supplier and retailer relationships, the suppliers relinquish ownership once the supplies reach the retailer's distribution center.

Along with the physical product flow, there is also an information flow between supply chain partners. Depending on the technology and collaboration efforts between partners, information flow can be extensive or limited. The type of information shared between partners

could include point of sale data or forecasts over a certain period of time. Suppliers and retailers that collaborate extensively share inventory status data as well.

Innovative changes to the traditional retail supply chain have been made in attempts to increase the velocity of products through the supply chain and increase the accuracy of inventory management. Crossdocking and distribution center (DC) bypass are two initiatives to increase product velocity. Crossdocking is a process where products flow through facilities designed to consolidate or deconsolidate inbound shipments and re-route them for outbound transportation. Products are not kept in inventory. In a DC bypass process, vendor shipments are made directly to retailers without being stored within a DC. The DC bypass is also referred to as a direct-to-store process. Both practices decrease the lead time of delivering orders to the retailer. Crossdocking and other supply chain initiatives will be discussed in further detail in the company case study portion of the thesis.

3.1.11 Supply Chain Challenges and Opportunities

Like many industries, major challenges in the retail supply chain include attempts to ensure that the right products get to the right places for the lowest costs. Collaboration efforts between trading partners has arisen as a response to this challenge. As indicated in the review of supply chain concepts, collaborative, planning, forecasting, and replenishment (CPFR) has been a process that has tried to link trading partners together more deeply. This process represents both a challenge and an opportunity. It has been a challenge due to the amount of cooperation and trust needed between both parties. The opportunity lies in more accurate management of inventory and quicker responses to supply chain disruptions.

Aside from external challenges, there are also internal challenges to companies wishing to improve their supply chains. The silo management paradigm is being replaced by the integrated supply chain management paradigm, which in turn causes major challenges in departmental responsibilities and the interaction across all departments. A supply chain consultant, who has worked with companies with reputations with strong and successful supply chains, pointed out the importance of embedding supply chain personnel into all levels and across all company function to teach the importance of supply chain management. He said that through pushing supply chain knowledge into all departments people are more inclined to understand how their decisions affect the entire supply chain. This shift in paradigm is difficult to implement due to the corporate culture and organizational structure that is already present in most companies.

Finally, a critical challenge for retailers is providing on-shelf availability of product. A representative from a major third-party logistics company stated that a major challenge for retailers, especially discounters, is having stock available for customers. It was also noted that a high percentage of major discounter's supply chain costs are located in the stock room to the shelf replenishment process. In order for stores to keep customer service levels high, the company must synchronize its supply chain around meeting these customer service levels. Service level in a retail environment is having demanded products in stock and available for purchase. The representative also mentioned that in order to help synchronize the partners in the supply chain, incentives should be put into place. For major discounters, the selling of shelf space to vendors provides supply chain partners with an incentive to make sure that these shelves are stocked with appropriate products. Empty shelves represent lost revenue not only to retailers but also to suppliers. The challenge lies in the balancing the cost of having stock available with

the cost of having inventory in the pipeline. The opportunity is increased revenue across the entire supply chain and retention of customers.

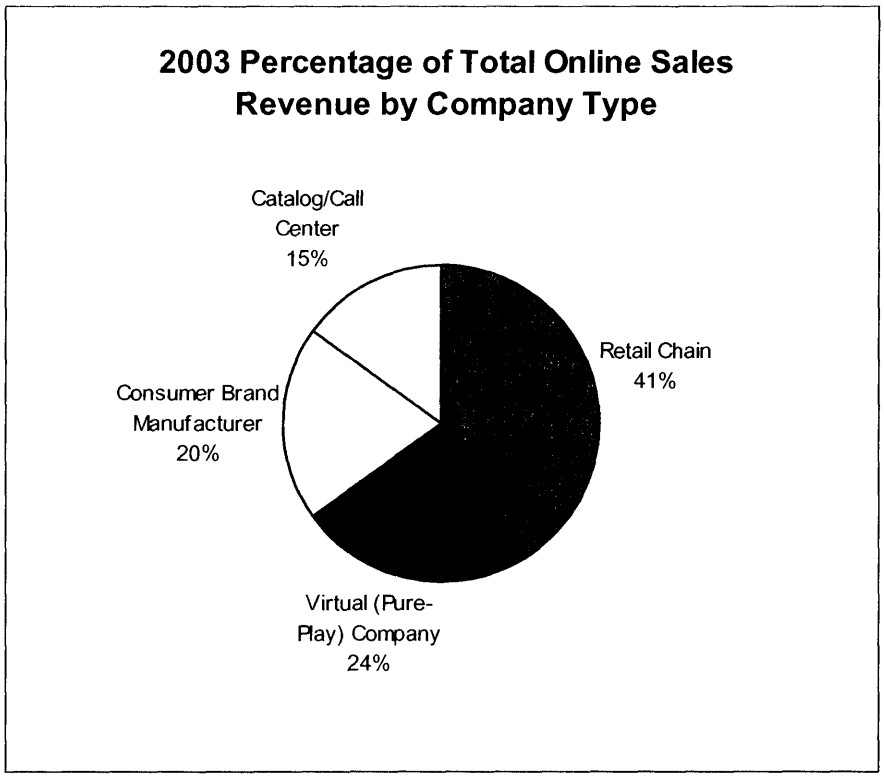
3.2 Internet Retailing

3.2.1 Internet Retailing Definition

The internet retailing industry is defined as the set of companies that sell products or services to consumers via websites that operate as online stores. Internet retailing is a segment of the overall retailing industry. Internet retailing consists of traditional retailers that operate an online channel and companies that solely sell products or services over the internet. Traditional retailers are sometimes referred to as "brick-and-mortar" companies. The online channels that they operate are known as "click-and-mortar" operations. Companies that do not operate stores and sell product only through their website are known as "pure-play" or virtual internet retailers. Additional online sales are attributed to manufacturers selling their product directly through their website and catalog companies that operate a website. Below is a figure that provides a percentage breakdown of online sales by company type.

Figure 3-9

The percentage of online sales by type of company among the top 300 US websites is shown in the graph below.



Source: eMarketer, Inc.: "Breakdown of Online Sales Revenues among the Top 300 US Retail Web Sites, by Type of Company, 2003 (as a percentage of revenue)" (2004)

Note that traditional brick-and-mortar retailers represent 41% of the overall sales revenues online among this set of companies. Pure-play internet retailers account for 24%. The scale on which this is measured is an overall amount of $40.09 billion dollars, which is the total 2003 online sales revenue from the top 300 US websites. Brick-and-mortar retailers represent $16.38 billion dollars in sales where pure-play internet retailers represent $9.72 billion dollars. Consumer brand manufacturers and catalog/call center companies have $8.14 and $5.85 billion dollars in sales respectively.

3.2.2 Products and Services

Internet retail offers a multitude of products and services. It includes general merchandise such as apparel, books, computer hardware/software, consumer electronics, flowers/cards/gifts, health/beauty, home products, jewelry/luxury goods, music/video, sporting goods, tickets, toys/video games, and all other merchandise not included in the aforementioned categories. Additionally, sites that offer travel booking and services and internet auction sites are included in internet retail.

Forrester Research explains consumer and supplier dynamics that could help to promote or hinder the growth of online sales for different product categories in the figure below (Johnson, 2002).

Figure 3-10 The Impact of Consumer and Supplier Dynamics on Sales in Selected Online Product Categories.

Arrows pointing up indicate that the dynamic will cause sales to rise.

Product category	Consumer dynamic	Supplier dynamic
All	**New and existing online shoppers drive growth.**	**Multichannel retailers master online selling.**
Apparel	↑ Consumers use tools like zoom to boost online shopping confidence.	↑ Catalogers aggressively push sales online and accept returns in stores.
Books	↑ Novice online shoppers typically buy books as their first purchase.	↑ The price battle between online booksellers continues.
Computer hardware/ software	↑ Consumers prefer the Web for comparison-shopping and selection.	↓ A slowing PC market limits sales.
Consumer electronics	↑ Demand is strong for new devices like DVD players and old devices from auctions.	↑ Retailers offer consumers the ability to buy online and pick up in stores.
Flowers/ cards/gifts	↓ Consumers prefer stores for last-minute purchases.	↑ Flower retailers expand product assortment to push gift sales.
Health/ beauty	↑ Replenishment purchases appeal to time-strapped shoppers.	↓ Channel conflict limits online sales efforts.
Home products	↑ Consumers shift home furnishings and office supply purchases to the Web.	↑ Retailers offer consumers the ability to buy online and pick up in stores.
Jewelry/luxury goods	↓ Consumers shy away from shipping expensive goods through the mail.	↓ Luxury brands prefer to send shoppers to stores.

↑ Driver of online sales ↓ Impediment to online sales

Source: Forrester Research: "US E-Commerce: The Next Five Years" (Johnson, 2002)

3.2.3 Historical Revenues and Margins

Internet retailing is a relatively new industry created in conjunction with the emergence of the internet in the mid 1990's. Industry financials and forecasts from different sources have slightly different results due to the relative infancy of internet retail as an industry segment, the dynamic nature of internet retail, and the variety of products and services that are offered. Therefore, this paper will take an approach of referencing several sources for a variety of internet retailing historical data and estimates.

Revenues have been growing rapidly since the introduction of internet retailing and are expected to grow at double-digit rates over the next several years. Forrester notes that from 1997 to 2002, online retail sales grew at a 97% compound annual growth rate (CAGR). This growth is reflected in the increase in sales from $2.4 billion in 1997 to $72.1 billion in 2002.

Forrester data includes travel and food related purchases in internet retailing data, where the US Department of Commerce does not. The US Department of Commerce data from 2000-2003 shows a more conservative actual growth rate of 23-27%.

Figure 3-11

US Department of Commerce - Online Retail Sales Figures (in billions)		
Year	Amount	Growth %
2000	$28.9	Not Provided
2001	$35.9	24%
2002	$45.5	27%
2003	$56.0	23%

Source: US Department of Commerce data, obtained from eMarketer, Inc. 2005

In "US eCommerce: The Next Five Years" (Johnson, 2002) Forrester Research publishes the following data projecting the future sales growth in each product and service segment from 2002-2007. The right-hand most column of the table projects the percentage of internet retail sales by product compared to overall retail sales of that product in the year 2007.

Table 3-2

Forecast: US Online Retail Sales, 2002 to 2007							
	2002	2003	2004	2005	2006	2007	% 2007 retail
Total US revenue (billions)	**$72.1**	**$95.3**	**$119.5**	**$148.6**	**$180.8**	**$217.8**	**8%**
General merchandise subtotal	**$40.7**	**$59.2**	**$77.4**	**$98.5**	**$122.1**	**$146.2**	**11%**
Apparel	$5.2	$7.9	$11.0	$14.6	$18.6	$22.5	10%
Books	$2.6	$3.5	$4.3	$4.7	$5.4	$6.0	27%
Computer hardware/software	$7.9	$10.4	$11.7	$12.6	$13.2	$13.7	37%
Consumer electronics	$3.4	$4.3	$5.8	$7.3	$8.9	$10.3	19%
Flowers/cards/gifts	$1.0	$1.4	$2.1	$3.0	$4.1	$5.3	10%
Health/beauty	$0.8	$1.2	$1.7	$2.7	$4.2	$5.0	6%
Home products	$7.3	$12.5	$17.5	$24.1	$32.2	$42.0	7%
Jewelry/luxury goods	$1.2	$1.7	$2.5	$3.5	$4.6	$5.7	10%
Music/video	$3.9	$5.3	$6.4	$7.5	$8.6	$9.7	21%
Sporting goods	$1.1	$1.5	$2.2	$3.0	$3.9	$4.8	9%
Tickets	$2.6	$3.5	$4.8	$5.9	$6.9	$7.6	23%
Toys/video games	$2.3	$2.7	$3.4	$4.4	$5.4	$6.4	14%
Other*	$1.4	$3.2	$4.0	$5.1	$6.2	$7.1	N/A
Auto/grocery/travel subtotal	**$31.4**	**$36.1**	**$42.1**	**$50.1**	**$58.7**	**$71.6**	**5%**
Auto/auto parts	$9.0	$7.2	$8.1	$9.5	$10.4	$11.1	2%
Food/beverage	$2.4	$3.5	$5.4	$9.3	$15.0	$18.2	4%
Travel	$20.0	$25.4	$28.7	$31.3	$33.2	$42.2	17%

Source: Forrester Research, Inc.: "US E-Commerce: The Next Five Years" (Johnson, 2002)

Within the General Merchandise category the top five products in projected total sales amounts in 2007 are home products, apparel, computer hardware/software, consumer electronics, and books. The top five products in terms of percentage of online sales to overall retail sales are computer hardware/software, books, tickets, music/video, and consumer electronics.

eMarketer, Inc. is another source that compiles online revenue. The following forecasts are created based on assumptions of an increasing number of US online buyers based on population growth and internet proliferation, as well as an increase in the average amount each buyer spends online annually.

Table 3-3

Forecast: US Retail Merchandise Sales and Online Travel Revenue, 2002-2007						
	2002	2003	2004	2005	2006	2007
Total US revenue (in billions)	**$71.3**	**$94.0**	**$119.5**	**$145.9**	**$172.5**	**$201.3**
Online retail merchandise revenue subtotal	$44.3	$56.0	$71.0	$87.9	$104.0	$121.1
Online travel revenue subtotal	$27.0	$38.0	$48.5	$58.0	$68.5	$80.2

Source: eMarketer, Inc.: "US Consumer Online Shopping and Buying Grid, 2002-2007 (in millions and % penetration)" (2004). Data through Q2 2004 is US Department of Commerce actual data.

Although the growth forecasts vary by source, both Forrester Research and eMarketer project substantial growth in online revenues through the year 2007. eMarketer's more conservative estimate of $121.1 billion in 2007 is more than double the actual 2003 amount of $56 billion reported by the US Department of Commerce.

Internet retailing industry profitability data is difficult to capture as most multi-channel retailers do not segment profitability numbers by distribution channel. However, the trend in recent years is an improvement in the profitability of internet retailers. A Shop.org and Forrester Research study shows that in 2001 only 56% of internet retailers had positive operating margins. By 2003, 79% of internet retailers had positive operating margins (Rubin, 2003).

Profitability has been growing due to increased sales that allow internet retailers to overcome fixed costs, increased selling efficiency, and customer retention successes. Future initiatives on reducing marketing and operations costs should continue to improve the profitability of internet retailers (Rubin, 2003).

3.2.4 Top Five Internet Retail Companies

The internet retail case study in this thesis analyzes a pure-play internet retail model. Therefore, the top publicly traded pure-play internet retailers in terms of revenue are those

chosen for an analysis of the top five internet retail companies. In May 2004 BarnesandNoble.com was acquired by Barnes and Noble, Inc. and thus became a multi-channel retailer. Thus, it is not included in this analysis. However, Barnes and Noble, Inc. is a significant competitor to Amazon.com and thus will be analyzed in the competition component of Chapter 4. 1-800-Flowers.com also has revenues that would qualify for top 5 consideration. However, 1-800-Flowers.com receives more than half of its revenues from telephone orders, and thus its online component is not as large as others.

The data for the top 5 companies was compiled through the S&P Industry Reports, Securities and Exchange Committee (SEC) filings, annual reports, and company websites.

Amazon.com

Amazon.com was incorporated in 1994 and completed an initial public offering in 1997. Revenues for 2004 were $6.92 billion, up 31% from 2003. Net income was $588 million in 2004. Amazon.com was profitable for the first time in 2003. Amazon.com competes with traditional retailers as well as other internet retailers on the basis of selection, convenience, and price. Amazon.com offers a wide variety of general merchandise product categories that are often found at mass merchandisers. Product categories include apparel and accessories, baby care products, books, camera and photography, cell phones and service, computers and accessories, consumer electronics, DVDs and videos, gourmet food, health and personal care, home and garden, jewelry, kitchenware, magazine subscriptions, music, office products, software, sports and outdoors, tools and hardware, and toys. Amazon.com leverages a supply chain network that includes internally operated distribution centers and inventories as well as several third-party partners to offer their extremely large selection of products.

eBay, Inc

Founded in 1995, eBay Inc. is an online auction marketplace that connects millions of buyers and suppliers daily. eBay has been growing rapidly since its inception and is based on the virtually unlimited product selection and perfect price competition that is offered via online auctions. Revenues were $3.27 billion in 2004 and net income was $778.2 million. Over the five years from 1998 to 2003, sales growth rates were 75% and earnings-per-share (EPS) growth rates were 162.5%. Brynjolfsson and Smith (2000) discusses the concept of internet retail as a nearly perfect market, where consumers are fully informed of products and prices. eBay extends this concept into the "perfect" supply chain, where suppliers are directly connected with buyers with no intermediaries and direct service.

NetFlix, Inc.

NetFlix, Inc. was founded in 1998 as an online home DVD delivery service. In 2003 NetFlix, Inc. had revenues of $506.2 million and was profitable for the first time with a Net Income of $21.6 million. Customers pay a monthly subscription fee and develop a list of movies they wish to view. After watching a movie, customers place the DVD in a return envelope and place it in the mail. Once the DVD is received back into the local NetFlix distribution center, the next movie on the customer's list is automatically sent to the customer. Consistent with most internet retail business models, NetFlix competes on selection, convenience, and price. Netflix offers 18,000 titles, the ability to automatically receive movies without leaving home, and no late fees.

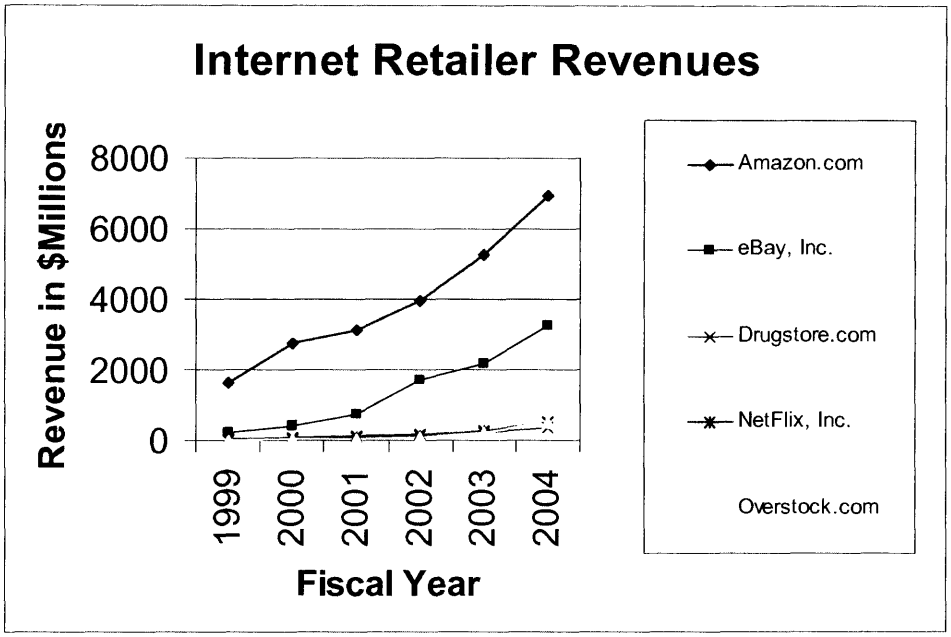
Overstock.com

Overstock.com seeks to provide a more efficient marketplace for connecting sellers and buyers of excess inventory at discounted prices. In some cases, Overstock.com buys unused inventory from manufacturers, and in other places the company just provides a web front end that enables manufacturers and retailers with a channel through which to sell their overstock product. Overstock offers a wide product selection including apparel and accessories; books, movies, and CD games; electronics and computers; home and garden; jewelry, gifts, and watches; sporting goods and events; travel; and worldstock. Worldstock offers numerous product categories from various countries around the world, such as Persian rugs. Overstock.com revenues for 2004 were $495 million.

Drugstore.com:

Drugstore.com was incorporated in April 1998 and launched its commercial website in January 1999. Revenues for 2004 were $360 million and Net Loss was $48 million. Drugstore.com offers health, beauty, wellness, and pharmaceutical products. Amazon.com owns a 19% stake in Drugstore.com. The two companies have entered into an agreement where Amazon.com will support a Drugstore.com presence on its health and beauty site. Drugstore.com pays Amazon.com for each new unique customer that places an order through the Amazon channel, and Drugstore.com supports Amazon.com shoppers that are searching for Health and Beauty products.

Figure 3-12



Source: Standard and Poor's Industry Surveys: Computers: Consumer Services and the Internet; Company SEC Filings

3.2.5 Customer Segments and Sales Channels

By definition, internet retailing is geared towards a specific customer segment and sales channel. The sales channel is the website, which operates as the online store. Customers shop online for the convenience, selection, and price advantages. Therefore, the typical online shopper is a well-informed shopper. The number of online shoppers and buyers is growing with the increasing proliferation of the internet. With the rise in online penetration comes an increase in the number of shoppers and buyers online. eMarketer projects that between 2000 and 2005 the percentage of online shoppers among internet users will increase from 65% to 75%. Online buyers will also increase from 48.5% of internet users in 2000 to 63.4% of internet users in 2005. Additionally, eMarketer projects that the annual amount purchased online per buyer will increase from $573.75 to $1053.21 by 2007.

3.2.6 Customer Demographics

The following percentages for internet shopping are compared against a 65% buyer percentage amongst all internet users. Women constitute 62% of total online retail sales. Historically, smaller percentages of African-Americans and Latinos have made purchases online in comparison to overall internet buyers. However, the trends show that the percentage of Latinos that have made a purchase online has increased from 41% in December 2000 to 63% in February 2004. Similarly, the percentage of African-Americans that have made a purchase online has increased from 47% in December 2000 to 59% in February 2004. ("US Online: Access, Demographics, and Usage", 2004). College students are more likely to make online purchases than the general population, with 86.4% of private school students and 66.8% of public school students purchasing online. Interestingly, a larger percentage of college men purchase online (76.1%) than women (69.1%).

3.2.7 Trends and Industry Drivers

The following drivers and trends are helping to shape the internet retail industry as well as illustrate the importance of supply chain excellence.

Internet Retail Growth:

The growth in internet retail usage, revenue growth, and profitability is illustrating the viability of internet retailing. The factors that are driving this growth were discussed earlier in the industry overview. This is an opportunity and a challenge for multi-channel retailers as well as internet retailers.

Leveraging Brand Awareness

Traditional retailers are leveraging their brand names to increase their online revenues. Furthermore, internet companies such as Amazon.com and eBay, Inc. are increasing their brand awareness. This increasing brand loyalty could increase customer loyalty, which historically has been a significant problem for internet retailers.

Price Competition

Internet retail provides a more "perfect" marketplace where buyers can easily find information on product and price. This information leads to intense price competition among retailers and internet retailers. Both brick-and-mortar and pure-play retailers are affected by this price competition as it erodes at profit margins. This dynamic is driving the need for new ways of competing such as online experience, service excellence and logistics efficiency to reduce costs.

Selection and Availability - Partnerships

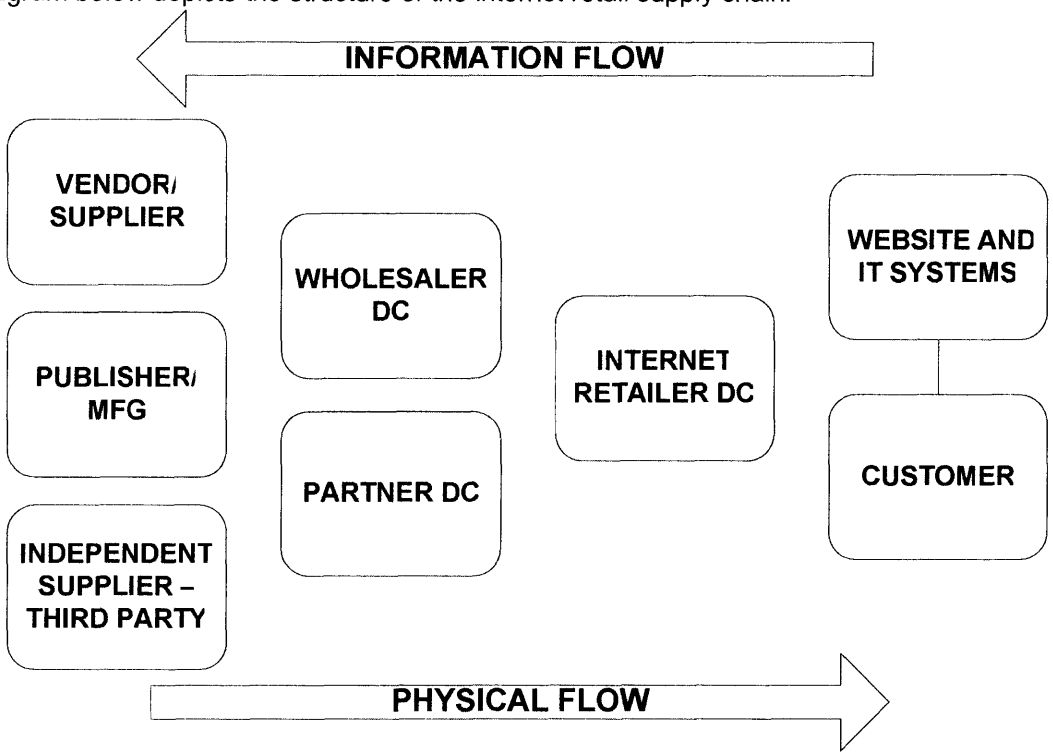
Internet retailers compete against traditional retailers on the basis of price, selection, availability, and service. We have noted that a retail industry driver is increased competition on selection and product availability. It appears that retailers, internet retailers, wholesalers, and manufacturers are increasingly partnering to strengthen the differentiating factors, which are product selection and availability online. For example, Amazon.com employs a three-echelon inventory system where orders may be filled by Amazon.com's distribution center, a number of wholesalers, as well as suppliers. Additionally, Amazon.com has partnered with a number of other internet retailers to cross promote product lines. The Drugstore.com agreement discussed in the internet retailer competitors section highlights such an agreement.

3.2.8 Internet Retail Supply Chain Structure

The internet retail supply chain structure is similar to that of the traditional retail supply chain. On the supply side there are manufacturers and vendors that supply products to the internet retailer. On the distribution side, wholesalers often serve as intermediaries that store inventory to service multiple retailers. There are distribution centers operated by the internet retailer or by third-party logistics (3PL) firms that stock products to fulfill customer orders. The differentiating factor for internet retailers is the customer side of the chain. In traditional retail environments physical retail stores represent the channel through which the customer purchases product or receives services. Store replenishments are sent from distribution centers to stores to ensure that products are available in the stores. Products are then replenished from backrooms to store shelves. Conversely, in internet retail the website serves as the store front-end through which customers enter, browse and receive product information, and make purchases. Distribution centers receive the customer orders and deliver directly to customer addresses. Occasionally, in the traditional retail model orders are shipped from manufacturers, vendors, or wholesalers directly to retail stores. Similarly, internet retailers often leverage the product selection and inventory of these supply chain partners to service customers.

Figure 3-13 Internet Retail Supply Chain Structure

The diagram below depicts the structure of the internet retail supply chain.



A customer places an order from the website. The internet retailer DC can ship the product if it is in stock. If an internet retailer does not have a product in its inventory, it may utilize a wholesaler, supplier, manufacturer, or other third party to ship the product directly to a customer. This process of drop shipping is a key factor that allows internet retailers to provide the nearly unlimited selection of products that they offer.

In "click-and-mortar" environments, multi-channel retailers are increasingly leveraging their physical store network and their online capabilities to increase sales. Customers can log onto retailer's websites, order a product, and schedule to pick it up in a store. Retailers can include products on the standard shipment from their distribution center to the retail store and service the customer, while leveraging the cheaper transportation and economies of scale that they possess (Maltz et al., 2004).

3.2.9 Supply Chain Challenges and Opportunities

Internet retail introduces a number of supply chain challenges. Customer expectations are unlimited product selection and availability at the lowest price. To meet these expectations internet retail supply chains need to be designed and executed properly. The challenges and opportunities associated with supply chains supporting internet retail are introduced below. The concepts will be developed more deeply as the Amazon.com case study is developed in later chapters.

Network Location and Order Sourcing

Order fulfillment costs represent a huge component of costs for internet retailers. For example, Amazon.com spent $477 million on fulfillment in 2003. This number represents half of Amazon's total operating expenses (Maltz et al., 2004). The number of distribution centers and their location are critical to the success of internet retailers. The internet retailer has the choice to add shipping and handling charges into the customer price, or pay the shipping and handling charges and offer free shipping to the customer. In either scenario, selecting locations that minimize transportation costs while providing the expected level of customer service is critical. Also, determining the order sourcing methodology is crucial to containing costs. For example, if an order requires two unique stock keeping units (SKUs), and the closest warehouse to the customer does not have one of the SKUs, internet retailers need a methodology to determine whether to split the order among two facilities, ship the order complete from a further facility, or a variety of other combinations.

Profiling for Distribution Center Layout and Process Design

Internet retail has a fundamentally different order profile from retail in terms of shipping orders from distribution centers. Retailer distribution centers ship a relatively small number of orders, but a high volume of units per order. This is because an order replenishes all products that a store requests from that distribution center. In internet retail, the order profile is a large number of small volume orders. Distribution center layout and process designs are quite different for these two environments. For example, internet retail distribution centers need dedicated pick faces for picking small numbers of units per order. Additionally, processes need to be in place for consolidation of orders for similar products and destinations for picking scale efficiencies.

Inventory Segmentation and Partnerships

Due to the robust product selection requirements for internet retailers, inventory segmentation offers a significant challenge. Deciding which products to carry in one's own distribution centers, versus wholesaler distribution centers, and manufacturer sites has an effect on the cost and service structure of internet retailers.

Balancing Service and Cost

Balancing service and cost is an important component in the internet retail supply chain as it is in the retail supply chain. Maltz et al. (2004) notes that often internet retailers consistently deliver product well before the guaranteed delivery date provided to the customer. This means that more intelligent aggregation of distribution center work as well as less expensive transportation options can be utilized while still achieving the same level of service.

These challenges and opportunities surrounding supply chain design, partnerships, and processes will be evaluated in depth in the forthcoming internet retail case study in this paper.

3.3 Industry Overview Conclusion

This chapter has provided the reader with an overview of the retail industry as a whole, and an analysis of the mass merchandising and internet retail segments of the industry. Current financials, industry drivers, trends, and supply chain challenges are discussed to provide a foundation for understanding each of the case study companies, and their relative positions in their retail segments, which is discussed in Chapter Four.

4 Wal-Mart and Amazon.com Case Studies

The following chapter introduces the two company case studies being researched for the retail industry. These two case studies do not represent the entire retail industry, but have been chosen due to their leadership positions, in terms of revenue and supply chain initiatives, in their respective segments of the retail industry. Wal-Mart, Inc. is used as a case study for traditional retailing, or more specifically mass merchandise retailing, and Amazon.com is the case study for internet retailing. This chapter focuses on each company's financial position as well as gives the reader an overall idea of each company's business units, products and services, retailing sales channels, customer segments, and competitive positioning over time. The goal of this portion of the paper is to understand Wal-Mart and Amazon.com's industry, financial, and business strategy positions more deeply, before diving into their specific supply chain practices in Chapter Five.

4.1 Wal-Mart Retail Industry Position Case Study

Wal-Mart Stores Inc. is the top retailer in the world in terms of annual revenue. The company was founded in 1962 in Rogers, Arkansas by Samuel Walton, and incorporated in 1969, as stated by Wal-Mart's timeline on its official website. As mentioned in the retail industry overview, Wal-Mart is considered a mass merchandiser or a discounter, titles that may be used interchangeably here. The following focuses on the company's position in the mass

merchandise retailing segment of the retail industry. Although this section briefly discusses Wal-Mart's different business units and some of the statistical data includes all business units, the majority of information provided is for Wal-Mart Stores.

4.1.1 Business Strategy

Wal-Mart's business strategy is to provide "Every Day Low Prices" or EDLP for all of its products and services. Their organization, company culture, and supply chain management all support and reinforce this clear business strategy. Wal-Mart's 2004 Annual Report defines this business strategy as a "...pricing philosophy under which we price items at a low price every day so that our Customers trust that our prices will not change erratically under frequent promotional activity." From this definition, Wal-Mart does not guarantee the lowest prices in the market. However, they do guarantee that their overall prices are lower than most retailers. Other retailers may offer lower prices than Wal-Mart on certain products at certain times due to promotional activities. In this sense, other retailer's prices may at times be lower than Wal-Mart's, but the price advantage is typically temporary due to promotions. Wal-Mart uses their EDLP strategy to negotiate prices with their suppliers to keep their purchasing costs low.

Another strategy that Wal-Mart has followed since its inception is to build Wal-Mart stores in smaller communities. Because key competitors like Target and Kmart were building their stores in metropolitan areas, Sam Walton decided to focus on building stores in communities with populations between 5,000 and 25,000 people (Barrett, Kenneth, & Seward, 1999). The advantages of this strategy are lower infrastructure investment costs and lower wages to set up mass merchandise stores in those communities. The disadvantages of being in small communities are the inbound and outbound distribution costs and convincing suppliers to

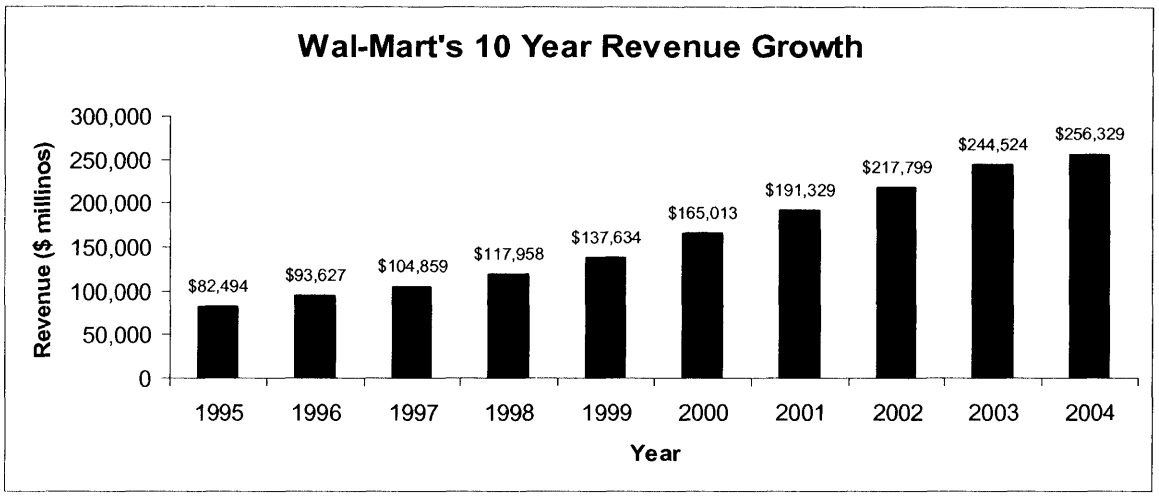
support stores that are out of their distribution network. Wal-Mart counters transportation costs with buying in higher volume to create economies of scale.

Other programs that have been implemented to support Wal-Mart's retail units are the "Rollback" and "Store of the Community" programs. Both programs are meant to draw in more customers and better serve current customers. According to the Wal-Mart 10-K Form filed in 2004, the Rollback program passes on Wal-Mart's savings to their customers through lower prices. For example, if Wal-Mart negotiates a price reduction from a supplier, Wal-Mart passes the savings on through product price reductions to consumers. The Store of the Community program aims to fill store inventories with products specifically tailored to the demands of a community. Because the stores around the US serve different demographics, the demand profile for specialty products differs by region and community. This program makes certain that community-specific demands are met to ensure product availability for customers.

4.1.2 Historical Revenues, Operating Margins, and Employees

Wal-Mart has more than tripled their annual revenue in the last ten years through continuously opening stores in small towns and minimizing costs in their supply chain network. The graph below shows the historical revenue of Wal-Mart in the last ten years from 1995 to 2004. In January of 2004 (end of their 2003 fiscal year) Wal-Mart reported approximately $256 billion in revenue, making it the highest grossing retailer in the world.

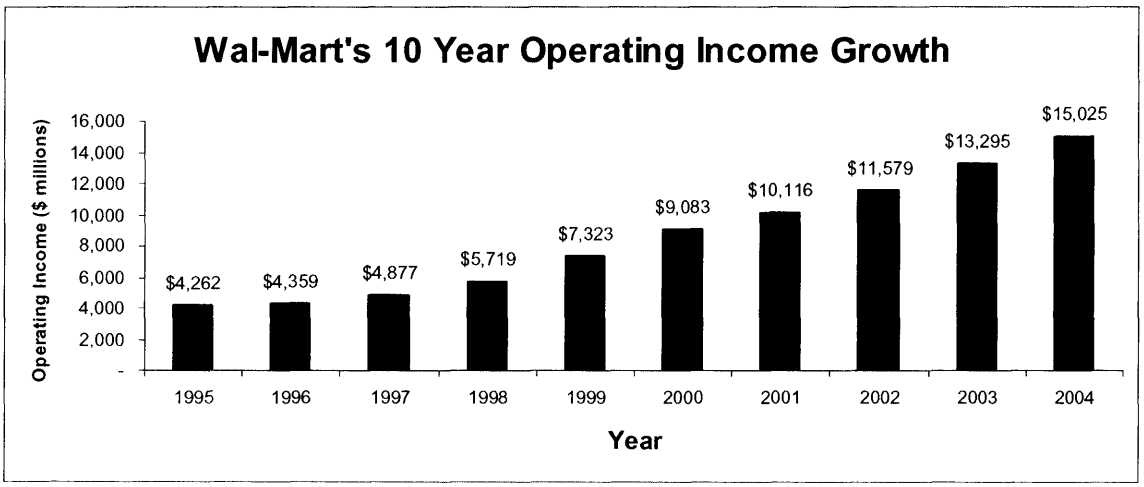
Figure 4-1



Source Wal-Mart 2004 Annual Report

As seen in the graph below, Wal-Mart operating income has also shown continuous growth in the past ten years.

Figure 4-2



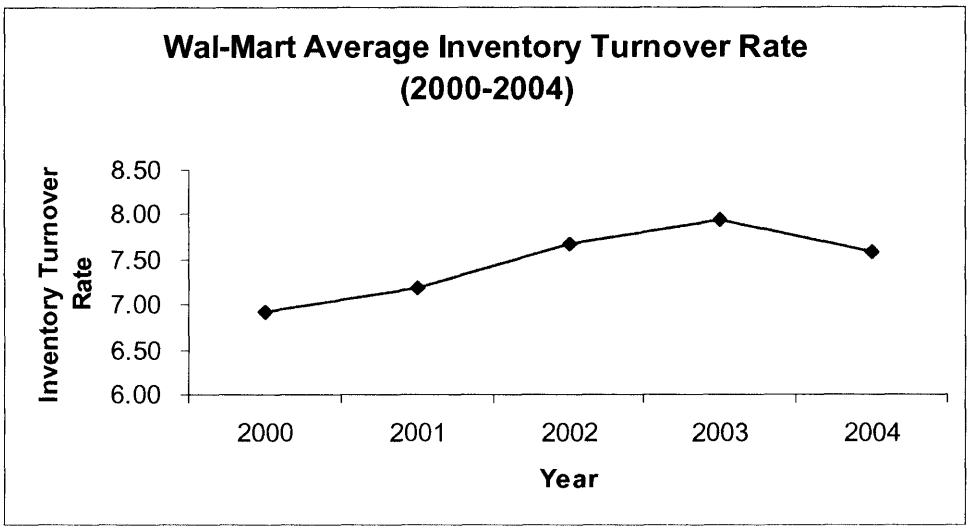
Source: Wal-Mart 2004 Annual Report

Wal-Mart has specific performance metrics of focus that are used to track the performance of the company. Some of the major performance metrics that Wal-Mart uses to measure its own progress are reported in the 2004 Annual Report. The measurement of gain in market share by existing stores is the first indicator of growth. Stores that have been modified or

stores that were opened after February of the current fiscal year are excluded from this metric. Wal-Mart experienced a high gain in market share in 2003, which was 5.7%, while only 3.9% in 2004. Wal-Mart attributes the slower growth to the slower overall economy. The operating profit to sales ratio is another important metric upon which Wal-Mart measures itself. Wal-Mart also utilizes the growth in inventory compared to half of the growth in sales as a critical performance metric. The goal is to lower this ratio each year.

In addition to the performance metrics mentioned in Wal-Mart's Annual Report, annual inventory turnover rates are a metric used by retailers, especially mass merchandisers, to measure performance. Below are Wal-Mart's average annual inventory turnover rates from 2000 to 2004.

Figure 4-3



Source: Wal-Mart Annual Ratio Report as reported by Standard and Poor's

Wal-Mart has employees located all over the world, due to international expansions. The 2004 10-K Form reports that Wal-Mart employs approximately 1.5 million people. The number of employees domestically and internationally totaled 1.2 million and .36 million respectively. Employees are compensated through salaries and hourly wages, as well as through incentive programs that reward employees based on company performance.

4.1.3 Business Units

Wal-Mart's three business units are Wal-Mart Stores, SAM'S CLUB, and their International retailing business. Each are described below, based on data provided by the Wal-Mart 2004 10-K form.

Wal-Mart Stores

Within Wal-Mart Stores, there are three different types of retailing facilities; Discount Stores, Supercenters, and Neighborhood Markets. The Supercenter outlet combines both general merchandise found in Discount Stores and grocery products that are found in Neighborhood Markets. The size of the different store types differs due to the amount of merchandise carried in each store. The largest outlet is the Supercenter, which averages 187,000 square feet, while the Discount and Neighborhood Markets average around 98,000 and 43,000 respectively. As a reminder, this thesis will be focusing on the supply chain process for only the Discount Stores. The growth of the Wal-Mart Stores business unit can be attributed to consistent investments in opening new stores in smaller communities, and year over year sales growth in existing stores.

Wal-Mart Discount Store managers have the freedom to determine product selection and store operating processes. The layout of the store and the departments within the stores are given general guidelines but specific details of allocation of space and placement of products are left to the managers. As more inventory management details become automated, there is less of a need for individual managers to make these decisions.

SAM'S CLUB

The concept of SAM'S CLUB came as a result of the hypermarkets that were appearing in Europe around the 1970's and 1980's. Hypermarkets are generally larger retail facilities that offer both groceries and general merchandise as well as give smaller retailers a place to sell their

products. Although SAM'S CLUB carries both grocery and general mass merchandise, it contains a smaller number of independent retail stores than the European hypermarkets (Barrett et al., 1999). SAM'S CLUB offers general merchandise products in bulk quantities for its customers. Customers are required to have a membership, which is renewed annually, in order to purchase products. The retail facility size averages approximately 127,000 square feet. Price per unit for products that are sold in bulk is generally lower than those found in Discount Stores.

International

Wal-Mart has grown internationally through mergers, acquisitions, and joint ventures. In 1994 in Canada, Woolco became Wal-Mart's first international acquisition. Wal-Mart has entered the Asian market through joint ventures with retail companies in China and other Asian nations. The following is a list of the Wal-Mart's international retail outlets in 2004.

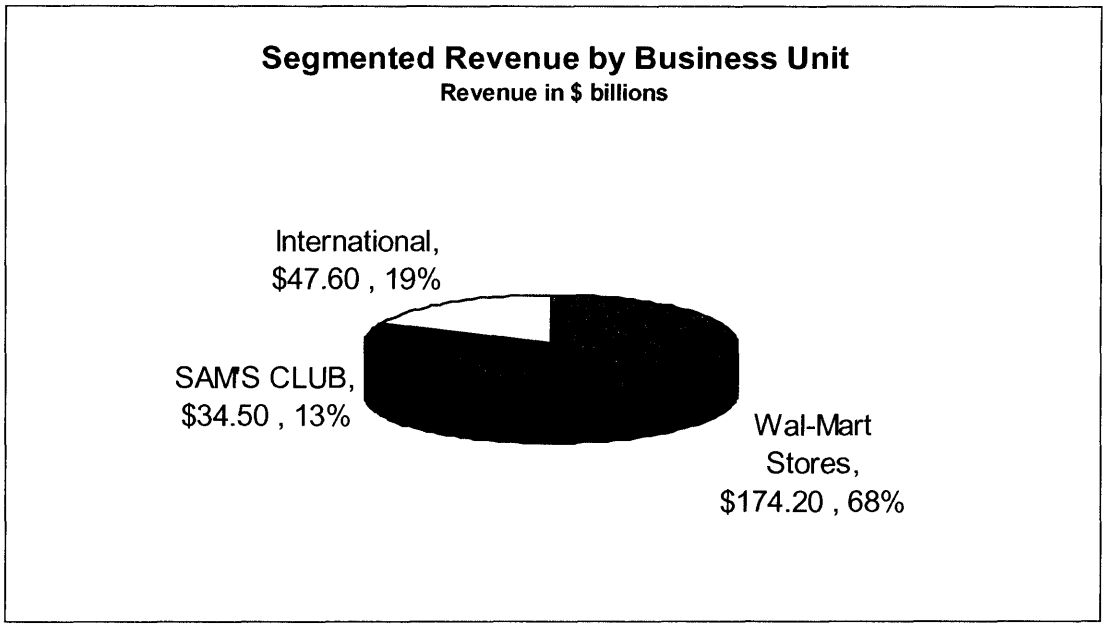
Table 4-1 Wal-Mart Stores, Inc. International Retail Outlets

	Discount Stores	Supercenters	SAM'S CLUB	Neighborhood Markets
Argentina	0	11	0	0
Brazil	0	13	10	2
Canada	231	0	4	0
China	0	28	4	2
Germany	0	92	0	0
South Korea	0	15	0	0
Mexico	487	83	53	0
Puerto Rico	9	3	9	32
United Kingdom	255	12	0	0
International Totals	**982**	**257**	**80**	**36**

Source: Wal-Mart 2004 Annual Report

The following graph shows the actual and percentage revenue contribution by Wal-Mart's different business units. Walmart.com is a small portion the revenue compared to other business units, and is combined with Wal-Mart Stores. It is obvious to see that Wal-Mart Stores is the largest revenue generating portion of the company.

Figure 4-4



Source: Wal-Mart 2004 10-K Form

4.1.4 Products and Services

Because Wal-Mart is considered a mass merchandiser, it carries a wide range of products. According to Barrett et al. (1999), there are thirty-six departments within each Wal-Mart Discount Store. The following is a list of the product lines that are carried and the percentage of revenue generated by each.

Table 4-2 Wal-Mart Discount Store Product Line

Product Line	Percentage of Sales
Grocery, candy, and tobacco	26%
Hardgoods	20%
Softgoods/domestics	16%
Pharmaceuticals	9%
Electronics	9%
Health and beauty aids	7%
Sporting goods and toys	6%
Stationary and books	3%
Photo processing	2%
Jewely	1%
Shoes	1%

Source: Wal-Mart 2004 10-K Form

Products found in Wal-Mart Stores are not considered to be high-end, luxury, or fashion-oriented. Because their strategy is being the low price leader, following the most up to date fashion trends and carrying luxury goods would be contrary to their strategy. Wal-Mart aims to provide a wide variety of products under one location for a low price. Wal-Mart stores also carry their own private labels that compete on price with national brands. Some of the services offered at Wal-Mart Stores are small places to dine such as McDonalds, the Vision Center for eye care, and the photo processing department.

SAM'S CLUB's offerings are different from Wal-Mart Stores' product line. SAM'S CLUB provides more services for smaller businesses that are members, and offers larger and more expensive products that would not be offered at Wal-Mart Stores such as tires. They also have departments that are not found in Wal-Mart Stores that carry perishable goods like baked goods, meats, and floral good. The following table shows the percentage of Sam's Club revenue by product line.

Table 4-3 Wal-Mart SAM'S CLUB Product Line

Product Line	Percentage of Sales
Food	30%
Sundries	28%
Hardlines	20%
Service Businesses	15%
Softlines	7%

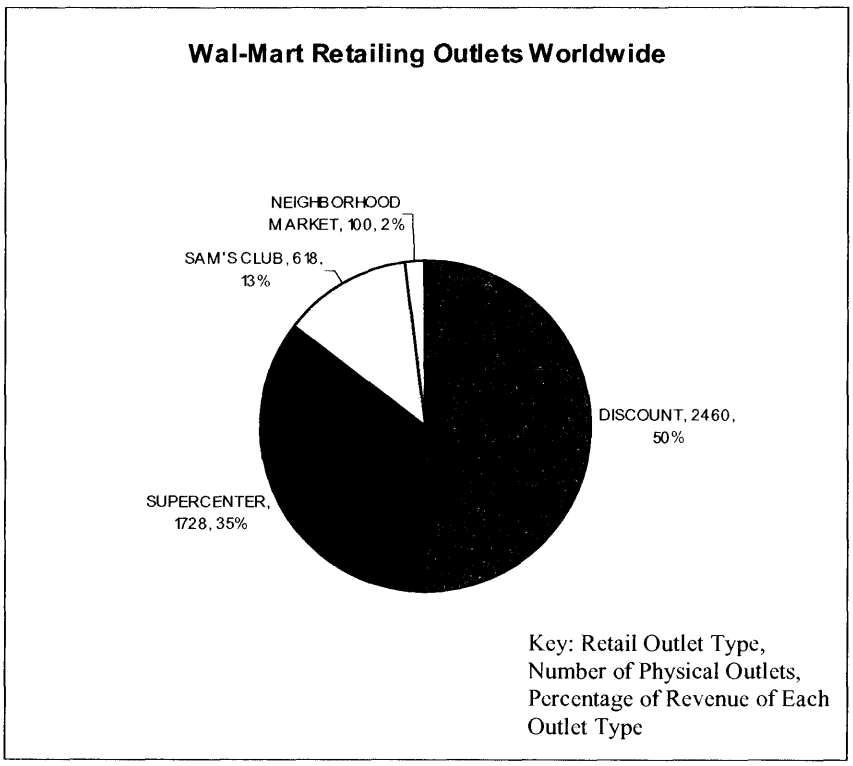
Source: Wal-Mart 2004 10-K Form

4.1.5 Sales Channels

Wal-Mart primarily sells products through its retail outlets including the three different store types and SAM'S CLUB. The following is a graph that shows the composition of all retail outlet types operated by Wal-Mart.

Figure 4-5

Wal-Mart retail outlets for both the US and International locations.



Source Wal-Mart 2004 Annual Report

Although the main emphasis in Wal-Mart is on physical retail outlets, Wal-Mart also operates internet sites where customers can buy Wal-Mart products. The two sites that are

owned by Wal-Mart are walmart.com and samsclub.com. Samsclub.com, like the physical retail outlet, requires a membership.

4.1.6 Customer Segments

Generally, Wal-Mart customers are cost conscious people, who know that Wal-Mart offers lower prices compared to other retailers. The Standard and Poor's Retail Industry Overview for 2003 has mentioned that the average salary for those that shop at Wal-Mart is below $30,000. Therefore, these customers are aware of their spending. As mentioned in the Retail Industry Overview in Chapter Three, consumers have become more aware the costs of goods needed for everyday use. Wal-Mart has tried to become a community retailer and provide products that have community-specific demand. The customer segment for SAM'S CLUB are customers who are buying products for professional use and need to buy in larger quantities than offered at supermarkets, or customers who want to save money by buying in bulk quantities. They are also cost conscious consumers who realize that buying in larger quantity could save them money overall.

Wal-Mart customers have also become accustomed to one stop shopping. As seen in the Retail Industry Overview, the sizes of retail outlets have become larger to hold more products and provide more services in one retail outlet. Therefore, larger Supercenters are beginning to replace Discount Stores so that consumers can do all their shopping in one place.

4.1.7 Wal-Mart's Competitive Positioning Over Time

Due to Wal-Mart's dominant position in retail and the large product line that they carry, almost all retailers are in some way competitors of Wal-Mart. Thus, the top four US retailers

behind Wal-Mart are discussed within a competitive context below. As a reminder, the top four US retailers behind Wal-Mart are Home Depot, Kroger Company, Target Corporations, and Costco Wholesale. The products that are found in these four retailers are generally products that can also be found in Wal-Mart. Home improvement products can be found in Wal-Mart, although, not larger industrial products that are sold in Home Depot. Kroger Company competes head to head with Wal-Mart's Neighborhood Market and Supercenters, since they both carry a full line of groceries as well. Target Corporations competes directly with Wal-Mart Discount Stores and Supercenters. Wal-Mart and Target carry similar product lines, although Target follows fashion trends closer than Wal-Mart. Costco is a direct competitor of SAM'S CLUB that follows the same warehouse membership retail setting.

Wal-Mart competes with its business strategy, which is being the low price leader. Although consumers could go to Wal-Mart competitors for the same products, consumers continuously return to Wal-Mart because they know that they can find consistently lower prices. Again, because of the EDLP strategy, consumers do not expect prices to change dramatically due to promotional activities. Wal-Mart leverages purchasing scale and buyer power over their suppliers to push unit prices lower than other retailers. Suppliers are willing to comply with Wal-Mart's price demands and compliance requirements due to the large amount of their sales revenue generated by Wal-Mart alone. The figure below illustrates the amount of buying power Wal-Mart has with major suppliers of consumer product goods. The depth of the collaborative efforts between Wal-Mart and their suppliers will be discussed in further depth in the next chapter, which deals specifically with Wal-Mart's supply chain.

Table 4-4 Percentage of Supplier Sales Dedicated to Wal-Mart in 2003

SUPPLIER COMPANY	MAIN PRODUCTS	% SALES TO WAL-MART
Dial Corporation	Toilet Soaps	28
Clorox Corporation	Liquid Bleach	23
Mattel Corporation	Toys	23
Revlon	Perfumes/Cosmetics	22.5
Proctor & Gamble Co.	Toilet Soaps, detergent	17
Energizer Holdings Inc.	Batteries	16.3
Kraft Foods	Packaged Foods	12.2
Gillette Co.	Shavers, Batteries	12
Kellog Co.	Breakfast Cereals	12

Source: Ramaswamy, K. (2004), *Wal-Mart Stores Inc.: Dominating Global Retailing*. Thunderbird, The American Graduate School of International Management.

Another advantage that Wal-Mart has over its competitors is the product variety that they can offer consumers. Consumers have become accustomed to one-stop shopping. Generally, the consumer's desire to save time in shopping is supported by large retail facilities like Supercenters, and the combination of this attribute with low price products can not be found in Wal-Mart's competitors. Furthermore, the EDLP strategy supports product availability for the wide product selection by preventing demand fluctuations and the subsequent supply chain variability associated with promotions.

4.2 Amazon.com Retail Industry Position Case Study

This area of the paper analyzes Amazon.com's position in the internet retail industry as well as the mass merchandising retail industry. Amazon.com started as an online bookseller, but has expanded into a wide variety of media, electronics, and other general merchandise categories in support of its business strategy. The company financial and informational data noted in this chapter are from Amazon.com annual reports and SEC filings unless otherwise noted.

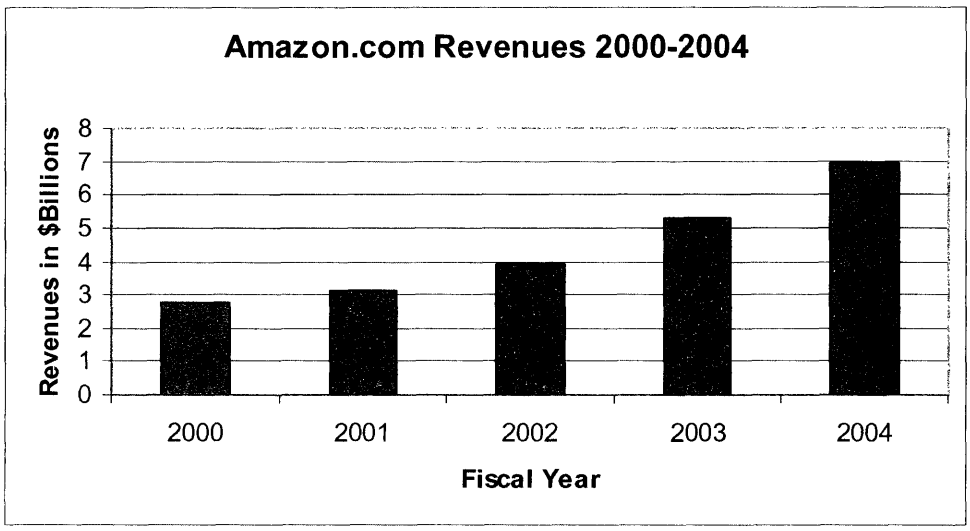
4.2.1 Amazon.com Business Strategy

It is important to understand Amazon.com's business strategy before analyzing its position in the internet retail industry. Amazon's annual report states that their mission is to offer "Earth's biggest selection" and to be "Earth's most customer-centric company, where customers can find and discover anything they want to buy." Specifically stated, their business strategy is to "offer customers low prices, convenience, and a wide selection of merchandise."

4.2.2 Amazon.com Historical Revenues, Margins, and Employees

Amazon.com was incorporated in 1994, launched web operations in 1995, and completed an initial public offering in 1997. It is been growing rapidly since its inception, and is currently the largest pure-play internet retailer. The chart below shows revenue growth from $2.72 billion in 2000 to $6.92 billion in 2004.

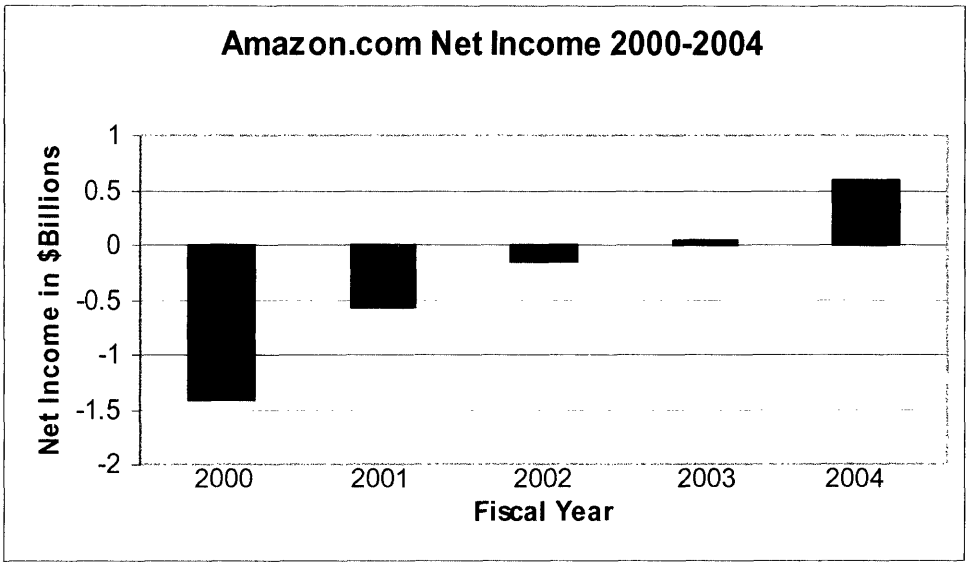
Figure 4-6



Source: Amazon.com 2003 Annual Report and SEC Filings

Amazon has also seen an improvement in net income during this period, with net income going from negative $1.41 billion in 2001 to $588 million in 2004. Net income for 2004 is inflated by a one-time $233 million deferred tax asset due to previous operating losses.

Figure 4-7



Source: Amazon.com Annual Report 2003 and SEC Filings

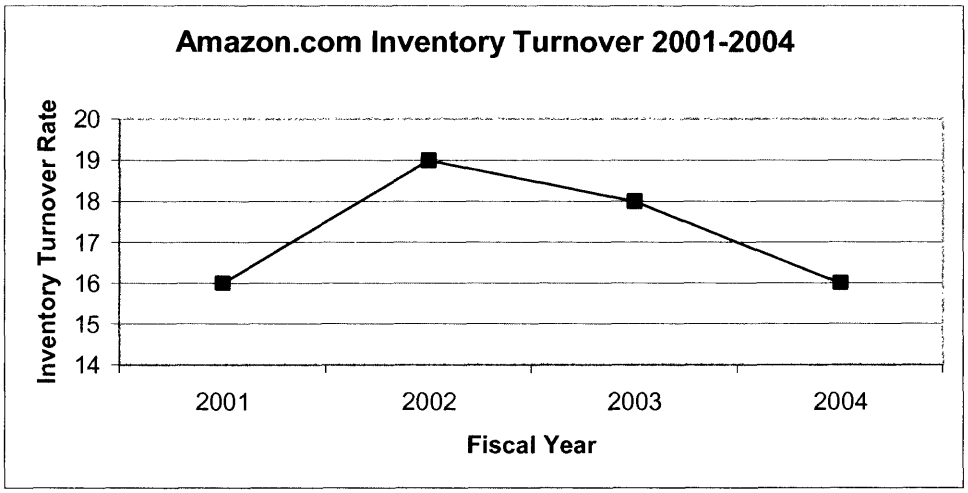
Amazon.com's rapid growth has led to an increase in employees. As of Q4 2004, Amazon employed more than 9000 people. That represents a 15% increase over the 7800 employees employed at the end of 2003.

Metrics of Focus: Free Cash Flow, Variable Costs, and Inventory Turnover

Amazon.com's Annual Report notes that its long-term goal is to optimize free cash flow. Free cash flow is the net cash provided by operating activities minus the purchases of fixed assets including physical and technology assets. Free cash flow can be improved through higher operating profits as well as managing working capital and capital expenditures. Amazon is able to improve free cash flow by turning inventories quickly. The variable cost per unit is an additional metric of focus for Amazon.com. Much of the Amazon.com physical and technical infrastructure represents a fixed cost to the organization. The company feels that there is room

for improvement in variable costs associated with customer service and order fulfillment to drive increased profitability with higher volume. Inventory turnover, defined as the cost of sales divided by average inventory, is also an important metric for Amazon.com. In 2004, the inventory turnover rate was 16. Inventory turnover rates fluctuate due to product line extensions and international expansion, as shown by an average turnover of 18 in 2003, 19 in 2002, and 16 in 2001.

Figure 4-8



Source: Amazon.com 2004 10-K Report, 2003 Annual Report

4.2.3 Business Units

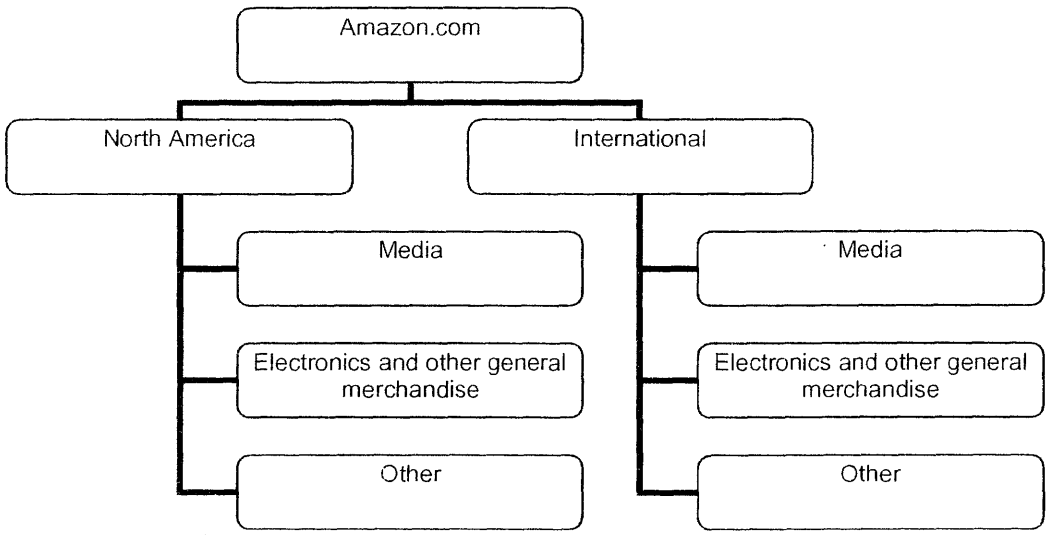
The two major business units by which Amazon.com financial metrics are segmented are North America and International. Amazon.com operates seven websites that support their business operations globally. Sites supporting the United States and Canada comprise the North American segment. Amazon.com offers five additional international websites that service their business in the United Kingdom, Germany, Japan, France, and China. In 2004, 56% of revenues were from North America, and 44% of revenues were from the International business unit. International sales have grown from 26% of overall sales in 2001, to 30% in 2002, and 38% in 2003. The growth in the share of international sales to overall sales illustrates that the

International segment has been growing faster than the North American segment in recent years. Operating income, which accounts for sales revenues, cost of sales, and direct segment operating expenses has improved by business unit as well. Operating income for North America was $321 million in 2004 on $3.85 billion in sales. International operating income was $169 million on $3.07 billion in sales. Operating income improved by 13% in North America and 116% in the International segment from 2003 to 2004.

4.2.4 Products and Services

Within the North American and International business units, revenues and margins are broken out by Media, Electronics and other general merchandise, and Other. The figure below shows how the product and service offerings of Amazon.com fit into the business unit and company structure.

Figure 4-9 Amazon.com Company, Business Unit, and Products and Services Structure



Source: Information from Amazon.com 2003 Annual Report

Media includes books, CDs, and DVDs and videos. Electronics and other general merchandise include all other product categories sold on Amazon.com or sold through its partner affiliates. All product categories sold by the company are shown in the list below.

- Apparel, shoes, and accessories
- Baby care products
- Books
- Beauty
- Camera and photography
- Cell phones and service
- Computers and computer add-ons
- Consumer electronics
- DVDs, including rentals, and videos
- Gourmet food
- Health and personal care
- Home, garden, and outdoor living products
- Jewelry and Watches
- Kitchenware and housewares
- Magazine subscriptions
- Music and musical instruments
- Office products
- Software
- Sports and outdoors
- Tools and hardware
- Toys and video games

Source: Amazon.com 2003 Annual Report

Other revenue comes from commissions from technology services and marketing agreements. As of 2004, Media accounts for 74% of overall sales. Electronics and other general merchandise and Other revenues account for 24% and 2% respectively. Despite the large scale of Media sales, Electronics and other general merchandise and Other sales are growing at faster rates than Media, both internationally and in North America, as shown in the figure below.

Table 4-5

Amazon.com Sales Growth Percentages				
	North America		International	
	2003	2004	2003	2004
Media	14%	14%	61%	41%
Electronics and other general merchandise	29%	28%	241%	149%
Other	29%	18%	-38%	98%

Source: Amazon.com 2004 10-K Report

Amazon.com launched A9.com in 2004, as a web search tool to expand its service offering. The site leverages the content expertise that Amazon.com has achieved to provide further details of search results including images. This tool will not be discussed in detail in this thesis, but is noted as a service offering that Amazon.com provides.

4.2.5 Sales Channels

The pure-play internet retailer business model utilizes a website as a virtual store through which to sell products to customers. This model constitutes a single sales channel by typical retail definitions. However, there are several variations within this sales channel that should be explored to more deeply understand the Amazon.com business model and sales channels. The Amazon.com and Syndicated Stores models utilize Amazon.com's technology and inventory and represent a model where Amazon.com the company is the seller. The Marketplace, Merchants@, and Merchant.com programs utilize Amazon.com technology, third-party company inventory, and in some cases Amazon.com fulfillment and represent models where Amazon.com serves as an intermediary or full service e-commerce provider. In 2004, 74% of units sold came from the Amazon.com and Syndicated Stores channels, and 26% of the units sold were from third-party companies. These channels will be discussed as distribution channels with supply chain implications in Chapter Five.

4.2.6 Customer Segments

The customer segments mentioned in the internet retailing industry overview are those serviced by Amazon.com. Amazon.com is a business-to-consumer (B2C) website that ships product directly to individual customers that purchase through an online store. The target customer is a well-informed shopper, with internet access, that values selection, convenience, and price.

4.2.7 Positioning Against Competitors over Time

Amazon.com is an internet retailer, however due to its increasing size and brand awareness, its main competitors are a mixture of multi-channel retailers and internet retailers. Due to its wide product selection, Amazon.com competes with product focused retailers, online marketplaces, and mass merchandise retailers.

With 74% of 2004 revenues in the media product category, the initial focus will be on two direct competitors in that space. Barnes & Noble, Inc. is often noted in the literature as Amazon.com's main competitor. When Amazon.com entered the market in the late 1990's it disrupted the bookselling industry and forced Barnes & Noble to launch BarnesandNoble.com. Barnes and Noble offers books, DVDs, and CDs, which competes directly with Amazon.com's media segment. Additionally, Borders, Inc. is a traditional bookseller that also sells DVDs and CDs. Amazon.com competes against these companies physical stores on selection, convenience, and customer experience while remaining price competitive. Initially, Amazon.com discounted the price of merchandise to undercut these retailers, but that strategy did not prove to be viable for profitability in the long-term. Barnes and Noble and Borders continue to operate profitable physical retail stores, despite increasing pressure from Amazon. However, they have not proven to be as successful in operating an internet retail environment. In 2001, Borders decided to partner with Amazon.com for Amazon.com to manage the Borders website, and execute the back-end fulfillment and delivery of orders to Borders.com customers. In 2003, Barnes & Noble, Inc. decided to acquire the remaining 25% stake it did not already own in BarnesandNoble.com to try to improve the poor profitability of the internet retailer (S&P Industry Surveys: Computers: Consumer Services and the Internet, 2004)

In addition to physical retail competitors, Amazon.com has pure-play competitors within the internet environment. eBay, Inc. is a major competitor to Amazon.com in the internet retailing space. eBay competes directly with Amazon.com on selection, convenience, and online shopping experience. Amazon.com differentiates itself from eBay on information and content that is more thorough than eBay, such as features that enable users to see the inner contents of a book online. Furthermore, Amazon.com offers customer service guarantees for order delivery. Independent sellers on eBay may not have the customer trust that Amazon.com has established with its customer base. Another online retailer that is directly competing with Amazon.com is Overstock.com. Overstock.com offers a wide range of products that are excess inventories from wholesalers and retailers. As an online retailer, it can offer a wide product selection and convenience. Furthermore, its business model based on selling discounted overstocked inventory allows Overstock.com to compete aggressively on price with Amazon.com. Amazon.com can differentiate itself from Overstock.com through its brand and by maintaining a loyal customer base through online shopping experience and order execution. Amazon.com has established a brand that is rated as the 66th most powerful brand in the world (Szkutak, 2004). This brand allows the typical internet user looking to purchase something online to first check with Amazon.com before looking to another internet retailer. Furthermore, the content and unique customer experience that Amazon.com offers can retain customer loyalty. Finally, fulfillment and logistics execution while providing customer visibility and updates can allow Amazon.com to differentiate on service when compared to Overstock.com.

Finally, Wal-Mart is a competitor to Amazon.com. Wal-Mart, the world's largest retailer offers most of the same products that Amazon.com offers in its stores. In addition, Wal-Mart has a strong brand, customer loyalty, a large customer base, and a sound financial position. The

Wal-Mart.com channel, although not specifically segmented out in Wal-Mart's financial statements, has been growing as well. Amazon.com competes against Wal-Mart in a similar manner to how it competes against the focused physical retailers Barnes & Noble and Borders. Amazon.com's differentiation against physical retailers is selection, convenience, and online content. Amazon.com offers a larger product selection through its own inventory and network of sellers than Wal-Mart. Furthermore, it offers product reviews and personalized storefronts to customers, which no physical retailer can offer. Although Wal-Mart is a competitor of Amazon.com's, Amazon.com is not necessarily a near-term threat to Wal-Mart. However, Amazon.com can maintain and grow the percentage of products that are purchased online through effective differentiation from Wal-Mart.

Amazon.com competes with product specific retailers, online marketplaces, and mass merchandise retailers. This creates an environment of intense competition, and requires Amazon.com to differentiate itself uniquely based on the competitor. The above paragraphs explain Amazon.com's differentiation from physical retailers on selection, convenience, and online content. When compared to eBay, Amazon.com can differentiate itself on personalized and innovative content features as well as order delivery execution. Against Overstock.com, Amazon.com can differentiate itself based on online customer experience, delivery execution, and brand. These examples show the intensely complex and intermingled competitive environment in which Amazon.com resides.

4.3 Case Study Retail Industry Position Conclusion

This chapter has introduced the reader to both Wal-Mart and Amazon.com's relative positions in mass merchandising and internet retailing. Each company's financial leadership

positions, product variety, and different operating models are uncovered through exploring the financial data, products and services, and sales channels. This information is provided to provide industry and company context to understand how Wal-Mart and Amazon.com compete in their industry segments in preparation for the detailed supply chain information that is evaluated in Chapter Five.

5 Wal-Mart and Amazon.com Supply Chain Case Studies

The following chapter discusses Wal-Mart and Amazon.com's supply chains, focusing on a chosen product segment for each company. The goal of this chapter is to provide an in-depth analysis of the supply chain structure and practices of the two companies. To provide sufficient depth, this chapter focuses particular aspects of the supply chain, and not the entire supply chain of each company. The majority of the information, unless otherwise stated, was collected through interviews with industry experts, those that have worked or still work closely with Wal-Mart and Amazon.com, and through literature. No information was collected directly from an official Wal-Mart or Amazon.com representative.

5.1 Wal-Mart Supply Chain

When studying Wal-Mart's supply chain, we focus only on the Wal-Mart Discount Stores business units. This excludes SAM'S CLUB, walmart.com, Neighborhood Markets, and International stores. Because Wal-Mart is a large mass merchandiser, most of Wal-Mart products are products with high velocity and high demand. This part of the thesis covers the current different supply chain methods Wal-Mart uses for products with various characteristics. This paper specifically analyzes the Health and Beauty Care (HBC) product line. Further financial statistics specifically represent the HBC product segment, but some of the supply chain

processes that the HBC product segment follow are also used for the majority of other Wal-Mart Store product lines.

5.1.1 The Health and Beauty Aid Product Segment

According to the 2004 Wal-Mart 10-K Form, Health and Beauty Care accounted for 7% of total Wal-Mart revenues worldwide. In actual dollar amounts, HBC accounted for approximately $17,943 million in fiscal year 2004, and $17,116.68 and $15,245.93 in 2003 and 2002 respectively. Standard and Poor's Industry Survey on Household Nondurables for 2004 reports that personal care products are hair care, cosmetics, skin care, deodorants, and oral care products. Personal care products are products found in HBC areas of mass merchandise stores and drugstores. The top manufacturers of those products are Unilever, Proctor and Gamble, Colgate-Palmolive, and Gillette Co., all of whom supply to Wal-Mart. Vendors that supply HBC products are competitive through branding and pricing.

5.1.2 Key Competitors and Positioning Over Time

In 2003, DSN Retailing Today reported that Wal-Mart was the top retailer in the personal care segment, with Target in second (Prior, 2003). In the 1980's, mass merchandisers had 20% of the HBC market share, while supermarkets and drugstores possessed 40% each. Towards the end of 1990's the shift of market share lessened for both supermarkets and drugstores to 35% each, with 30% belonging to mass merchandisers. Mass merchandisers have been able to compete and grab market share through price competitiveness, variety, and shopping convenience for its customers ("Controlling the HBC Aisle", 1999).

The key competitors for Health and Beauty Care are confined to other mass merchandisers and drugstores mentioned by Standard and Poor's 2004 Household Nondurables Industry Survey. The top competitors for the HBC department for Wal-Mart are the HBC departments of Target, Kmart, CVS, and Walgreen's. It is difficult to report the actual revenue generated by HBC for the top competitors to Wal-Mart due to the fact that financial reports fail to report percentages of the HBC category of revenue. The only company that did have their product line segmented in their financial reports was CVS. As reported by the CVS 2004 10-K Form, the revenue generated by HBC for CVS in 2002, 2003, and 2004 were $1450.89, $1595.28, and $1527.47 million respectively. These revenues are significantly less than Wal-Mart's sales revenue for the product segment. Because of the volume generated by Wal-Mart, the sales by Wal-Mart in HBC are far above any of its competitors.

Drugstores have traditionally drawn in customers through their pharmacies in order to generate sales in other departments. With the addition of pharmacies in most Wal-Mart stores, this competitive advantage has deteriorated. Instead, drugstores have begun to compete on location. With drugstores being much smaller than Discount Stores, the number of drugstores in one region can be many times greater than the number of Wal-Mart stores in that region. For instance, in the state of Florida, there are 624 CVS retail outlets, in comparison to the 191 Wal-Mart retail outlets. While Wal-Mart emphasizes the convenience of one stop shopping, CVS and other drugstores emphasize the convenience of not having to travel far from home to pick up prescriptions and, if needed, HBC products. Nonetheless, drugstores are still losing market share to mass merchandisers like Wal-Mart.

With other mass merchandisers, specifically Kmart and Target, Wal-Mart's main competitive advantage is price. Target, which prices its products 10-15% higher than Wal-Mart

(Ghemawat, Mark, & Bradley, 2003), competes with Wal-Mart on product variety and quality. Because Target prices are higher, the quality and sometimes variety offered at Target is also higher. Target also invests in developing in-house HBC products that are designed by well-known designers, such as cosmetics by Sonia Kashuk (Hellar, 2004). As for Kmart, the attempt to compete with Wal-Mart in this area has been based on price alone. Competing on price with Wal-Mart in all areas, including HBC, has led Kmart into financial woes. Regardless of how these players compete with Wal-Mart, Wal-Mart generates an unmatchable level of volume and revenue.

5.1.3 Supply Chain Challenges

The supply chain challenges that Wal-Mart experiences are very similar to the ones mentioned previously in Chapter 3, which focus on challenges for most mass merchandisers. In order to understand the initiatives that Wal-Mart is performing in their supply chain to mitigate certain challenges, it is important to reiterate the challenges that are specific to Wal-Mart. According to interviews and literature, the major challenges that Wal-Mart faces are on-shelf availability at the retail outlets, improving collaboration between retailer and supplier, embedding an understanding of total supply chain costs into the merchandising organization, and cutting inventory and store replenishment costs by determining the best replenishment method for different product types.

Like many retail companies with storefronts, a main challenge is the necessity of having the right products on shelves at the right time and price. Because of the large product variety that Wal-Mart carries, it is not unusual for Wal-Mart carried products to be available in competitor stores. As mentioned in the Retailing Industry Overview, competition in mass

merchandising is very high through price and service. In order for on-shelf availability to be successful, the replenishment process, which starts with procurement and ends with shelf replenishment within the stores, must be well executed. Industry experts have stated that a high percentage of the total retailer distribution costs are associated with in-store replenishment of shelves after products have arrived at stores. A well executed replenishment process as well as accurate knowledge of inventory at the stores and in the supply chain are important to ensuring on-shelf availability.

Another challenge for Wal-Mart is engaging in collaborative efforts with their suppliers. The Associated Press reports that Wal-Mart had over 20,000 vendors supplying its DC and retail outlets in 2003 (D'Innocenzio, 2003). Ensuring that all vendors are providing products demanded at the lowest price takes cooperation between Wal-Mart and their vendors. Because of the differences in vendor company size and product sales volume, the level of collaborative effort is different for each relationship. Balance in the necessary roles for both parties is a challenge for Wal-Mart and its suppliers.

Educating the organization on supply chain fundamentals and total net landed cost structures for all products is another challenge that Wal-Mart faces. With a large number of suppliers, products, and retail outlets to maintain, it is critical and difficult for the merchandising organization to understand the supply chain effects of every decision. Spreading this knowledge through supply chain experts is an action that Wal-Mart has to take to enable more intelligent choices for decision-makers in the company.

Because of the large supply chain network that Wal-Mart has to maintain, finding the best process to replenish stores with goods demanded by consumers is a major challenge. In order to ensure the EDLP business strategy, distribution costs must be as low as possible. On the

other hand, because of high competition, products must be readily available when demanded at the store level. Accomplishing cost-effective high service levels is an integral part of Wal-Mart's success. In response to this challenge, Wal-Mart is able to leverage its size and distribution network to accomplish both tasks through differentiated processes based on product and demand profiles.

5.1.4 Supply Chain Network Overview

Wal-Mart has both retail outlets and distribution centers that make up its supply chain network. Focusing solely on Discount Stores in the US, Wal-Mart operates 1478 stores in all 50 States. Wal-Mart's total supply chain network has 90 distribution centers (DC) total, with each holding particular product segments and product types. According to the Wal-Mart Annual Report, the following is a list of the number of stores located in each state as of 2004.

Table 5-1

Discount Stores in US			
Alabama	27	Montana	5
Alaska	6	Nebraska	9
Arizona	21	Nevada	10
Arkansas	31	New Hampshire	19
California	143	New Jersey	34
Colorado	16	New Mexico	4
Connecticut	27	New York	54
Delaware	3	North Carolina	43
Florida	59	North Dakota	8
Georgia	37	Ohio	74
Hawaii	6	Oklahoma	37
Idaho	3	Oregon	21
Illinois	79	Pennsylvania	52
Indiana	38	Rhone Island	7
Iowa	23	South Carolina	18
Kansas	26	South Dakota	6
Kentucky	30	Tennessee	26
Louisiana	31	Texas	102
Maine	12	Utah	5
Maryland	34	Vermont	4
Massachusetts	40	Virginia	22
Michigan	49	Washinton	23
Minnesota	33	West Virginia	8
Mississippi	18	Winconsin	41
Missouri	52	Wyoming	2

Source: Wal-Mart 2004 Annual Report

According the Wal-Mart 2004 10-K Form, the number of DCs for different product groups is shown below.

Table 5-2

General Merchandise	**34**
Grocery	**30**
Specialty	**15**
Clothing	**7**
Imports	**3**
Walmart.com	**1**

Source: Wal-Mart 2004 10-K From

Since Discount Stores generally do not carry grocery, and one DC is dedicated to walmart.com's replenishment process, only 59 of the 90 DC's are used for replenishing Discount Stores. Supercenters, which are very similar to the Discount Stores, are also replenished by these

DCs, but because of their full line of groceries sold, they are also replenished by the other 30 Grocery DCs.

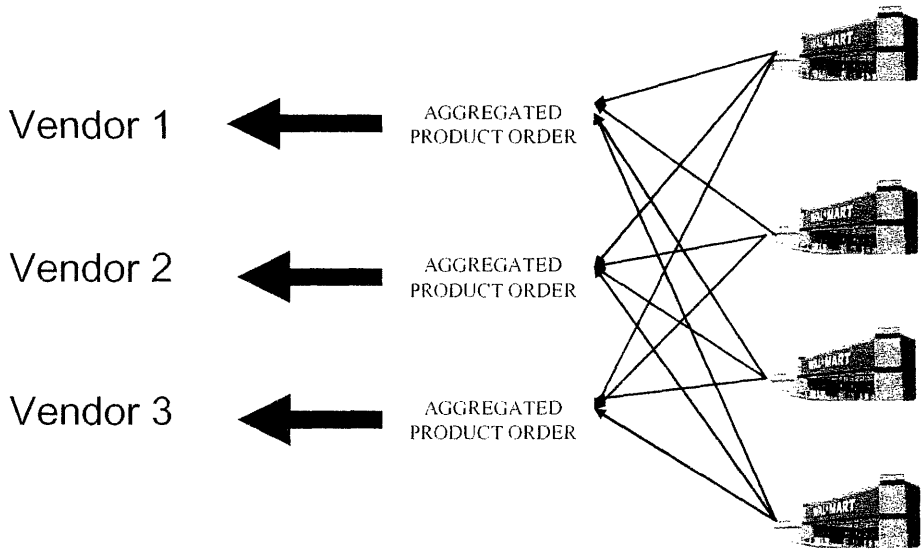
In Wal-Mart's supply chain network, DCs perform two functions. One of its functions is to be a warehouse, in order to store products near retail stores for quick and flexible store replenishment. The other function is to serve as a crossdocking facility where products flow through to stores without being warehoused. The DCs and stores operate on a hub-and-spoke system; therefore, the shipments made to stores from the DC are relatively short, usually less than a day drive. Two factors are taken into consideration when deciding when and where to develop a DC facility. These factors are an analysis of Wal-Mart store demand in the proposed DC service area and the cost of the outbound distribution to the stores, in comparison to other DCs that could replenish the area. The inbound cost to the DCs from vendors is not considered in the decision.

5.1.5 High-Level Vendor Replenishment Process

Figure 3.8 in Chapter 3 depicts the flow of products and information in a traditional retail supply chain, with the products flowing from the vendor, to the retailer DC, and finally to the retail outlet itself. Consumers interact with retailers at the retail store, which ultimately results in products being sold. Information flows from the retailer to both the retailer DC and the vendor in order to convey the trends and inventory status for replenishment.

Wal-Mart's supply chain flow of products and information is done in a similar manner. The figure below depicts the flow of order information between Wal-Mart stores to vendors.

Figure 5-1 Wal-Mart to Vendor Ordering Process Information Flow

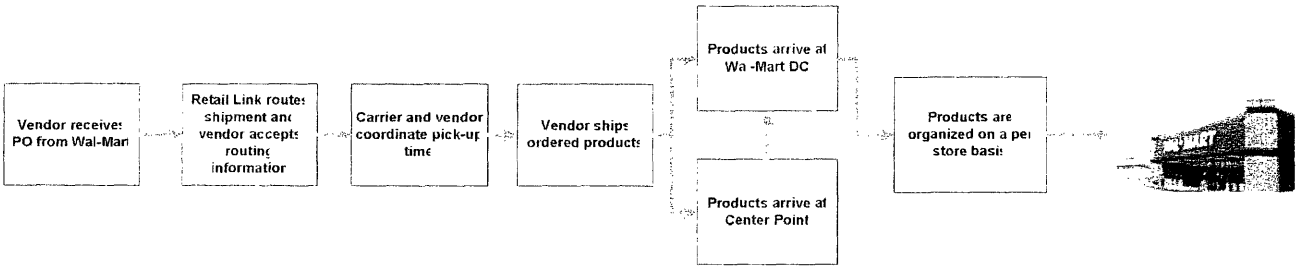


Source: Industry Experts

A system called Inforem automatically determines order quantities for suppliers to replenish Wal-Mart. This system is discussed in detail in the technology portion of the Wal-Mart supply chain case study. Product orders for each store and each vendor are aggregated and sent to vendors. The consolidation of orders is used to take advantage of economies of scale and lower transportation costs. Vendors get to take advantage of risk pooling, since they only need to forecast aggregated store demand instead of individual store demand.

The following figure is a general overview of the flow of products from vendor to Wal-Mart stores.

Figure 5-2 Wal-Mart Replenishment Process Overview



Source: Industry Experts

The diagram begins with the Wal-Mart vendor receiving an order from Wal-Mart for a certain amount of products. Some products that are ordered at this point are dedicated to certain stores and will be delivered to those stores when they reach the DC. If they are not dedicated then the products will be stored in the DC until they are needed to replenish stores. After an order is received, Retail Link, Wal-Mart's supply chain visibility tool, will take the ship point information and determine a routing schedule based on cost. The ship point is the point of origin from which the vendor is expected to ship the products to a Wal-Mart DC. Generally, Wal-Mart would like vendors to use common ship points for DCs to keep transportation costs low and ensure that products arrive at the same time. Retail Link also determines which type of carrier will be used for the shipment. Approximately 50% of shipments from vendors to Wal-Mart are made by common carriers and the other 50% is made by Wal-Mart's own private fleet. The vendor works with the carrier to coordinate the actual date and time for pick up. The carrier delivers the product to three possible destination types: distribution centers, center points or directly to stores. The diagram above shows the process that goes through Wal-Mart DCs and not directly to stores. According to Wal-Mart's 10-K Form, 20% of shipments are made directly from vendors to Wal-Mart Stores and 80% of store replenishments go through the DC process. If products are shipped to DCs, the two possible destinations are either to a Wal-Mart DC or to pure crossdock facility, called center points. Center points are facilities that deconsolidate full truck loads from vendors and aggregate those products with products from other vendors for outbound distribution to Wal-Mart DCs. This is done to lower transportation costs through achieving scale on inbound and outbound transportation through the center point. From the DC, products are then sent to Wal-Mart stores. The three types of replenishment processes that Wal-Mart utilizes are explained in more detail in the following section.

5.1.6 Replenishment Processes – Warehouse, Assembly, Direct-to-Store

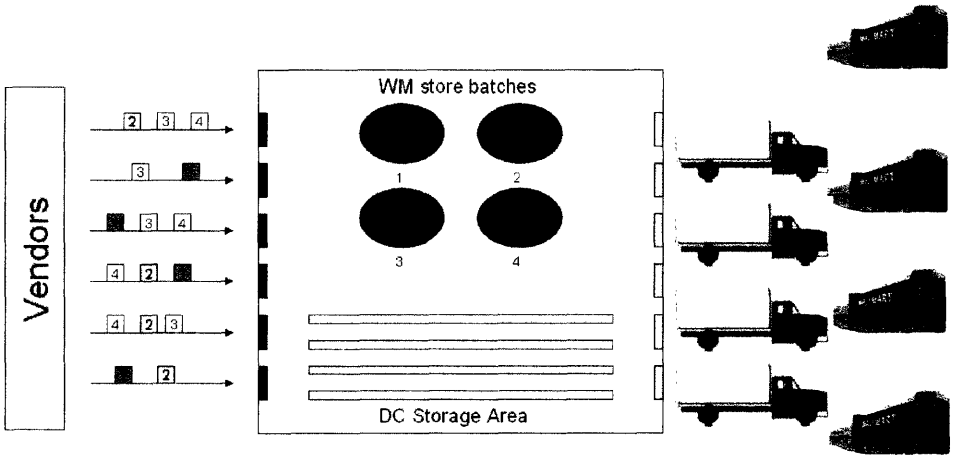
Although there is a general flow of products from vendor to retail store, Wal-Mart employs process differentiation to find the appropriate method for moving products with different profiles and demand characteristics through the supply chain. There are three possible processes that are used to flow products through the supply chain. The three processes are warehouse, assembly, or direct-to-store replenishment processes.

Warehouse Replenishment Process

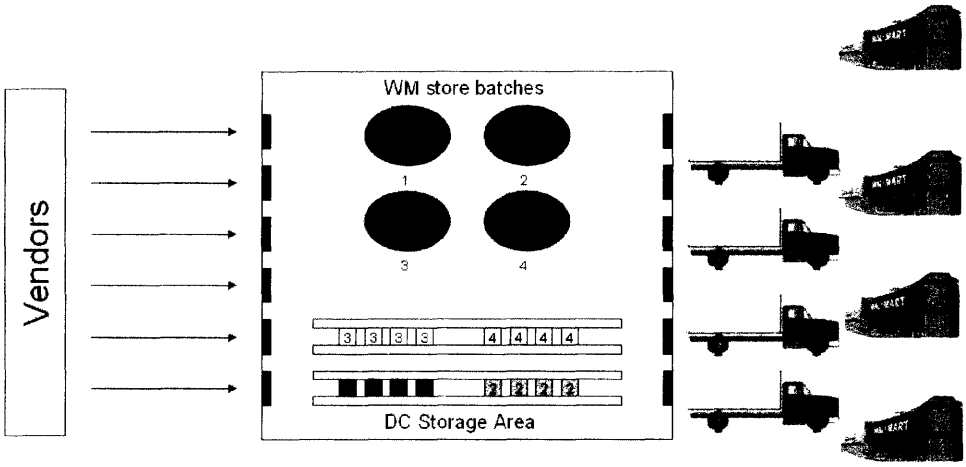
In the warehouse replenishment process, products are first stored at the warehouse level and then distributed to different retail stores. The terms distribution center and warehouse are used interchangeably here. This process is considered to be the traditional method of distribution in retailing. The following diagram shows the process in which products go through the DC and out to retail outlets. When products go through this replenishment process, they are generally ordered in order to restock the DC, not the store.

Figure 5-3 Wal-Mart Warehouse Replenishment Process

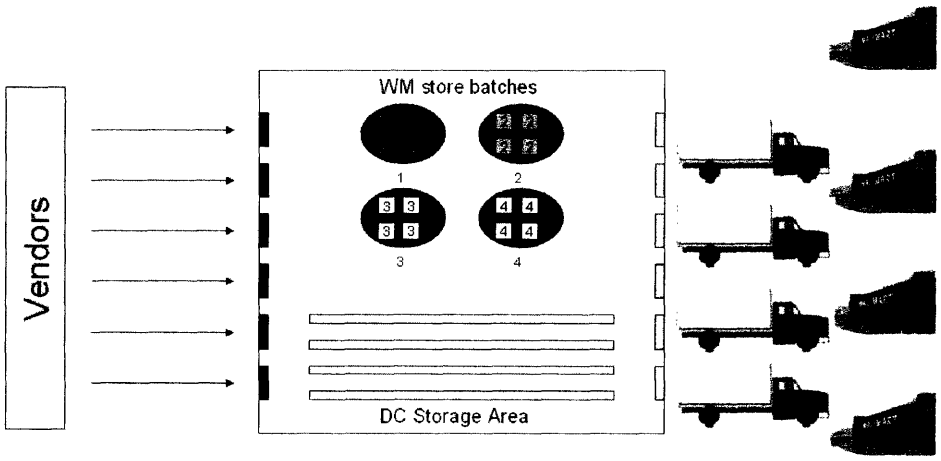
Event 1: Products are shipped from vendor to DC



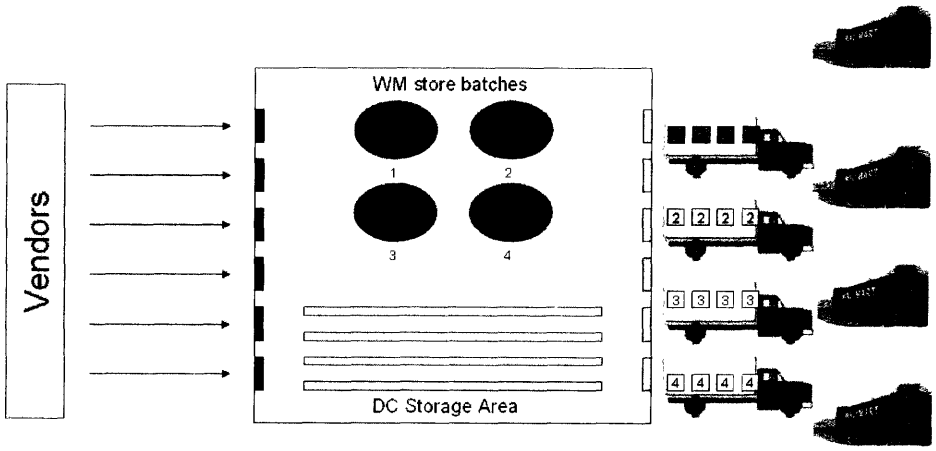
Event 2: Products are stored in the DC storage area



Event 3: Product is batched by retail store



Event 4: Products are shipped out by retail store



Source: Industry Experts

When products reach the DC, they are stored in inventory until they are needed at the stores. If the products are needed at the stores, they are then batched by store and delivered using the Wal-Mart private fleet.

The types of products that go through the warehouse replenishment process are products that are in high demand and have high margins. In other words, on-shelf availability for these products is very important to Wal-Mart. By keeping the products closer to the retail stores at the DC, Wal-Mart can ensure that products will be readily available for store replenishment. There

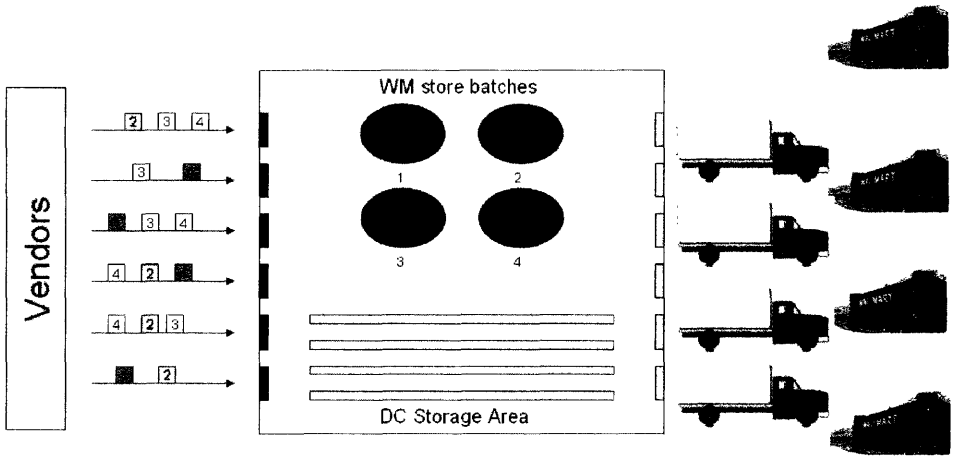
continues to be a push for moving products more quickly through the supply chain and lowering inventory levels. A paradigm shift in how products flow through the supply chain is discussed in the Supply Chain Initiatives portion of this chapter.

Assembly Replenishment Process

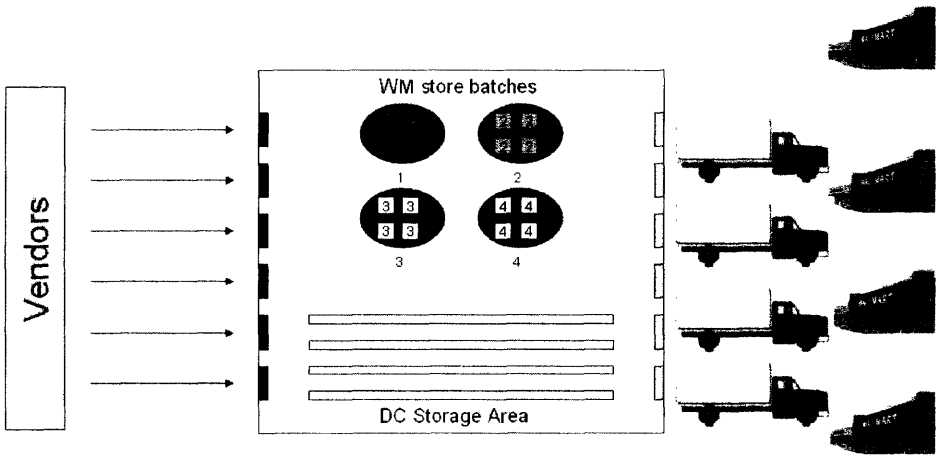
In the assembly replenishment process, products flow through the supply chain via a modified form of crossdocking. Products arrive at the DC pre-allocated for specific stores and are batched for delivery to those stores. The following is a diagram of the events that occur in an assembly replenishment process. In this case, the numbers in the boxes in the diagram matter. They represent the store number to which products are dedicated before they even reach the DC.

Figure 5-4 Wal-Mart Assembly Replenishment Process

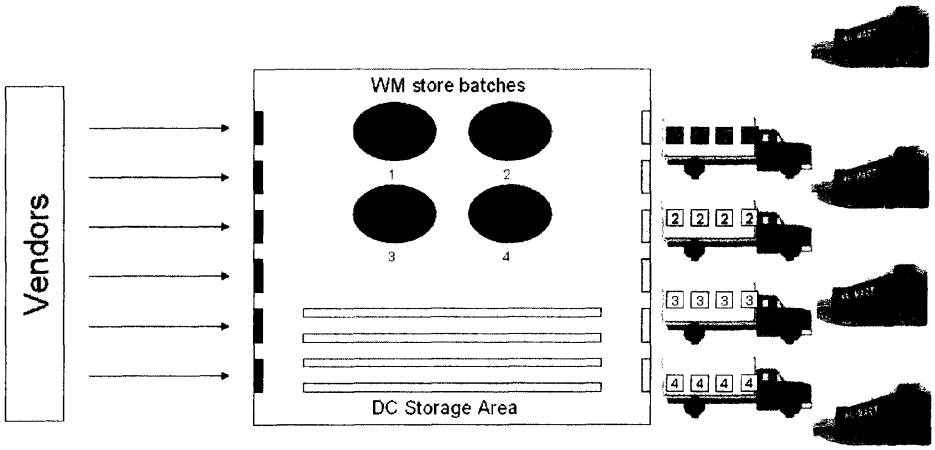
Event 1: Products are shipped from vendor to DC



Event 2: Product are batched by retail store



Event 3: Products are shipped out by retail store



Source: Industry Experts

By skipping the inventory storage portion of the supply chain, the products that flow through the DC move at a quicker velocity through the supply chain. When the SKUs arrive at the DC, they are consolidated in the batch area and sent directly to stores. Most products going through this process do not stay in the DC for more than 24 hours. The product types that flow through the assembly replenishment process are products that are not highly demanded with low price margins. With these characteristics, there is no need for a high safety stock level or a need to store a staple stock of this inventory in the DC. Again, the characteristics of the products that

should flow through this replenishment process are changing which is discussed in the Supply Chain Initiatives portion of the chapter.

Direct-to-Store

The last replenishment process for Wal-Mart stores is shipments directly from vendors to stores. Products that are shipped directly from vendors are done so for various reasons. Generally, the products that flow through this type of replenishment process are products that are not easy to store and are highly demanded. An example given through interviews with various industry experts was dog food. Dog food packages present fulfillment challenges because they are large, bulky, and attract rodents due to their contents. Because of these reasons and the fact that dog food is a highly demanded product with limited shelf space, retailers found it best if vendors manufactured and stored these items in their facilities and shipped them directly to the stores. This allows Wal-Mart to not waste DC storage space on such large packages and permits high velocity product to flow through the supply chain directly to retail outlets. As mentioned earlier, 20% of products are shipped in this manner. In order for this process to be successful, Wal-Mart and its vendors must collaborate intimately with one another to ensure that all Wal-Mart stores are stocked to meet customer demand.

5.1.7 Store Level Processes

Various industry experts mentioned that a large percentage of Wal-Mart's overall distribution costs are incurred in replenishing products from the backroom of the store to the shelves. The high costs of shelf replenishment drive Wal-Mart to focus on the methods described below to help maintain or reduce store level costs. Generally, Wal-Mart stores are very simple in their display of products. The shelves are generally uniform, and therefore the

cost of restocking is kept lower due to low complexity. In their case report for the Harvard Business School, Ghemawat, Mark, and Bradley (2003) state that in 2002, Wal-Mart's shrinkage was lower than competitors and store level replenishment was observed to be better executed than competitors. It was also mentioned that this level of success at the store level was possible due to the autonomy of store managers and incentives for them to keep costs low and productivity high.

Wal-Mart is also successful in stores due to Sam Walton's encouragement to endorse the products that generate high volumes. The key challenge is the identification of products and prices that cause large amounts of volume be generated (Arnold and Fernie, 2000). An in-store promotion of Suave shampoo is an example in the HBC product line. With the low price and the promotional location of the product, Wal-Mart encourages consumers to overlook brand and buy products according to price and promotion instead (Prior, 2003). Vendors benefit through high volume, even though their selling price to Wal-Mart may be lower than with other retailers.

5.1.8 Wal-Mart and Technology

Wal-Mart leverages technology to help support their supply chain and business strategy of EDLP. Wal-Mart utilizes an in-house developed supply chain visibility tool called Retail Link to facilitate communication and collaboration with supply chain partners. According to Arnold and Fernie (2000), Wal-Mart invested approximately $4 billion in developing this program. The three major functions of Retail Link are to store data, to share data with vendors, and to aid in shipment routing assignments. Suppliers are given large amounts of raw data concerning their product sales in Wal-Mart Stores. Retail Link provides data such as point of sale data, average price, current inventory by store, and current on order quantity. The information

can be viewed by day, by week, by store, or in any other combination, by day, by Discount Store, and by SKU. The information can be downloaded into the vendor's data managing system and manipulated and analyzed in any way that would aid the vendor in managing its own products. The main reason why Wal-Mart provides such detailed amounts of data to its vendors is because they believe that with this data, vendors can make their supply chain more efficient, which will in turn improve their service to Wal-Mart while lowering Wal-Mart's costs. From Wal-Mart's perspective, service can be improved by vendor anticipation of Wal-Mart order quantities through the exploitation of data in Retail Link. Retail Link makes collaborative efforts such as vendor-managed inventory and co-managed inventory are possible, which are further discussed later in the chapter.

Wal-Mart uses a system called Inforem to automate their replenishment process for their retail stores. Inforem is a system originally developed by IBM that has been heavily modified by Wal-Mart to suit its specific business processes. According to a user of Inforem in the retail industry, there are two important variables that are taken into consideration when making inventory decisions. The two variables are the point of sale data as well as the amount of inventory on hand. Taking these two factors along with trends and demand and supply variability, Inforem makes decisions on when to order and how much inventory to order ("Flow-through DC", 1995). According to industry experts that have used Wal-Mart's version of Inforem, SKU shelf space, economic order quantity, and SKU pack size are other factors taken into consideration when making replenishment decisions. An order quantity for each stock keeping unit (SKU) in each Discount Store is automatically determined by Inforem. Inforem makes order quantity recommendations multiple times a week. Managers within the store have

the ability to override the order quantity, but it is not typically done. Overall, Inforem allows the replenishment process to be more accurate with less human intervention.

Inforem and Retail Link provide examples of how Wal-Mart utilizes IT applications to help support their business practices. However, it is Wal-Mart's early adoption and extensive use of barcode technology that enables Wal-Mart's flow-through supply chain processes. The IT applications include business rules to facilitate communication and provide direction to supply chain partners. Barcode technology ensures real-time, accurate data capture and product visibility throughout Wal-Mart's supply chain as product flows from vendors through distribution centers, centerpoints, and onto retail stores. Wal-Mart is currently driving the adoption of RFID technology through supplier mandates and operational process redesign. RFID promises to be the next generation of barcode technology to provide automated data capture to further streamline Wal-Mart's processes and vendor compliance initiatives.

These examples illustrate Wal-Mart's use of technology to gather, process, and analyze information to support efficient supply chain processes and vendor collaboration to help keep supply chain costs low to support their EDLP strategy.

5.1.9 Vendor and Retailer Collaboration

Wal-Mart works with its vendors to ensure that they have the information they need to make their supply chain decisions. The information is given in a raw form and must be manipulated and analyzed in order to make it beneficial. Nonetheless, the data is readily available through Retail Link. Wal-Mart expects its vendors to continuously improve the efficiency of their supply chain to cut costs that can then be passed on to Wal-Mart and its

consumers through lower prices. The Everyday Low Price strategy is the driver behind this effort.

With the large amount of vendors, some level of collaboration is needed between each vendor and Wal-Mart to ensure that shelves are readily stocked. The level of collaboration for each vendor is different, depending on the volume and value of products they sell to Wal-Mart. The level also depends on the amount of capital vendors have to invest in building a collaborative relationship with Wal-Mart. Larger vendors are more inclined to invest employees as well as technology to exploit the information shared by Wal-Mart. Some larger suppliers have even opened offices in Bentonville, AR to be near Wal-Mart's headquarters and strengthen communication efforts. As seen in Table 4.4 in the previous chapter, some of the top HBC suppliers have a large percentage of sales dedicated to Wal-Mart. Gillette, a major supplier for Wal-Mart of HBC products, revealed that it employs up to ten analysts dedicated to monitoring and analyzing data provided by Retail Link. With so much inventory and money tied into Wal-Mart, the incentive to make Wal-Mart profitable is pushed back to the suppliers. The level of collaboration is very low for other vendors who do not have the capital to invest in allocating resources to build stronger ties with Wal-Mart or to exploit data provided by Retail Link. Some suppliers instead rely on third parties to aid in analyzing Retail Link data to maintain and support their relationship with Wal-Mart.

Another trend that is developing is Wal-Mart pushing more responsibilities on to their suppliers, as identified through interviews conducted with various industry experts as well as those closely associated with Wal-Mart. This is seen through vendor-managed inventory (VMI), co-managed inventory (CMI), and radio frequency identification (RFID) initiatives. Wal-Mart's relationship with Proctor and Gamble is a well-documented example of deep collaborative

efforts between supplier and retailer, through both vendor-managed inventory and RFID compliance initiatives.

As mentioned in Chapter 1, VMI is a process where the responsibility of replenishing and managing inventory at the retailer level is performed by the vendor. For the most part, vendors who participate in VMI with Wal-Mart do so at the DC level. Products are ordered and replenished at the DC by the vendor. Vendors use the demand data provided as well as coordination with Wal-Mart to manage the inventory. The vendor should be able to accurately forecast and supply products at a level which avoids stockouts but also minimizes holding inventory costs. The benefits of VMI were mentioned in Chapter 1. Very few vendors actually replenish the shelves at the store level. Instead, vendors perform store level maintenance that improve and maintain of the appearance of their products at the retail outlets. Also at the store level, Ghemawat, Mark, and Bradley (2003) indicate that suppliers also help in planning store product displays based on statistical data and individual store characteristics. This program is known as the Modular Category Assortment Planning System. These interactions at the store level do not affect the product ordering process.

Wal-Mart and its vendors are shifting from Vendor Managed Inventory to Co-Managed Inventory (CMI). Wal-Mart is driving this shift to obtain more control over its replenishment process, due to concerns regarding suppliers ordering to their advantage. Because most VMI initiatives are not consignment inventory, and thus vendors are paid when they deliver the inventory to Wal-Mart, vendors were ordering to their advantage in certain scenarios. As a result, Wal-Mart was forced to carry more inventory or push these products onto the store shelves in order to release DC storage space. Blatherwick (1998) speaks of CMI as a collaborative effort that still allows suppliers to monitor their own inventory but the level of

control the retailer has over the DC replenishment is higher. Like VMI, CMI is successful only if retailers understand that consistent ordering and open communication through data and strategic discussions are involved. This does not mean that all vendors who formerly practiced VMI with Wal-Mart will now shift to CMI, but it does indicate that those who are not managing their inventory to Wal-Mart's benefit will lose the freedom and privilege to do so in the future. With retailers that are knowledgeable about supply chain and with technology that enables communication, CMI is a successful collaborative relationship for some vendors.

Finally, the RFID initiative is a major collaborative effort between Wal-Mart and vendors that has caused much hype in retail and other industries. RFID promises to provide supply chain visibility, security, and cost improvements. At this time, it is pre-mature to state whether Wal-Mart or its suppliers will realize significant value from RFID, as the mandate to vendors to use RFID tags just recently passed in January of 2005. However, after speaking with Gillette about the implementation of RFID in parts of their supply chain, Gillette indicated that they have already seen some benefits from the RFID implementation. Although tags were only used at the case level, the two benefits were in monitoring promotional activity at the store level as well as handling freight claims. To further explain the second benefit, freight claim disputes were hard to settle in situations where the vendor reported that the products were sent and the retailer said that the product was never received. With RFID tags, the reader tells both parties if the product case left the vendor's facility and if it entered the retailer's facility. These are just small examples of how RFID has shown potential value in the Wal-Mart supply chain.

5.1.10 Supply Chain Organization

This section explains how Wal-Mart embeds supply chain management knowledge in its organization. An important part of providing the right products at the store level is first to procure the products that will sell. As learned through interviews, Wal-Mart's organizational structure promotes a procurement process that incorporates supply chain personnel. Although the entire structure is unknown, there are key groups within the organization that enable Wal-Mart's supply chain success. Like other mass merchandisers, there is an organization that is responsible for improving and maintaining the supply chain. The size and therefore the complexity of Wal-Mart's supply chain is greater than other mass merchandisers, due to its large sales volume. Through interviews with those that have worked with Wal-Mart, the supply chain group includes warehousing, transportation, and staff and DC planning. Within staff and DC planning, long-term supply chain strategies are developed. Additionally, a group known as the merchandise logistics managers (MLM) is found within this segment. They are a key group responsible for educating decision-makers within the organization of the importance of supply chain knowledge. A major group of decision-makers are the merchandise buyers. Traditionally, buyers are expected to procure products based on predicted consumer demand at Wal-Mart stores. Buyers are now expected to understand the total net landed costs associated with the products they decide to buy. The MLM group enables educated procurement by buyers. The MLM group is just one example of the importance Wal-Mart puts on supply chain knowledge in the organization. Additionally, Wal-Mart also has a Global Sourcing Group that discovers potential suppliers and negotiates with low cost international suppliers. Together, the Global Sourcing Group and buyers select low cost suppliers and products to sell in Wal-Mart stores. In summary, Wal-Mart has a supply chain organization that covers traditional supply chain

management functions such as transportation and warehousing. However, Wal-Mart has recognized the importance of supply chain knowledge in the supplier selection and product procurement processes and has built an organization to instill supply chain management knowledge in those areas as well.

5.1.11 Wal-Mart Transportation

Wal-Mart maintains the largest private trucking fleet in the United States. Because of the volume that flows through their supply chain network, the private fleet is used in order to provide transportation cost savings. Inbound transportation, which is shipment from vendor to Wal-Mart, is done by both common carriers as well as Wal-Mart's private fleet. A Harvard Business School case by Ghemawat, Mark, and Bradley (2003) indicate that Wal-Mart also utilizes its private fleet to perform backhauls from store deliveries. In backhaul scenarios, the private fleet picks up products from vendors to replenish DCs or drop-off returned products to vendors. The private fleet is mostly used for short-hauls, which are routes that can be serviced within a working day. Long-hauls are typically performed by other carriers due to US driving regulations. Excluding groceries, the Wal-Mart private fleet is used for all distribution from distribution centers to Wal-Mart stores.

5.1.12 Supply Chain Initiatives

With the reputation of always aiming for supply chain cost reduction in support of its EDLP strategy, Wal-Mart is continuously launching supply chain initiatives and transformations. Wal-Mart is able to initiate new supply chain practices due to human resource expertise, monetary funds available for carrying out projects, and the power Wal-Mart has over its

suppliers to facilitate compliance. Because no first-hand interviews were done with current Wal-Mart associates, the supply chain initiatives mentioned may have already been implemented or abandoned since this research was done. The major supply chain initiatives discovered through interviews are applying the pick-to-pallet process to discount stores, implementing post-receipt allocation for outbound distribution process, and changing the flow of replenishment based on different product characteristics.

Pick to pallet is a replenishment concept used for Wal-Mart's perishable goods. At the grocery DCs, which replenish the Neighborhood Markets and Supercenter retail outlets, products are picked specifically for an outlet aisle. Each pallet that is delivered to a retail outlet contains items that belong to one aisle. When the pallets are received at the stores, they are then moved directly to the appropriate aisle to be replenished. From interviews with industry experts, Wal-Mart is hoping to replenish their general merchandise discount stores in the same manner. The tradeoff is that in distribution center efficiencies are forsaken and costs increase, with respect to DC automation and economies of scale. However, this process decreases replenishment costs at the store level by increasing restocking efficiencies. When products are received and replenished by aisle, they are less likely to get lost in storage, which is a contributing factor in the high supply chain costs at the store level.

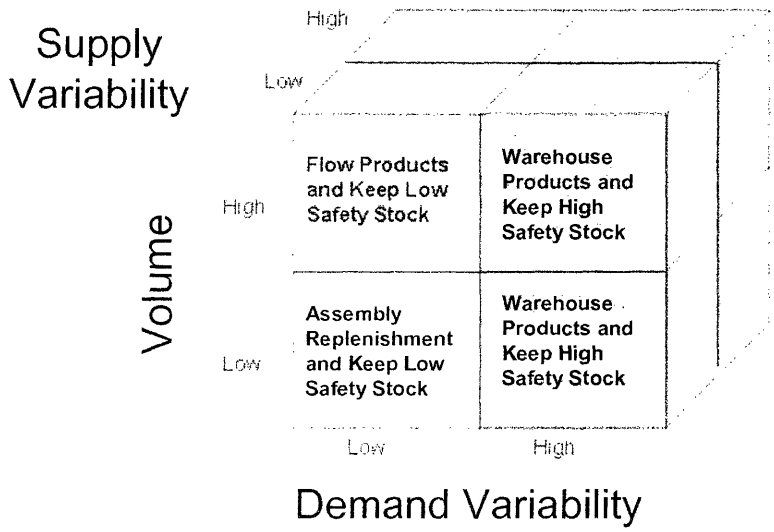
Post-receipt allocation is another Wal-Mart supply chain initiative. In the current assembly process, Wal-Mart orders an aggregate amount of products from vendors across a number of stores. At a disaggregated level, the store level order quantities are dedicated to those stores. Products are received by the truckload or less-than-truckload at the DC level and then sorted by batching for each store. When products are received at the DC for batching, the sorters already know which SKUs are going to which stores. In post-receipt allocation, SKUs are not

dedicated until they have been received into the DC. When products for each store are ordered and aggregated for vendors, a general volume per DC is calculated. When the products are sent from the vendors to the DC, the amount of each SKU that will go to which store is not hard-allocated to the store. It is not until the products are received and an analysis is done as to where the SKUs are needed most, that the products are batched for outbound distribution to stores. Thus post-receipt allocation is a form of postponement that increases supply chain flexibility. Because product allocation for stores is postponed until product is received at the DC, Wal-Mart is able to respond to consumer demand more readily. For example, currently if two Wal-Mart stores each order two pallets of shampoo, the order is placed for the aggregate amount of four pallets. When the four pallets arrive at the DC in the assembly process, two pallets are dedicated to Store #1 and two pallets are dedicated to Store #2. If demand changes over the lead time and Store #1 needs three pallets when the product arrives and Store #2 needs one, under the current process each store will still receive two pallets. With post-receipt allocation, Wal-Mart will be able to incorporate supply chain flexibility through postponement. An order for four pallets will still be made. However, that product is only soft-allocated, and can be reallocated out to stores upon receipt. In this way Store #1 will get three pallets and Store #2 will receive one pallet. This ensures the proper distribution of inventory while providing improved service.

The last supply chain initiative mentioned in interviews is a shift in the product flow according to product and demand profiles. Currently, high margin and highly demanded products are stored in the DC in order to ensure a low stockout percentage. Wal-Mart is attempting to shift the process for products that have high volumes but low demand and supply variability. These products with variable but predictable demand are candidates for flow-through processes, which can reduce inventory. The following is a graphical representation of the

replenishment flow for the different product types depending on volume, supply variability, and demand variability.

Figure 5-5 Process Differentiation Based on Product Characteristics



The yellow portion of the cube represents products with high volume levels and low demand and supply variability. Products with these characteristics would flow through DCs in a crossdocking process. There should be very little safety stock for these products. The products in the green portion are products that are low in volume, demand variability, and supply variability. These products may flow through the system at a lower velocity but in a very similar manner. Using the assembly replenishment process products are able to flow through the supply chain less frequently, but still avoid being stored at the DC. These products should have a low safety stock due to low demand and supply predictability. Any product with high demand and supply variability should be warehoused to mitigate stockouts. By shifting the replenishment processes based on these characteristics, the overall level of safety stock and inventory in the system will be reduced. Under this new paradigm, most of the products that are high in volume, which is the general characteristic for Wal-Mart products, will theoretically continuously flow into the stores at a frequent rate.

The supply chain initiatives that Wal-Mart is considering support the EDLP business strategy. Every initiative that Wal-Mart takes is either aimed at lowering cost, improving service, or both. Wal-Mart has many advantages over its competitors, and the supply chain initiatives that they have been implementing or will be implementing continue to widen the gap of supply chain excellence between Wal-Mart and its competitors.

5.2 Amazon.com Supply Chain

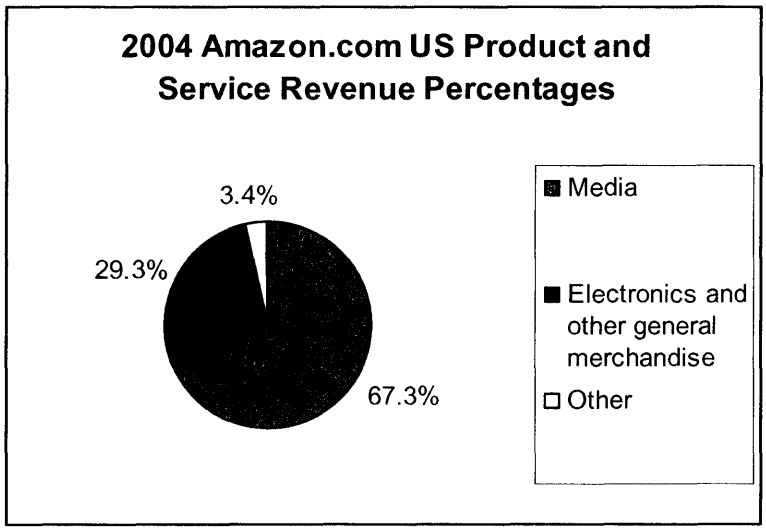
This area of the paper focuses on Amazon.com's supply chain and how it supports their business in the internet retailing environment. First, it discusses Amazon.com's different operating models and explains the different supply chains that support those business models. After the business and supply chain models are defined in detail, this section documents Amazon.com's supply chain network, inventory segmentation strategies, order sourcing decisions, overall replenishment and fulfillment process flows, intra-warehouse process flows, and transportation policies. This paper analyzes the overall Amazon.com supply chain for United States distribution with a specific emphasis on the Media product segment.

5.2.1 Amazon.com US Retail Product Segment

Books, CDs, and DVDs and magazine subscriptions comprise the media product line at Amazon.com (Amazon.com 2002 Annual Report). Amazon.com began as an online bookseller and its first product line expansions were music and movies. As a result, the Media segment comprises a large percentage of Amazon.com overall revenues. In 2004, Media accounts for 74% of all revenues. Within the US, the Media segment accounts for 67% of all revenues. In dollar terms, the Media segment in the US generated $2.6 billion in revenue in 2004, compared

to $3.8 billion generated across all segments in the US (Amazon.com 2004 10-K Report). The pie chart below shows the breakout of revenue percentages by product and service segment.

Figure 5-6



Source: Amazon.com 2004 10-K Report

Amazon.com does not provide margin numbers by product segment, so the Media contribution to profit is unknown. JP Morgan estimates that Amazon.com gets 25% gross margins for books and media and 15% for electronics ("US Equity Research: Amazon.com", 2005). Additionally, data regarding important financial metrics such as inventory turnover, free cash flow, and fulfillment costs are not segmented by product type.

5.2.2 Media Segment - Positioning Against Competitors over Time

An in-depth analysis of Amazon.com and its main multi-channel and internet retail competitors is performed in Chapter Four of this paper. This section will elaborate and clarify Amazon.com's competitive strategy within the media segment. Amazon.com competes with product focused retailers, online marketplaces, and mass merchandise retailers in the media segment.

Barnes & Noble, Inc. and Borders, Inc. are both retailers that focus primarily on the products that comprise Amazon.com's media segment. In revenue terms, Amazon.com is now larger than both Barnes & Noble and Borders. Amazon.com's revenues in 2004 were $6.9 billion compared to Barnes & Noble's $4.9 billion and Borders' $3.9 billion ("Amazon.com Competitive Landscape", 2005). An analysis of fiscal years 2002-2004 shows that Amazon.com has a 36-month revenue growth percentage of 30.7% compared to Barnes & Noble's 1.3% and Borders' 5.0% ("Amazon.com Competitive Landscape", 2005). Amazon.com competes against these companies' physical stores on selection, convenience, and customer experience while remaining price competitive.

As discussed in the competition area of Chapter 4, Amazon.com also has pure-play competitors within the internet environment. eBay, Inc. is a major competitor to Amazon.com in the internet retailing space as well as in the media segment. Amazon.com and eBay offer nearly unlimited selection, convenience, and superior customer experiences. Amazon.com can differentiate itself from eBay on innovative features and content as well as service guarantees and logistics execution. Another competitor mentioned in Chapter 4 is Overstock.com, which aggressively targets Amazon.com's media segment. Amazon.com can differentiate itself from Overstock.com on brand, customer shopping experience, post-sales customer service, and logistics execution.

Finally, Wal-Mart is a competitor to Amazon.com. Although Wal-Mart does not specifically segment revenues by media, Wal-Mart's $256 billion 2004 annual revenue makes it a formidable competitor to Amazon.com as it offers books, CDs, and DVDs focusing primarily on bestsellers. Amazon.com's differentiation against Wal-Mart in the media channel is selection, convenience, and online content. Amazon.com offers a larger product selection

through its own inventory and network of sellers than Wal-Mart. Furthermore, it offers product reviews and personalized storefronts to customers, which no physical retailer can offer.

This analysis of the competitive landscape in the media product segment shows that Amazon.com competes with product specific retailers, online marketplaces, and mass merchandise retailers. Depending on the type of competitor, Amazon.com differentiates itself on different fronts. Many of the differentiating aspects are supply chain related. For example, the selection that Amazon.com is able to offer requires a supply chain that can support the effective location and delivery of millions of stock keeping units (SKUs) without excess inventory costs. Furthermore, accurate, on-time, cost-effective order fulfillment and transportation are key to the service that Amazon.com can offer to differentiate itself from online competitors.

5.2.3 Amazon.com Supply Chain Challenges and Opportunities

Amazon.com has overcome a number of supply chain challenges as a pioneer in internet retailing. Although significant progress has been made, a number of challenges remain in supply chain design, inventory segmentation, order sourcing, fulfillment, and transportation.

Supply Chain Design

Deciding on the number and location of Amazon.com distribution centers (DCs) to support a seasonal and growing business is a challenge for Amazon.com. Amazon.com over-expanded in 1999 and eventually had to eliminate DCs in Seattle, WA and McDonough, GA to cut costs. The amount of internal distribution center growth that should occur based on capacity, seasonality, and the evolving business model is both a challenge and an opportunity. Also, based on the ever expanding product line at Amazon.com the decision of which items to store in which warehouse, and how best to design warehouses for different product types is a challenge.

Inventory Segmentation and Policy

Amazon.com is able to deliver orders directly to customers from inventory that is not kept at its distribution centers through partnerships with distributors, publishers, manufacturers, and other partners. Additionally, the number of third-party sellers that enable Amazon.com to offer nearly unlimited product selection without ever purchasing the inventory is increasing. With this multi-tier supply chain in place, Amazon.com is faced with the challenge and opportunity of making decisions regarding which inventory to store in its facilities, versus inventory to be stored in upstream tiers in the supply chain. Furthermore, which products should not be carried at all, but supplied by third-party affiliates is an issue that is worthy of ongoing analysis.

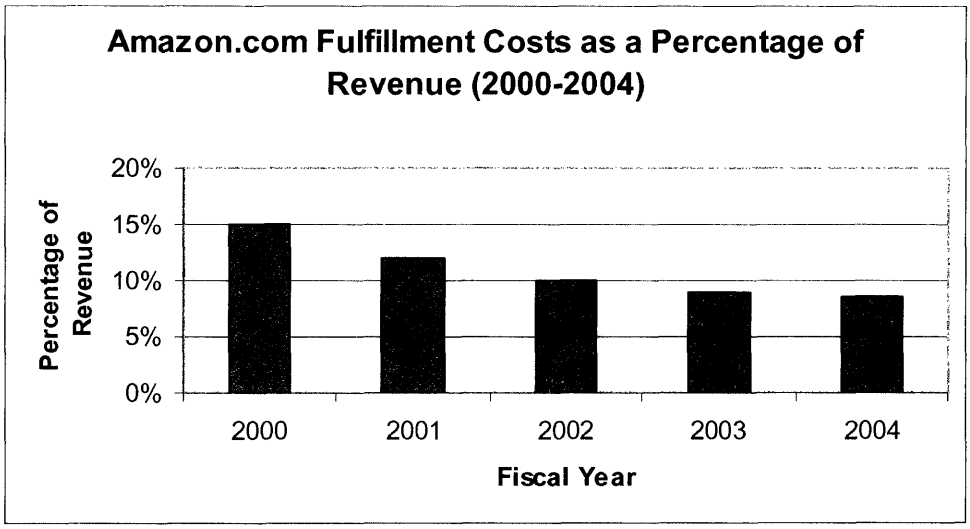
Order Sourcing Cost Minimization

On a per order basis, determining which internal facility or external partner should be responsible for fulfilling the order is a challenge based on Amazon.com's business model. Orders are placed via the website, and customers expect a real-time promised delivery date. Finding the lowest cost solution is a difficult problem in real-time when there can be multiple items on an order, stored in different internal or external facilities, while balancing the customer expectation of a single delivery. Amazon.com is currently sponsoring research that aims to improve the costs associated with suboptimal order sourcing decisions.

Fulfillment Costs

Amazon.com has made improvements in fulfillment costs as a percentage of revenues over the last five years. The results are shown in the figure below.

Figure 5-7



Source: Amazon.com 2004 10-K, 2003 Annual Report, 2002 Annual Report

The 2003 Annual Report notes that much of the costs of building and operating fulfillment centers are fixed costs, but an area of focus for the company is reducing variable costs per order. From the 2003 Amazon.com Annual Report, fulfillment costs include the costs associated with operating their fulfillment and customer service centers, including costs associated with warehouse processes from receiving through shipping, credit card collection costs, and payments to drop shippers for services provided. Due to the variable nature of these costs, Amazon.com focuses on internal operational improvements to reduce these costs. Reducing fulfillment costs from 15% of revenues to 8.5% of revenues is a significant improvement, although reducing these costs while managing a growing product line is a challenge.

Transportation – Balancing Cost and Service

Amazon.com does not have the scale on a per order basis to contract truckload or less-than-truckload carriers as less expensive alternatives to their parcel partners. Nor do they have the luxury of a planning cycle where deliveries can be planned with long lead times. Therefore,

Amazon.com must find ways to save money on transportation through innovative methods to achieve scale and scope. Amazon.com offers free shipping and other options that can enable them to achieve a longer planning cycle through longer service windows to customers. A specific example of how they do this through their use of transportation hubs is discussed in this chapter. Understanding the dynamics of achieving and exceeding customer service levels while containing transportation costs is a challenge to Amazon.com due to the internet retailing business model.

These challenges and opportunities are discussed further as this chapter develops within the scope of Amazon.com's supply chain design, inventory segmentation, fulfillment, and transportation policies.

5.2.4 Amazon.com Operating Models and Supply Chains

The Amazon.com sales channels discussed in Chapter Four will be discussed here as different operating models that Amazon.com utilizes to serve customers. There are three distinct models that Amazon.com offers, each with a different supply chain. Each will be described below as an operating model while highlighting the supply chain differences. The three models are Amazon.com as seller, Amazon.com as intermediary, and Amazon.com as full-service e-commerce provider.

Amazon.com as Seller

The base Amazon.com sales channel is the web store front-end that serves as the core of their business. Customers go to the Amazon.com website, browse for products, and place orders. Amazon.com is responsible for all front-end customer relationships and back-end logistics in this model. Once an order is placed, Amazon.com decides which internal distribution center or drop shipper should be responsible for shipping the order to the customer. Amazon.com is then

responsible for coordinating the fulfillment of the order. When products are sourced from its internal distribution centers, Amazon.com picks, packs, and ships the order. When products are sourced from a drop shipper, such as a book distributor, the distributor packages the item in an Amazon.com box and delivers it to the customer (Maltz et al., 2004). This model requires Amazon.com to maintain or purchase inventory for immediate selling. In this model, Amazon.com owns the customer relationship, provides the technology, owns or purchases the inventory, and executes the logistics of each order.

Another part of Amazon.com as a seller model includes the Syndicated Stores program, which allows third-party companies to sell Amazon.com products through their websites. In this model, Amazon.com does not own the initial customer relationship, but does provide the technology, inventory, and logistics to deliver the order to the customer, and thus owns the customer service relationship. Amazon.com pays a percentage of each sale made to the syndicated store that provided a link to Amazon.com on its website. Examples of syndicated stores include Borders, CDNow, HMV, Virgin, WaldenBooks, and Waterstones (Szkutak, 2004). An example of this model, is where a customer goes to www.borders.com, browses for a book they want to buy, and places an order. The order is placed on Amazon.com inventory and Amazon.com technology determines which Amazon.com facility or drop shipper will deliver the order to the customer. The fulfillment execution then follows the same process as the base Amazon.com process.

Amazon.com as Intermediary - Third-Party Sellers

Initiated in 2000, the Amazon Marketplace and Merchants@ programs allow third-party companies to list their products on Amazon.com's website. Marketplace serves individual sellers and smaller companies. Merchants@ services larger businesses that wish to sell their

products on Amazon.com. This model represents Amazon.com as a virtual trading company, connecting buyers and sellers that would otherwise would not have the ability to benefit from one another. Amazon.com manages the front-end customer relationship, provides the technology, but typically not the inventory, fulfillment and delivery services in these arrangements. In some cases, larger merchants utilize Amazon.com for fulfillment services. As of Q4 2004, Amazon.com had over 850,000 seller accounts that received an order in the last 12 months (Szkutak, 2005). In scenarios where Amazon.com is not responsible for fulfillment, the orders are routed to the Merchant or Marketplace member responsible for fulfillment and they pick, pack, and ship the order to the customer. Therefore, Amazon.com does not have a high degree of control over the supply chain delivery service that each partner provides. However, the incremental cost of each sale for Amazon.com is close to zero with very low incremental variable fulfillment costs associated with the sale for Amazon.com. Therefore, sales made by third-parties help Amazon.com's margins.

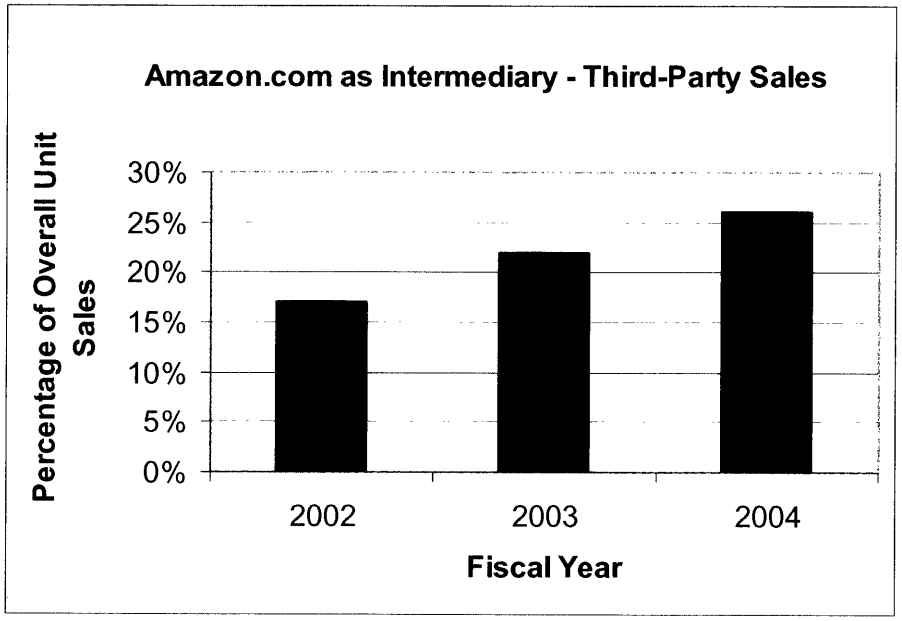
Amazon.com as Full Service e-Commerce Provider - Merchant.com

Amazon.com is recognized for its innovative site design and unique customer experience. Recently, Amazon.com has begun to leverage its technology platform to provide the technical infrastructure, site design, and web storefront experience for companies on their websites. This model allows retailers to maintain their brand and website customer ownership, while utilizing Amazon.com's fulfillment network. An example of this is the website that Amazon.com designed and operates for Target, Inc. In the bottom right hand corner of Target.com, there is a logo that notes the site is "Powered by Amazon.com". Target maintains control over merchandising decisions, and Target maintains ownership of Target inventory that is stored in Amazon.com's distribution centers. Therefore, Amazon.com does not own the customer

relationship or the inventory, but does provide the technical and operations infrastructure to execute the order fulfillment process. Amazon.com is responsible for sourcing the order from the appropriate distribution centers and delivering the order to customers.

Third-party sales are increasing as a percentage of overall unit sales at Amazon.com. The trend is shown in the figure below. Note that third party sales have increased from 17% of unit sales in 2002 to 26% of unit sales in 2004.

Figure 5-8



Source: Amazon.com 2004 10-K Report.

There are several business and supply chain benefits and concerns associated with the increasing prevalence of third-party sales on Amazon.com. Business benefits are a higher margin for each unit sold and the ability to offer nearly unlimited selection of products through a network of sellers without carrying extensive inventory. The third-party seller network creates a supply chain where information replaces inventory for Amazon.com. Therefore, Amazon.com creates a supply chain where sellers can offer their products to buyers at no fulfillment cost to Amazon.com. As a result, the revenue that is generated from these transactions carries a much

higher margin than revenue that requires Amazon.com to physically process an order. Also, the network of sellers allows Amazon.com to offer the selection that they use to compete with physical and online retailers without having to carry inventory of all of the items available for sale on its website. This keeps inventory costs in control and is one factor that allows Amazon.com to have higher than average inventory turns for the retail industry.

Concerns regarding third-party sales are a potential cannibalization of Amazon.com's product offerings and a lack of supply chain control over the level of customer service provided. Amazon.com provides transparent pricing for products available for sale on its website. Therefore, when one browses for a book online, the website returns the information regarding product availability and price from Amazon.com as the seller, as well as prices from third-parties. In some cases, these third-parties offer the same products at lower prices than Amazon.com. In this scenario, Amazon.com is assisting customers in finding products from different sellers to substitute for their own offerings. Supply chain control is also a concern for Amazon.com utilizing third-party sellers. Amazon.com has established a brand and customer loyalty around superior customer service. In February 2004, they received the highest customer satisfaction score in history according to the American Customer Satisfaction Index (Szkutak, 2004). Third-party sellers are responsible for order fulfillment in the Amazon.com as intermediary model. However, Amazon.com owns the customer relationship and any issues associated with poor supply chain execution are attributed to Amazon.com. Amazon.com has undertaken efforts to guarantee service to their customers to ease this concern, but they are not in control to proactively ensure excellent supply chain delivery.

5.2.5 Amazon.com US Supply Chain Network

This section of the paper focuses on the physical supply chain network that Amazon.com utilizes to support its different business models.

Retail Outlets

As a pure-play internet retailer, Amazon.com has zero retail outlets. All sales are generated through the virtual stores created by the Amazon.com website and affiliate websites. Amazon.com does not have to incur the incremental cost of opening a new physical retail store to attract new customers. The Amazon.com technology infrastructure and website functionality creates a personalized storefront for each customer. This technical infrastructure requires a significant capital investment, but the marginal cost of presenting a storefront to a new customer is very small. Additionally, there are supply chain benefits to an internet retailing model without retail stores. In order to ensure product availability, physical retailers have to carry inventory in each store location as well as in distribution centers. By consolidating inventory at distribution centers and other inventory locations operated by partners and wholesalers, Amazon.com is able to carry a much wider selection of inventory while maintaining a competitive advantage over retailers in inventory turnover.

Distribution Centers (Fulfillment Centers)

Amazon.com operates eight leased distribution centers throughout the United States. These eight facilities account for a total of 4,465,000 square feet (Amazon.com 2004 10-K Form). These facilities are large with a square footage generally falling in the range of 500,000 to 600,000 square feet per facility. Location decisions are made based on proximity to customer concentrated areas and tax implications. Note that Amazon.com has three facilities in Nevada and Delaware, which both have no state income tax. Amazon.com has also taken advantage of

unique opportunities to grow its distribution network, such as the abandonment of a large facility in Kentucky by another retailer that gave Amazon.com the opportunity to lease at a favorable rate. Amazon.com's eight distribution center locations are listed below:

- Campbellsville, KY
- Lexington, KY
- Chambersburg, PA
- Coffeyville, KS
- Fernley, NV
- Reno, NV
- Grand Forks, ND
- New Castle, DE

Source: Amazon.com 2004 10-K

Amazon.com's initial model relied heavily on a small number of partners. An HBS case notes that in Amazon.com's original supply chain model, 60% of Amazon.com's orders were sourced from Ingram Book Distributors and the other 40% were sourced from other distributors and publishers (Leschly, Roberts, & Sahlman 2003). Amazon.com's original distribution center in Seattle, WA only stocked bestsellers (Spector, 2002). Amazon.com began expanding its distribution network in preparation for the 1999 holiday season, opening five new distribution centers, in addition to the two existing facilities in Seattle and Delaware. The reasons for internal distribution were to reduce the dependency on book distributors, more proactively manage logistics execution and customer service, and improve margins (Digital4Sight, 2000).

Processes in Amazon.com's distribution centers vary by the product mix in the facility. Products that are easily sortable and conveyable are stored in highly automated facilities. Most of the items in the media product category fall into the sortable, conveyable category as products are relatively small, have a small variation in dimensions, and can easily be transported on conveyors and sorted by people or equipment. Products that are large or have irregular dimensions are stored in less automated facilities. Certain items in the toy product line have irregular dimensions and thus are difficult to handle in an automated fashion. Also, large consumer electronics such as plasma televisions are an example of a product type that is not conducive to automated conveyor and sortation systems.

Transportation Hubs – "Injection Points"

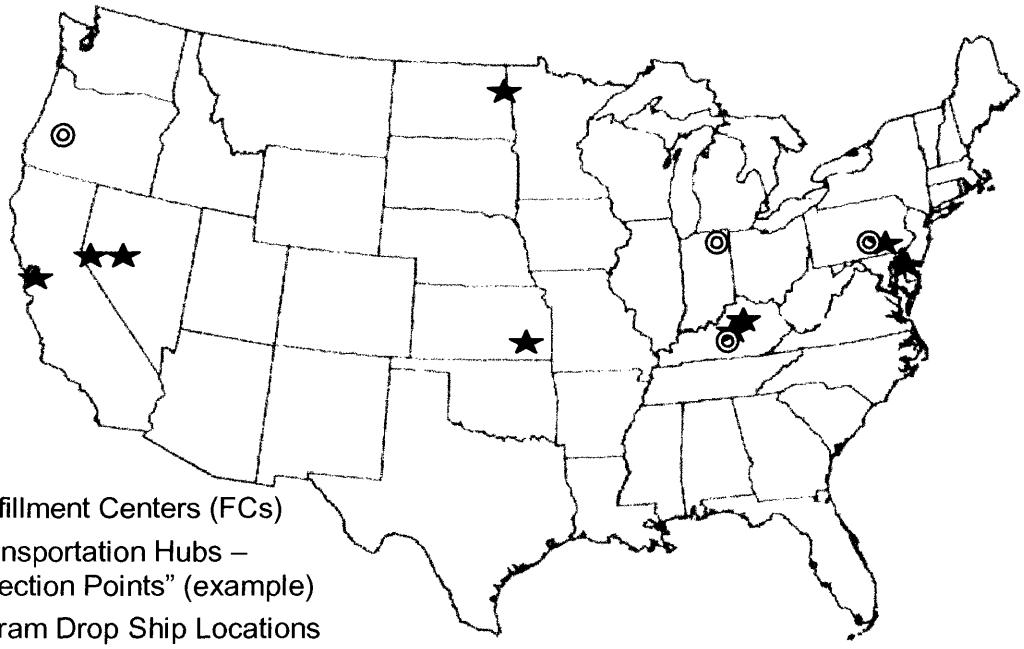
Industry expert interviews uncovered that Amazon.com operates a number of transportation hubs that they refer to as injection points. Injection point locations are located in heavily customer concentrated areas. The purpose of these locations is to save on transportation costs. The process begins by consolidating orders in distribution centers and contracting less than truckload (LTL) or truckload (TL) shippers to provide the long-haul transportation from the DC to the transportation hub. Once in the hub, the inbound trailers are unloaded and the packages are then sorted the orders out to smaller carrier partners such as United Parcel Service (UPS) or the United States Postal Service (USPS) The idea is that overall transportation costs are lower due to less expensive unit mile costs for LTL and TL carriers when compared to UPS and USPS. LTL or TL transportation is used for the long-haul and parcel carriers are used for "last-mile" delivery. This process is described in more detail later in this chapter.

Drop Ship Locations

Amazon.com utilizes the capabilities of its supply chain partners to deliver orders directly to customers. These shipments bypass the Amazon.com internal distribution center network. An example of this arrangement is an order for an item that Amazon.com does not have in stock in its distribution centers, but that Ingram Book Distributors does have in stock. Amazon.com will route this order request to Ingram, which will pick the order, pack it in an Amazon.com box, and ship it to the customer (Maltz et al., 2004). This process is seamless to the customer. Although Ingram is provided as an example, other book distributors, CD distributors, wholesalers, publishers, and manufacturers support Amazon.com through drop shipments to customers. The third-party sellers that offer their products for sale on Amazon.com can also be considered drop shippers.

The figure below gives a graphical representation of Amazon.com's US Supply Chain structure. Note, that only one transportation hub is noted. Amazon.com does not disclose transportation hub locations, although industry experts confirm their existence in Amazon.com's heavily concentrated customer hubs with San Francisco as an example. Also, note that only four drop ship locations are noted. These are the four distribution centers that Ingram Fulfillment operates in the US and are assumed that they utilize these locations to drop ship to Amazon.com customers (www.ingramfulfillment.com). Other drop ship locations include the other Amazon.com partners supporting Amazon.com sales as well as third-party sellers.

Figure 5-9 Amazon.com US Supply Chain Network



Sources: Amazon.com FCs – Amazon.com 2004 10-K; Transportation Hubs – Industry Experts; Ingram Drop Ships – www.ingramfulfillment.com

5.2.6 Inventory Segmentation within the Amazon.com Network

Amazon.com has competed on selection with traditional retailers since its inception. It is estimated that Amazon.com offers over 20 million items for sale through its website and affiliates (Anderson, 2004). Amazon.com is able to support this selection through its multi-tier

inventory network. The following is a description of the three tiers or echelons that comprise Amazon.com's inventory network.

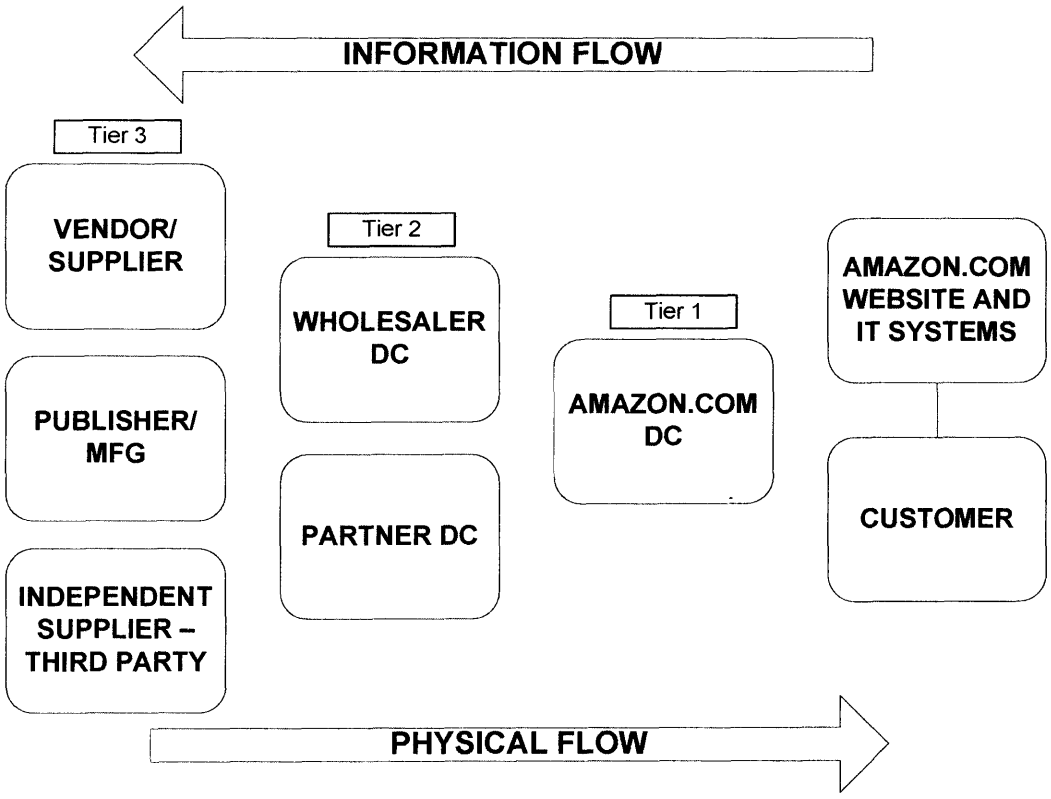
The website www.amazon.com owns the relationship with the customer. The first tier within the supply chain network is the Amazon.com distribution center network. Inventory is aggregated in distribution centers, which enables Amazon.com to carry less overall inventory than physical retailers that have to carry inventory in stores and DCs to support customers. The benefits of inventory aggregation are an improved ability to respond to fluctuations in geographic demand and high service level support with a lower level of safety stock.

The second-tier in the inventory model is composed of wholesaler and partner DCs. This tier includes drop shippers such as Ingram Book Distributors, Baker and Taylor, and other book distributors. Also CD distributors and other partners that are utilized to fulfill Amazon.com orders are also seen at this level. If Amazon.com is unable to fulfill the item from its DC, Amazon.com's IT systems can look into partner inventories to determine which party to assign the order. This prevents the Amazon.com customer from experiencing a stock-out for an item that Amazon.com carries but currently does not have in its own stock. It also allows Amazon.com to offer items that it does not sell directly through its inventory.

Publishers, manufacturers, vendors, and third-party sellers comprise the third-tier in the Amazon.com multi-tier inventory model. These parties further enable Amazon.com to offer the nearly unlimited selection that they offer. Additionally, products sourced from these entities enable Amazon.com to avoid distributor markups, reduce their dependency on distributors, and improve margins.

The graphical representation of Amazon.com's three-tier inventory model is shown on the following page.

Figure 5-10 Amazon.com's Multi-Tier Inventory Model



In this model, Amazon.com IT systems pass information to each tier in the supply chain model. Physical products can then flow from any tier to the customer. Furthermore, partners in second and third tier replenish Amazon.com distribution centers with their inventory.

5.2.7 Amazon.com Replenishment and Distribution Processes

With an understanding of Amazon.com's supply chain network and inventory segmentation in place, this section begins to explain the company's replenishment and distribution processes.

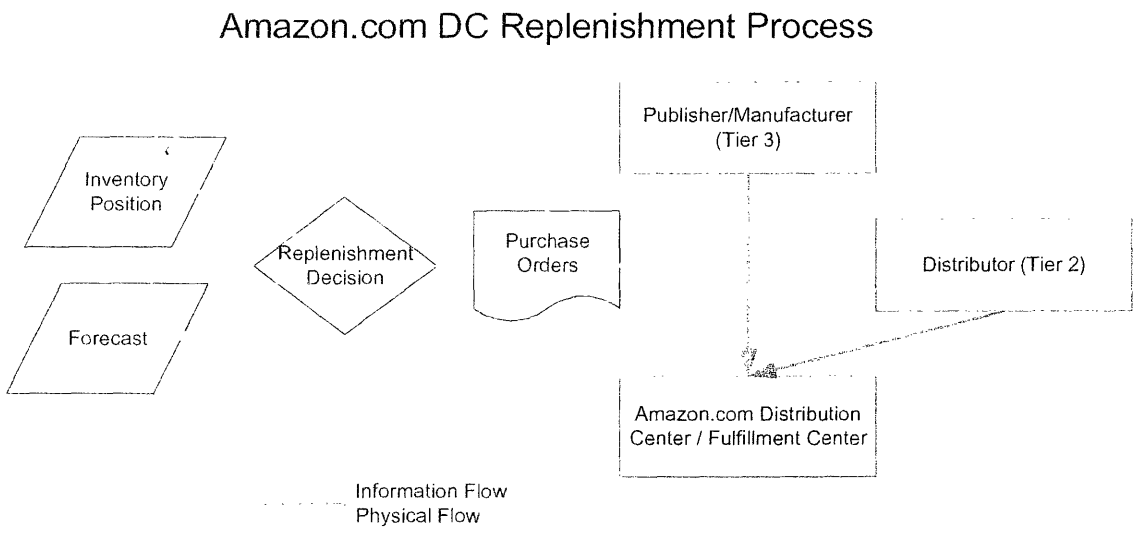
Replenishment Processes

Amazon.com replenishes its distribution center inventory through a variety of suppliers. Suppliers for their media product segment are large book distributors such as Ingram Book Distributors, Baker and Taylor, as well as other smaller book distributors. CD and DVD

distributors also are utilized as well as other wholesaler partners. Publishers, CD, and DVD manufacturers are also parties that replenish products to Amazon.com distribution centers. To give some perspective regarding the structure of the industry, data from Amazon.com's early stages in 1996-1997 indicate that Amazon.com procured the 200,000 to 400,000 best selling books from wholesalers, and up to 1.5 million additional book titles from 20,000 different publishers (Spector, 2002).

Amazon.com utilizes a Sales and Operations (S&OP) planning process to determine forecasts for each product that it stores in its distribution center inventory. Amazon.com keeps track of its inventory position in real-time based on warehouse receipts and shipments. Purchase orders are placed to suppliers based on the forecasted amount needed minus the current inventory on hand in the warehouse (Zeppieri, 2004). A graphical representation of the Amazon.com DC replenishment process is shown below.

Figure 5-11



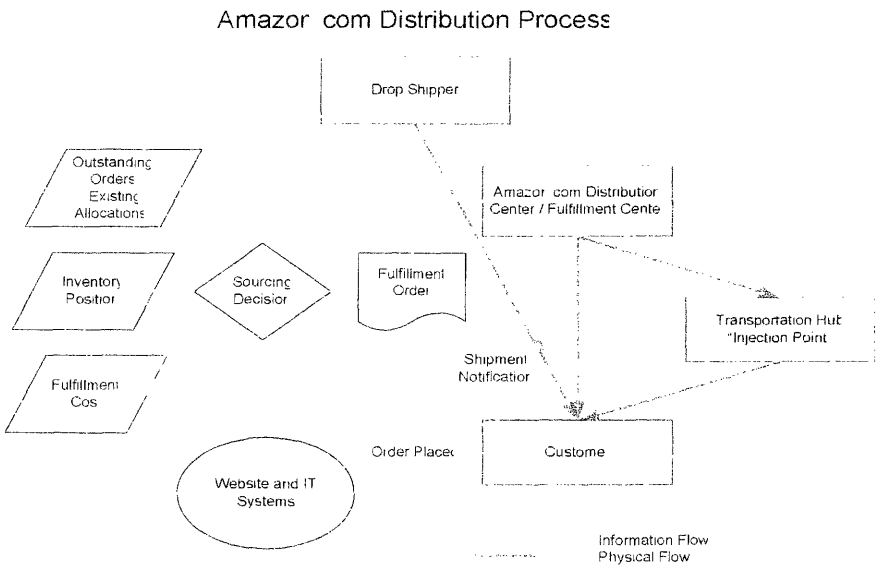
Source: Information obtained from Zeppieri (2004)

Distribution Process

The distribution process is initiated by a customer ordering from the Amazon.com website or an affiliate website. Amazon.com's IT systems determine which Amazon.com distribution center to ship the item from or whether to ship the item from a drop shipper. The order sourcing decision is determined by product availability and the desire to minimize transportation costs in fulfillment costs. Drop shippers package items in Amazon.com packaging and deliver it directly to customers. Amazon.com distribution centers can ship items directly to customers or through transportation hubs. Orders are delivered to transportation hubs by Amazon.com contracted LTL or TL carriers. Upon arrival in the hub, packages are sorted and routed to small parcel carriers such as UPS or the US Postal Service for "last-mile" delivery.

A graphical depiction of Amazon.com's distribution process is shown in the figure below.

Figure 5-12



Source: Industry Experts

5.2.8 Amazon.com Intra-Distribution Center Profiling and Processes

Amazon.com utilizes advanced warehouse management principles and sophisticated IT capabilities to reduce costs in its fulfillment centers. This section of the chapter focuses on its intra-distribution center processes with respect to item activity and order profiling, inbound receiving and inventory storage, and outbound picking, packing, sorting, and shipping.

Item Activity and Order Profiling

In World Class Warehousing and Materials Handling, Dr. Ed Frazelle (2002) covers many factors that are essential to success in warehousing environments. Warehouse profiling is covered prior to process design to ensure that the appropriate processes are being utilized for the operation's profile. Profiling ensures that process efficiency initiatives aim to make improvements upon the proper process rather than attempting to optimize an inherently sub-optimal process. Warehouse profiling entails data gathering and analysis for the purposes of understanding the best methods for warehouse layout design and process creation to reduce and eliminate work content. Amazon.com designs the layout, inventory segmentation, and process flows of their distribution centers based on item activity and order profiling analyses. The information provided below on Amazon.com profiling initiatives was obtained from Zeppieri (2004) unless otherwise noted.

Item Activity or SKU profiling aims to uncover the proper storage type for a type of product. Amazon.com distribution centers are segmented into reserve storage locations and forward pick storage locations. Amazon.com refers to forward pick storage as prime storage. Pickers select product from prime storage locations to fulfill orders. Replenishments are performed from reserve storage to prime storage. Amongst the prime locations, there are library bins, case flow bins, and pallet bins. Library bins are similar to bookshelves and contain unique

bins that each can store a small number of items. Case flow bins are locations where cases of smaller moving, faster items are stored. Cases are replenished from the back of the shelves, and flow based on gravity to the front of the shelf where pickers can select the product. Pallet bins are traditional pallet storage locations that are typically associated with warehouse environments.

At Amazon.com, products are assigned to these locations according to "days of cover" and "velocity to bin type" mapping. Days of cover is a term to explain the amount of inventory to store in prime inventory to meet inventory demands over a specified number of days. A min/max replenishment system is employed where products are replenished from reserve when inventory drops below the min days of cover level. The min days of cover serves as safety stock and the max days of cover includes the cycle stock of a given product. Items are assigned to a particular prime area bin type based on forecasted velocity. SKU velocity is how much cubic volume moves through the distribution center over a specified time period. Velocity is calculated by taking the actual or forecasted demand and multiplying it by the cubic dimensions of the product. SKUs with a cubic volume of 0-1000m^3 are assigned to library bins. SKUs with a volume of 1000-2000m^3 are assigned to case flow bins. Items with a demand over 2000m^3 are stored in pallet storage. The matching of SKU to bin type is a balance of space utilization criteria, replenishment costs, and picking efficiencies. For example, a set of highly demanded products may be picked more efficiently from library bins than case storage due to less picker travel. However, if demand requires multiple daily replenishments to the library bins, then case storage may be a better overall storage option based on reducing overall operational costs.

Order profiling is the analysis of order characteristics to determine the most effective approach for grouping orders for release to the warehouse floor. Order profiling can involve looking at the different distribution channels that are served by the facility and looking at the

characteristics of those orders. For example, a traditional retailer might have two distribution channels, retail store fulfillment and business-to-consumer online orders. Retail store fulfillment orders typically involve many order lines and varying order quantities of units, cases, and pallets. Business-to-consumer online orders typically are for a small number of lines (small number of unique SKUs) and a small number of units. As the largest pure-play internet retailer in revenue terms, Amazon.com receives a large number of orders, each with a small number of lines and a small number of units per line. Order profiling enables an operation to determine the proper release of work to the warehouse floor for load balancing and outbound efficiencies. For example, understanding Amazon.com's high order volume low unit per order environment enables the company to design picking and sorting strategies to gain efficiencies from order aggregation and batching. In this way, Amazon.com is able to take advantage of its scale to reduce its fulfillment cost per order. The advanced picking and sortation strategies that Amazon.com employs are discussed further later in this paper.

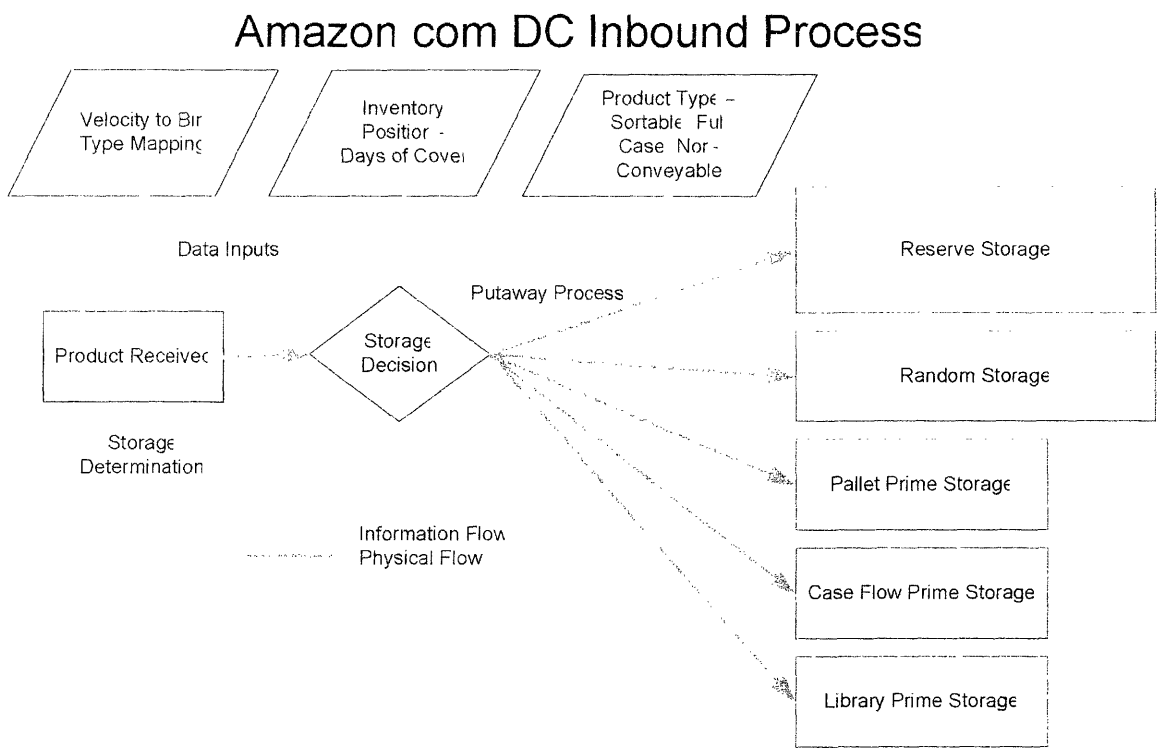
Item Activity and order profiling support and reinforce one another to allow an operation to support efficient outbound order processing. Together, these profiling techniques ensure that the right products are in the right locations in the right amounts to be selected with the right process. With proper profiling techniques in place, an organization can focus on designing and streamlining distribution center processes.

DC Inbound Processes – Receiving, Putaway, and Storage

Amazon.com receives products from its distributors, partners, manufacturers, and publishers. Receiving is typically at the pallet or case level. In some cases, Amazon.com receives mixed cases that include many SKUs. Product is received and routed for putaway to a location type based on its SKU activity profile (see Item Activity and Order Profiling). Items are

received and routed directly to prime storage locations or sent to reserve storage. Item types are also taken into account at receiving. If an item is "sortable", it comes in a mixed case with other items and needs to be sorted into unique SKUs before putaway. "Full Case" items arrive as a case of homogeneous products and can be putaway as such. "Non-conveyable" products are too large or awkward to flow smoothly on automated conveyors and thus are routed to unique locations (Zeppieri, 2004). The diagram below illustrates the inbound distribution processes for Amazon.com including the inputs to the storage type decision and the different putaway processes. Note that prime storage locations are scaled to indicate their relative size when compared to reserve storage locations.

Figure 5-13



Source: Information obtained from Zeppieri (2004)

DC Outbound Processes: Picking, Sorting, Packing, and Shipping

Amazon.com's DC outbound processes support the fulfillment of customer orders placed through Amazon.com or affiliate websites. Picking, sorting, packing, and shipping constitute the outbound processes of customer fulfillment in Amazon.com distribution center operations.

In Amazon.com operations, pickers select products from forward pick locations (prime locations) to start the order fulfillment process. Depending on the item and the volume requested, an item may be picked from library shelving, case flow racks, or pallet racks. Frazelle (2002) notes that picking accounts for 50% of operating costs in typical warehousing environments. Therefore, picking productivity is generally the highest priority initiative when companies assess warehouse productivity improvements. Picking productivity is defined as the number of units picked divided by the number of labor hours involved in picking. Among the costs associated with picking, traveling to and from picking locations accounts for 55% of labor (Frazelle, 2002). For this reason, initiatives to minimize picker travel and improve picking productivity are essential to reducing Amazon.com's fulfillment costs.

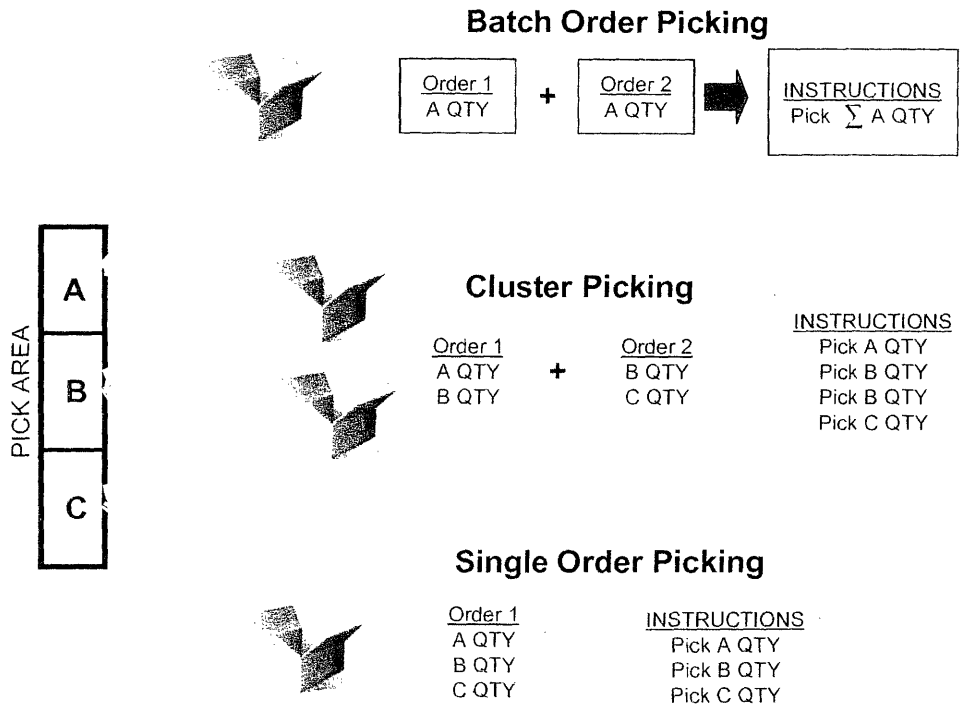
Amazon.com uses both full-path picking and zone picking to determine the scope of picker travel. Full-path picking is when a picker can travel to all locations within the pick area to pick items for orders. Zone picking confines the potential travel to a subset of locations within the picking area known as zones (Bragg, 2003). Zone picking can increase productivity through simultaneous multi-user picking, picker familiarity with locations, and increased pick density. Pick density is a measure of how many items can be picked with a specified area. Although zone picking provides the benefits listed above, it increases the need for downstream sortation and consolidation, because multiple pickers could be working on a single order in different zones. For example, an order for three items could require picks from three separate zones. In order to

ship those items in a single box, manual or automatic sortation must be performed after picking to consolidate the items for shipment. Therefore, decisions regarding full-path picking and zone picking should take into account the tradeoffs in picking productivity to downstream sorting and packing requirements.

Amazon.com uses single-order, batch, and cluster picking in their operations in an effort to reduce fulfillment costs. Single order, batch, and cluster picking are ways to pick orders. Full-path and zone picking are methods to define the scope of the pick area. Single order picking is a picking methodology where a single picker completes one order at a time. Batch picking involves picking an aggregate amount of items across a group of orders. A batch picking example is as follows. Four orders each request one unit of SKU A. In a batch picking environment a picker would receive picking instructions to perform one pick for four units of SKU A, rather than perform four picks of one unit of SKU A. Later on, the batched pick will need sortation to distribute the items out to their individual orders. In batch picking, pickers are picking an aggregate amount by SKU, and do not necessarily pick complete orders. Cluster picking involves picking a group of orders together and segregating them into their unique orders upon picking. In cluster picking, pickers pick all items for a given order, but attain picking efficiencies by minimizing travel and picking aggregate amounts of items requested on multiple orders. A grocery store analogy can explain the difference between batch picking and cluster picking. Batch picking would be utilized to pick all the items that all family members need and not segregating them in the cart. Each family member is responsible for sorting through the cart to find the items that they ordered. In cluster picking, the pick path would be similar, but upon picking, the items are segregated into bags representing each family member's order, thus reducing the need for downstream sortation. The figure below notes the difference between the

three picking strategies. All of these strategies can be utilized in full-path and zone picking environments.

Figure 5-14 Picking Methodology Overview

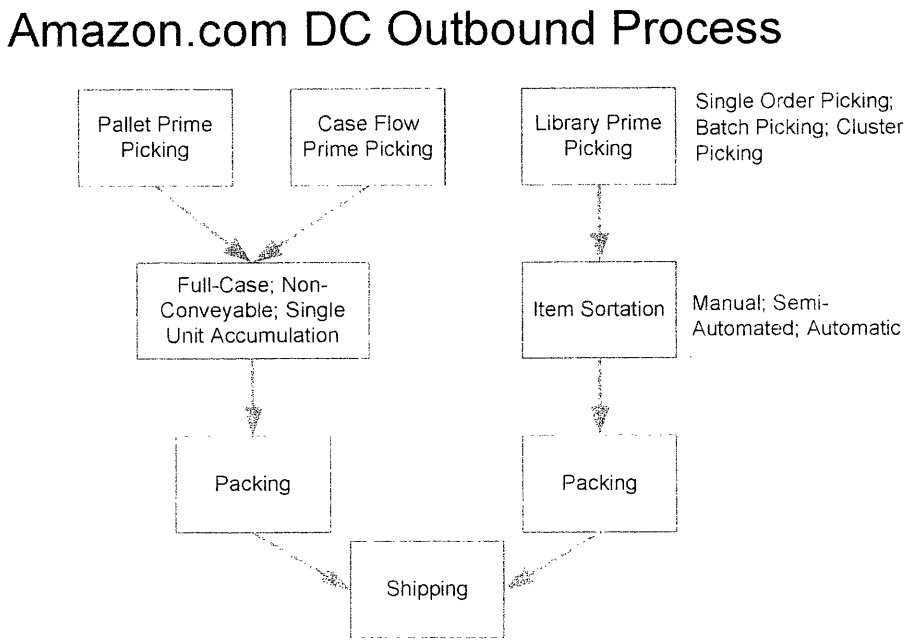


Single order picking is appropriate for certain SKU and order profiles. In environments where orders have a large number of units or the items are very large, there are not great efficiencies in batch or cluster picking. Single order picking is an appropriate picking strategy for a plasma TV or irregular shaped toy ordered from Amazon.com. Cluster picking and batch picking help minimize travel and improve picking productivity in environments with high order volume, low number of units per order, and small, easily conveyable items. This is the typical Amazon.com order profile for the media segment. The tradeoff in picking efficiencies and sortation requirements drive the need for either batch or cluster picking. For example, cluster picking may be appropriate if automated sortation systems are not in place to help facilitate the more cumbersome sortation and consolidation requirements that batch picking presents.

The impact of picking strategy on downstream sortation and packing has been discussed in the previous paragraph. Here, the different sortation mechanisms are discussed. Amazon.com has manual, semi-automated, and automated sortation mechanisms in its facilities. Factors that go into the appropriate selection of a sortation strategy are the number of items per order, the number of items per picking tote, the number of customer orders per batch or wave, workstation set-up time, and the individual pace of the sorter (Bragg, 2003). Manual sorting involves warehouse personnel (sorters) taking the picking totes and sorting each item out to its respective slot on a "rebin" cart. There are many barcoded slots on a cart. Customer orders are associated to each barcode. The semi-automated system utilizes conveyors to bring together the picking totes from multiple zones, so that they can be sorted in a manner similar to manual sortation. Automated sortation involves a tilt-tray sortation system where the products are inducted into the conveyor system and trays tilt allowing the products to be routed to chutes that correspond to customer orders (Bragg, 2003). The automated system requires significant capital investment, but is highly efficient. In automated environments, lights indicate that all items for an order have been sorted and it is ready to be packed. After manual or semi-automated sortation, packing involves taking the items from a rebin cart and packing them in the appropriate boxes for shipment.

Single-line, single unit orders do not require sortation and thus can bypass these processes. Full-case and non-conveyable products also do not go through sortation process and are accumulated and sent straight to packing. The overall process is depicted in the figure below.

Figure 5-15



Source: Modified from Bragg (2003)

Amazon.com's outbound processes show their commitment to continuous improvement in analyzing fulfillment inefficiencies to reduce fulfillment costs. The process of profiling, matching appropriate picking strategies to profiles and products, and weighing the overall benefits of advanced picking strategies to downstream sortation and packing illustrate Amazon.com's understanding of the criteria necessary to reduce costs in their business environment.

5.2.9 Transportation

Due to its order profile, Amazon.com has relied heavily on small parcel carrier partners to deliver orders to customers. In traditional retail environments, large retailers such as Wal-Mart take advantage of scale through large replenishment orders to stores through their private fleet of trucks. Gaining transportation efficiencies in the internet retail model is difficult due to a

large customer base that is highly distributed and the small number of units per order by each customer. However, Amazon.com has determined an innovative way to save on transportation costs through leveraging their scale and service windows. Amazon.com has several transportation hubs located throughout the US that they call "injection points". Amazon.com does not disclose the exact location of these hubs, but it is understood that they exist in heavily customer concentrated areas. These hubs serve as crossdocking facilities to transfer packages from lower cost long-haul carriers to their last-mile delivery partners to save on overall transportation costs.

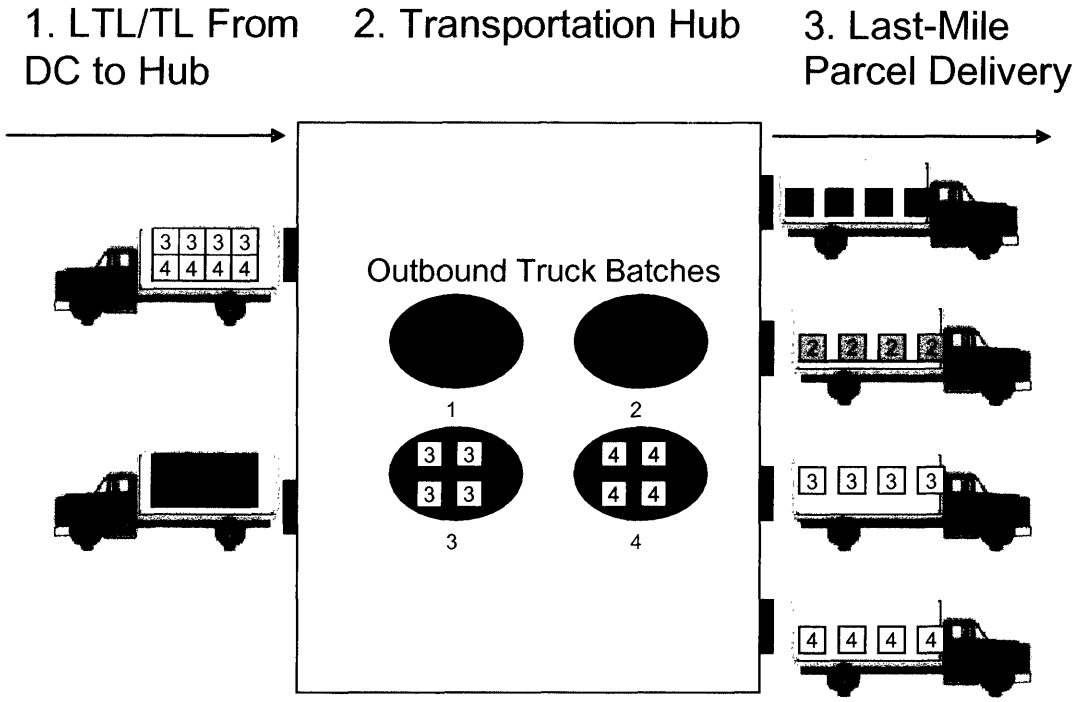
The process begins in the distribution center where orders are sourced based on their proximity to the customer location to save on transportation costs. Orders are aggregated and released in batches so that there are efficiencies in internal outbound distribution center processes. As mentioned earlier, Amazon.com does not have the opportunity to achieve the scale to justify LTL or TL carriers on a per order basis. However, by aggregating their orders going to a specific customer region, Amazon.com can contract LTL or TL carriers to provide long-haul transportation from the distribution center to the transportation hub. Once the long-haul carrier arrives at the transportation hub, the packages are routed to the appropriate parcel carrier for last mile delivery. In the past, 1000 orders going to the San Francisco Bay area may have had 1000 long-haul deliveries by the US Postal Service, UPS, or other parcel carriers. Now, there is 1 long-haul delivery, and 1000 last-mile deliveries. One area in which this system provides savings is in zone skipping. UPS segments the country into delivery zones. Rates are incremental based on the number of zones that a package must pass through. Transportation hubs enable Amazon.com to zone skip by using long-haul transportation to inject the packages

into the UPS system once they have arrived in the zone of delivery, thus avoiding incremental zone charges.

In order to succeed with this strategy, Amazon.com needs a sufficient scale of customers in an area and a service window that allows for order aggregation. The service window is the amount of days within which Amazon.com promises delivery. Amazon.com offers customers different shipping options for different prices on its website as well as free shipping for most orders over $25. In this way, they provide customers with an incentive to increase the service window. Order aggregation at the DC and longer lead time long-haul transportation both are dependent upon a certain service window to achieve the scale necessary for transportation hubs to succeed.

The transportation hub process is depicted below. The numbered squares represent packages that are pre-routed to customer locations. They are transferred from LTL/TL trucks to parcel carriers in the transportation hub for last-mile delivery.

Figure 5-16



Source: Industry Experts

5.2.10 Amazon.com and Technology

Amazon.com utilizes technology innovation to differentiate itself on online customer experience. Innovations such as personalized recommendations, one-click ordering, and search inside the book are all Amazon.com innovations. These innovations comprise the virtual store experience for the Amazon.com customer.

While acknowledging Amazon.com's front-end innovations, Jeff Bezos recently noted that 90% of innovation has been to support back-end supply chain integration and execution (Kirkpatrick, 2004). Amazon.com has highly customized software applications that support their supply chain business model. For example, the integration of the partners in Amazon.com's multi-tier supply chain requires advanced information technology capabilities. For example, Amazon.com is linked into Ingram's systems to see Ingram inventory levels when deciding whether to use Ingram to drop ship an order to a customer (Digital4Sight, 2000). The ability to

display products on the virtual storefront, source them to different supply chain partners, and manage the delivery of those orders while providing customer visibility illustrates Amazon.com's supply chain technology expertise.

In addition to using technology to support supplier collaboration and order sourcing, Amazon.com utilizes its core technology expertise to improve supply chain execution. Execution involves the internal distribution center processes that have been highlighted in this paper as well as the transportation initiatives. Vogelstein (2003) notes that Amazon.com's proprietary warehouse management system (WMS) has as many lines of code as their website does. The advanced labor management, load balancing, process alternatives, and optimization routines built into their WMS enable the efficient processes for internal DC processing that have been discussed in this paper. Amazon.com drives competitive advantage by utilizing proprietary information technology specifically designed to support their business model. An indication of Amazon.com's confidence in its technology is the bundling of its e-commerce front-end and back-end to develop the Merchant.com model. Additionally, Amazon.com evaluates technology to drive business value. For example, COO Jeff Wilke noted that RFID can provide value where inventory accuracy is poor, shrinkage rates are high, or more real-time information is needed (Bacheldor, 2004). Due to their existing IT capabilities, Amazon.com does not have issues in these areas, and thus they are not an early adopter of RFID. These examples show how Amazon.com leverages its technology expertise to support supply chain innovation on both the customer and supplier sides of the supply chain.

5.2.11 Amazon.com Supply Chain Initiatives and Research

This section highlights some current initiatives and research that Amazon.com is supporting to drive continuous improvement in its supply chain organization. Initiatives include

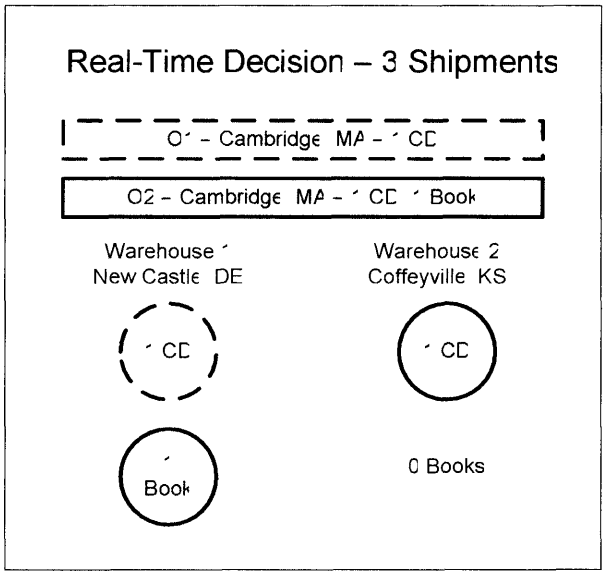
looking at improving the costs associated with order sourcing, driving efficiency and capacity improvements in distribution centers, and leveraging their scale and service window to reduce costs.

Order Sourcing Decision – Re-Evaluating Real Time Decisions

Currently, when a customer orders from Amazon.com, the website integrates with Amazon.com's order sourcing engine to determine which warehouse should ship the order. This decision occurs real-time and is aimed at minimizing transportation costs associated with that order. However, research is being performed that shows a potentially significant cost savings with re-evaluating the sourcing decision to minimize the number of packages shipped within a one to two-day window. The information below is based on research conducted by Xu, Allgor, and Graves (2005).

An example more clearly describes the value of reevaluating fulfillment decisions. A customer in Cambridge, MA orders 1 CD from Amazon.com. This is Order 1 (O1). A few seconds later, a second customer orders the same CD and a book (O2). The CD is available from the New Castle, DE distribution center, but the book is not. The book is only located in the Coffeyville, KS facility. The CD in New Castle, DE is allocated to Order 1 (O1). Then, the second order has to be split between the two distribution centers. This scenario requires 3 packages to get the 3 items to the 2 customers. The assignment is shown in the figure below.

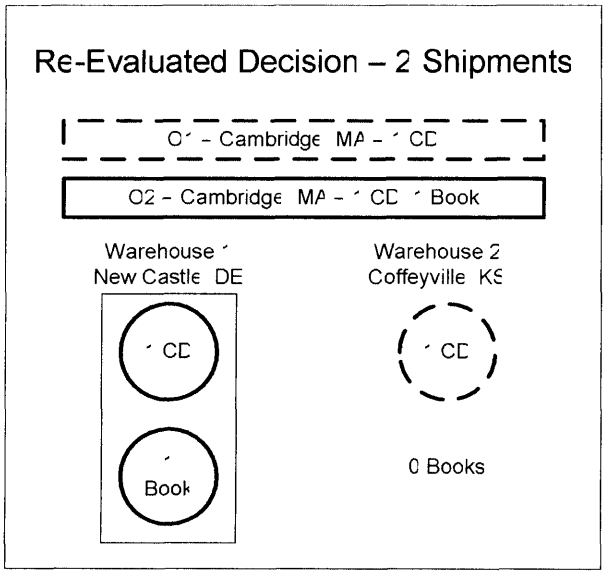
Figure 5-17 Real-Time Sourcing Assignment



Modified from Source: Xu, Allgor, Graves (2005)

If the assignment of orders to DCs were done at a later time, then both the CD and Book associated with Order 2 could be shipped together from the Delaware facility. This would reduce the number of shipments from 3 to 2, thus saving on transportation costs. The savings is based on a significant fixed cost component to parcel transportation.

Figure 5-18 Re-Evaluated Sourcing Assignment



Modified from Source: Xu, Allgor, Graves (2005)

This is a simplistic example of the decision making process. Sophisticated operations research models and IT capabilities need to be developed to implement these decisions at scale to reduce fulfillment and transportation costs without compromising the promised delivery date to the customer.

Distribution Center Initiatives – Efficiency and Capacity Planning

Another focus of recent MIT research through the Leaders for Manufacturing (LFM) program at MIT is improving operations performance through efforts to model more efficient storage techniques, sortation mechanisms, and capacity planning. These two research initiatives show Amazon.com's ongoing focus on operational improvement through profiling, planning, and processes.

Bragg (2003) completes an analysis of manual, semi-automated, and automated sorting mechanisms to determine the appropriate sortation method based on order volume and cubic volume. The research focuses on analyzing the overall outbound costs associated with picking through shipping in the various Amazon.com fulfillment environments. Although specific numbers are confidential, Bragg discovered an order and cubic volume threshold that justified the automated environment. Decreasing volumes lead to solutions where semi-automated and manual sorting deliver the least cost solution.

Zeppieri (2004) developed a capacity planning model that determines the amount of inventory and the bin type selection that is appropriate for different products based on forecasted SKU velocity. The model is useful at a tactical level for understanding the capacity constraints of existing Amazon.com distribution centers, and analyzing the tradeoff between forward pick inventory levels and replenishment costs. At a strategic level, the model also provides a

foundation for mapping the layout and design of future Amazon.com distribution centers when expansion is required.

Leveraging Scale and Service Windows

Through the literature review and industry expert interviews, Amazon.com is shown to be looking for opportunities to leverage scale and service windows to provide a more cost-effective supply chain. Increasing scale has led to internal distribution center efficiencies in batching. Additionally, increasing scale has led to transportation efficiencies through the transportation hub initiatives. As Amazon.com grows, their scale is also being used to generate buying power to negotiate discounts with suppliers (Amazon.com 2003 Annual Report) Service windows are created through Amazon.com free shipping and reduced price shipping initiatives. These services offer customers reduced cost for their willingness to accept longer delivery lead times. Service windows allow Amazon.com to perform more proactive outbound supply chain planning for fulfillment and transportation. Additionally, the increased service window may allow Amazon.com to reduce safety stock levels and potentially flow product through facilities without holding inventory in the future.

5.3 Supply Chain Case Studies Conclusion

This chapter has introduced and evaluated Wal-Mart and Amazon.com's operating models, supply chain designs, replenishment and distribution processes, and ongoing supply chain improvement initiatives. Wal-Mart and Amazon.com inherently have different supply chains to support their different business models supporting mass merchandising and internet retailing. Although their processes may be distinct, both Wal-Mart and Amazon.com have supply chains that clearly support their business strategies and operating models. The next

chapter discusses how Wal-Mart and Amazon.com leverage their supply chains to support and reinforce their competitive strategies.

6 Business Strategy and Supply Chain Strategy

In reviewing retail supply chain management concepts earlier in this thesis, we discussed the importance of linking supply chain strategies and activities with overall company business strategy to create lasting competitive advantage. This chapter leverages the information previously expressed in this paper regarding the retail industry and company case studies to analyze how both Wal-Mart and Amazon.com operate their supply chains in support of their business strategies. Wal-Mart and Amazon.com's operating models, supply chain designs, and practices are discussed within the context of operational excellence, operational innovation, and cross-reinforcing activities in support of their respective business strategies.

6.1 Wal-Mart Business Strategy and Supply Chain Strategy

As mentioned in previous chapters, Wal-Mart's overall business strategy is to provide Every Day Low Prices (EDLP) to customers. As a reminder, EDLP is not a guarantee to customers that they will always find the lowest prices on a given product, but it does ensure that Wal-Mart prices will not erratically fluctuate due to promotional activities. Aside from every day low prices, a complementary element to their strategy is the variety of product offerings at Wal-Mart retail outlets. Wal-Mart has many competitors across retail segments, due to the fact that Wal-Mart's product offerings cover a wide range in one convenient location. The fact that a customer can find so many products under one roof is a competitive advantage for Wal-Mart.

Lastly, a very important element to their business strategy is product availability when products are demanded by customers. In other words, product availability is essential to maintaining an acceptable customer service level that will compel customers to return and become consistent Wal-Mart shoppers. If products are not on the shelves when consumers demand them, all supply chain efficiencies that lead to delivering the product to the store are inconsequential. In summary, Wal-Mart's supply chain strategy must support its business strategy to ensure on-shelf availability of a variety of products in a convenient location at low prices.

6.1.1 Operating Model

In the context of this thesis, which covers only the Wal-Mart Discount Store business unit, there exists one main operating model. Generally for discount stores, the discount stores are replenished by distribution centers (DCs), which are replenished by various vendors. In order to support the EDLP strategy, Wal-Mart focuses on efficiency improvements in all areas of its supply chain, which lowers costs. Wal-Mart utilizes flow-through processes to shorten lead times and reduce inventories. Cost savings can then be passed on to consumers in the form of lower prices. The main objective of the model is to support the Wal-Mart business strategy, as well as find a balance between maximizing customer service levels, supply chain efficiency, and asset utilization. Within the operating model, there are various supply chain factors and processes that enable the model to work effectively in support of Wal-Mart's business strategy.

6.1.2 Operational Objectives Balance

Wal-Mart's operating model balances supply chain efficiency, asset utilization, and customer service levels to support its business strategy. Supply chain efficiency is the most important lever for Wal-Mart in keeping its costs down. Through continuous supply chain cost control, Wal-Mart is able to maintain low prices for customers. Wal-Mart's extensive vendor

collaboration efforts, innovative flow-through distribution processes, and capital investments are all primarily aimed at reducing supply chain costs through efficient processes while maintaining on-shelf availability. Asset utilization is another goal for Wal-Mart, but facility, private fleet, and information technology utilization are again primarily focused on lowering costs. Effective asset utilization leads to lower costs through economies of scale in distribution and transportation. Information technology investments are directed towards improving efficiencies across the extended supply chain from vendors to stores, and thus the use of information technology supports the EDLP business strategy. Finally, although on-shelf availability is a key challenge and important element in Wal-Mart's success, premium customer service is not as critical to Wal-Mart's strategy as is cost-effective product availability. Wal-Mart carries a wide range of products, but by definition the EDLP strategy supports products that are more consumer staple products. High fashion items are not offered. Additionally, product price promotions are limited. By limiting demand variability through carrying products with stable demand and limited promotions, Wal-Mart is able to leverage its assets and utilize efficient processes to meet customer product availability requirements. The following sections explain each of the EDLP enablers more deeply.

6.1.3 EDLP Enablers

Capital investments to support supply chain processes and vendor collaboration are two major supply chain enablers of Wal-Mart's EDLP strategy. These enablers provide competitive advantage by supporting continuous supply chain improvements from within Wal-Mart and through its supplier network. Capital investments and vendor collaboration also provide the foundation for a third EDLP enabler, differentiating supply chain processes that aim to find the most cost effective way to achieve on-shelf availability.

Wal-Mart has made a significant amount of capital investments in order to support its business, including retail store locations, DCs, and crossdocking facilities. Wal-Mart's supply chain investments have been larger than most retailers due to Wal-Mart's size, the volume of inventory that flows through their systems, and their commitment to supply chain improvements. Asset utilization and exploitation is one of the main advantages that Wal-Mart has over competitors, according to industry experts. More specifically, the two main investments that provide Wal-Mart with a competitive advantage are their information technology (IT) infrastructure and their private trucking fleet. Although not obvious at first glance, both investments have been made in order to support its low cost structure. Wal-Mart maintains a private fleet to lower transportation costs by taking advantage of the volume that flows through both their inbound and outbound distribution networks. Wal-Mart focuses their private fleet on short-haul transportation, where deliveries can be made within a day. Common carriers handle long-hauls, since they have larger distribution networks and can more cost effectively make long-haul shipments. Wal-Mart is able to save on transportation costs by maximizing utilization of its fleet. By having a private fleet, Wal-Mart is has flexibility in distribution to stores, due to the fact that truck availability through common carriers is not a factor. This enables Wal-Mart to respond better to changes in customer demand. It is less obvious to see how Wal-Mart's IT infrastructure and capabilities, which include the Inforem and Retail Link systems, cut costs within the supply chain. Inforem, which automatically determines order quantities at the store level for each SKU, is an enabler of EDLP, in that it attempts to eliminate ordering mistakes caused by human error. Essentially, Inforem determines store fulfillment and prevents wasted costs from stockouts and overstocks. Retail Link supports the EDLP strategy by making vital information available to Wal-Mart vendors. When information is available, Wal-Mart vendors

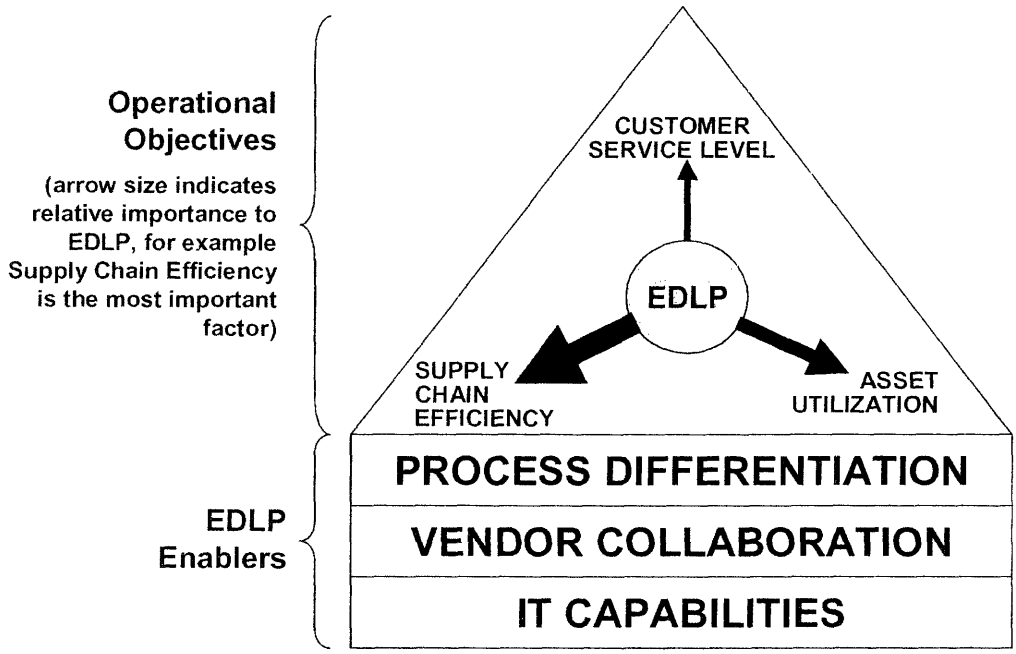
can exploit the data to continuously improve their supply chains and pass on their savings to Wal-Mart. By lowering costs for suppliers through information, Wal-Mart can obtain the best price for the procured products. This price then allows Wal-Mart to retail these products at a lower price than competitors. It is important to acknowledge that the capital investments are deliberately made within the framework of Wal-Mart's business strategy.

Collaborative relationships with suppliers are another supply chain management initiative where Wal-Mart differentiates itself from competitors. The level of collaboration is dependent upon the investment capabilities of each vendor, as well as product volume and value to Wal-Mart. Wal-Mart's IT infrastructure and capabilities enable data sharing to build collaborative relationships with suppliers. In addition to technology, trust and cooperation are essential for Wal-Mart to develop collaborative relationships with vendors, such as vendor managed inventory (VMI) and co-managed inventory (CMI). In order to persuade vendors to make decisions and take actions that are beneficial to Wal-Mart, Wal-Mart has made their profitability and business strategy attached to the performance of their suppliers. Therefore, suppliers are expected to continuously improve their supply chain and organization because their business with Wal-Mart is for the most part, essential to their survival. As seen in Table 4.4, the percentage of each vendor's sales contributed by Wal-Mart is significant. The amount of responsibility that is expected of vendors is another reason why the collaboration between Wal-Mart and its vendors is so advanced. Wal-Mart makes it a priority to give its vendors the tools and the incentives they need to continuously improve, through demanding more out of their suppliers than most retailers. Although Wal-Mart competitors have similar relationships with their vendors, the scale and the depth of Wal-Mart vendor collaboration is greater than the collaborative relationships that Wal-Mart competitors have with their vendors.

Through its IT infrastructure, private trucking fleet, and vendor-retailer collaboration efforts, Wal-Mart is able to apply differentiating supply chain processes to its products. With the large variety of product types and demand patterns, a uniform replenishment process for all products would be inefficient. Supply chain differentiation according to product type is discussed in Chapter Two's conceptual review and is seen in Wal-Mart's supply chain processes. Fisher (1997) expresses the importance of fitting the supply chain process with the product type in order to balance customer service levels, supply chain efficiency, and asset utilization. Even Wal-Mart products, most of which are defined as commodity items, have different supply and demand characteristics, and come in all shapes and sizes. The differences of each SKU should be accounted for when shipping them through different replenishment processes. Wal-Mart's segmentation of products into warehouse, assembly, and direct-to-store replenishment processes shows their understanding and dedication to ongoing operational efficiency and innovation, while maintaining or improving service. Wal-Mart's relationship with suppliers and their IT infrastructure are critical enablers to Wal-Mart's process differentiation.

The following diagram graphically depicts the three factors discussed above, within the context of the Wal-Mart Operating Model.

Figure 6-1 Wal-Mart's Business Strategy and Supply Chain Model



6.1.4 Continuous Improvement

Wal-Mart revenues have grown rapidly from year to year. A portion of the growth can be attributed to their deployment of additional retail outlets throughout the US. The other major growth driver is Wal-Mart's consistent drive for efficiency and improvement throughout its supply chain. This commitment helps keep prices low and product available in existing stores, which enables growth within existing stores. More importantly, the actions taken to make improvements have been done in accordance with its business strategy. All supply chain initiatives mentioned in the previous chapter along with major capital investments that have been made since its inception ultimately lead towards continuing the Every Day Low Price promise made to Wal-Mart customers. Wal-Mart has been an innovator or an excellent implementer of

many supply chain initiatives prevalent in the retail industry, including crossdocking, VMI and CMI with partners, and RFID adoption and compliance. These initiatives, as well as ones mentioned in previous chapters would not be possible if Wal-Mart was not the dominating force in the retail industry. This is a strength that most retailers can not replicate.

6.1.5 Tailored Business Processes: Wal-Mart Supply Chain Strategy Linkage to Competitive Strategy

Supply chain processes, such as crossdocking, can easily be replicated by any retail company that has the monetary resources and dedication to institute process change. So why is it that Wal-Mart dominates the retail industry in sales volume with a widening gap year after year? The answer lies in the fit and cross-reinforcement of Wal-Mart's activities. Porter (1996) discusses the concept that a set of activities that fit together and reinforce one another while supporting a company's business strategy provides a lasting competitive advantage. Wal-Mart is praised for its vendor collaboration, IT capabilities, asset utilization, and distribution process efficiency. Other retailers can attempt to copy Wal-Mart's distribution processes to achieve supply chain cost reductions and service improvements. However, Wal-Mart's distribution processes have evolved over time through leveraging their IT capabilities to support vendor collaboration, and building scale to support asset utilization. Wal-Mart's distribution processes can not be copied competitively without developing the integrated capabilities that Wal-Mart has in place. Wal-Mart's supply chain practices are specifically tailored to its operating model and are cross-reinforcing to support competitive advantage. Information sharing, vendor collaboration, distribution network efficiencies, and transportation efficiencies all work together to support Wal-Mart's distribution processes. Replicating these practices requires significant capital investments and significant implementation timeframes for competitors.

As other retailers make capital expenditures in facilities and information technology, negotiate with vendors on collaborative efforts, and attempt to replicate Wal-Mart processes, Wal-Mart investigates the next generation of supply chain innovations that keep it one step ahead of the competition. In this way, the organization's commitment to operational efficiency and innovation support lasting competitive advantage. Although some may find Wal-Mart's relationship with its vendors to be demanding with respect to supply chain initiative compliance, Wal-Mart invests a great deal of effort to give its suppliers the tools needed in order to encourage improvements that benefit the suppliers and the entire retail channel. The financial and resource dedication to effective collaboration is a contributing factor to Wal-Mart's supply chain and business success. Finally, the culture of never being satisfied with current conditions and making decisions based on whether or not those decisions support EDLP allows Wal-Mart to sustain its competitive advantage.

In summary, Wal-Mart utilizes a set of cross-reinforcing supply chain practices that are tailored to its business environment to sustain its competitive advantage in retail. Vendor collaboration efforts, IT capabilities, and Wal-Mart's network of facilities and private fleet all support the efficient distribution processes that Wal-Mart employs. These intermingled activities require significant investment and time for competitors to imitate. As the competition attempts to match Wal-Mart's efficiency, Wal-Mart's cultural dedication to continuous operational innovation allows the organization to further extend Wal-Mart's capabilities. The integrated nature of Wal-Mart's investments, operational efficiency, collaboration and compliance, and culture comprise a supply chain strategy that supports the EDLP business strategy to create lasting competitive advantage.

6.2 Amazon.com Business Strategy and Supply Chain Strategy

Amazon.com's business strategy is to compete on selection, convenience, and price. Amazon.com's goals through its vision statements are to be "earth's most customer centric company" while providing "earth's biggest selection" (Amazon.com 2003 Annual Report). Underlying Amazon.com's strategy and vision is a cultural and organizational commitment to innovation. The company has built their supply chain to support their business strategy through a multi-tier supply chain design, innovative inventory management techniques, and a focus on cost-effective processes. The sections below discuss Amazon.com's supply chain differentiation through its operating model and specific supply chain practices related to leveraging scale, scope, and service windows.

6.2.1 Operating Model

Amazon.com's operating model has several variations as discussed in Chapter Five of this paper. Amazon.com operates as a pure-play internet retailer that does not have physical retail stores. Customers order through a website that serves as a virtual storefront. Product is delivered through a network of distribution centers that are operated by Amazon.com, through wholesaler and supplier partners, or through third-parties. This operating model enables Amazon.com's strategy of selection, convenience, and price. The multi-tier inventory model that includes Amazon.com inventory, partner inventory, and third-party sellers allows customers to browse a selection of millions of products. Furthermore, this supports customer convenience, as Amazon.com allows a virtual one-stop shopping experience where customers can find anything online without having to search another website. With the network of inventory that ensures that Amazon.com will have the product available through at least one of its channels, customers are

not lost to other websites. Finally, the operating model allows Amazon.com to be competitive on price through lower inventory costs through consolidated inventory in distribution centers as opposed to store inventory and distribution inventory that traditional retailers require. In the Amazon.com operating model, a large amount of customers typically order a small amount of units per order. For this reason, Amazon.com is required to employ innovative batching, picking, and sorting processes to gain distribution and transportation efficiencies that help keep costs in control. This allows, Amazon.com to keep prices low for customers while maintaining profitability. In summary, Amazon.com's operating model variations, multi-tier inventory network, and efficient distribution center processes support Amazon.com's strategy of selection, convenience, and price.

6.2.2 Operational Objectives Balance

To support their internet retailing operating model, Amazon.com balances the operational objectives of customer service, supply chain efficiency, and asset utilization to support its supply chain and business strategy. Amazon.com's vision statements revolve around customer-centricity. In light of this vision, customer service is the primary goal for Amazon.com's supply chain. Front-end customer service is the store browsing experience with personalized virtual storefronts, recommendations, and content features. Back-end customer service is supported through the operational model and network that ensures product availability for millions of items. Additionally, customer service is supported through allowing customers to self-select the level of service they desire. Self-service selection allows customers to balance the delivery lead time with the amount they wish to pay, with free shipping offered on most orders of $25 or more. Supply chain efficiency and asset utilization are important to Amazon.com's supply chain, but are secondary to customer service. Supply chain efficiency and asset utilization are related in

that increased scale and scope improves asset utilization as well as supply chain efficiency for Amazon.com. Amazon.com looks for efficient distribution and transportation processes through aggregating a large number of orders and executing efficient batch processes. Advanced picking strategies and sortation mechanisms reduce the incremental cost per order in the distribution center, as the number of orders increases. Additionally, when Amazon.com leverages longer service windows to enable batching for less-than-truckload (LTL) or truckload (TL) shipments, transportation efficiencies are obtained. As the number of customers and orders grows and the product selection increases, Amazon.com's information technology and distribution center assets are utilized more effectively. These efficient distribution center and transportation processes and the resulting asset utilization benefits allow Amazon.com to keep prices low while striving to improve profitability. Therefore, Amazon.com's primary supply chain focus is in providing customer service excellence through product availability and self-selection of service. The combination of customer service, supply chain efficiency, and asset utilization allow Amazon.com to provide the service and convenience on which they compete at a competitive price. The sections below discuss how Amazon.com leverages scale, scope, and service windows to support their operational goals of product availability, efficiency, and asset utilization in support of the Amazon.com business strategy.

6.2.3 Scale

Amazon.com founder and CEO Jeff Bezos focused on a strategy of growth in revenue scale before focusing on profitability (Spector, 2002). This strategy has been criticized by many in the financial community as Amazon.com failed to make a profit until 2003. However, Amazon.com realizes many benefits from innovative processes to leverage scale in their supply chain. Unlike traditional retailers, Amazon.com does not have the opportunity for scale in

fulfillment and transportation on a per order basis. For example, retail stores are typically replenished in full pallet or case quantities. At the distribution center, picking efficiencies are obtained by picking in full pallet or case quantities. When orders are shipped to stores transportation savings are realized, as retailers can leverage less expensive full truckload (TL) or less than truckload (LTL) shipments due to the size of their store order replenishments. In the business-to-consumer (B2C) Amazon.com environment, customers typically order a small number of items and a small number of units. This requires Amazon.com to be innovative in developing initiatives and refining processes to leverage scale. Amazon.com creates picking scale efficiencies in its distribution centers by batching multiple orders for aggregated picking. Additionally, Amazon.com creates transportation scale by batching multiple orders going to a heavily concentrated customer area to be able to utilize less expensive transportation for long-haul transportation as opposed to their parcel carrier partners. Amazon.com's large, automated facilities with significant information technology investment are created with the idea of high initial fixed costs, but relatively low marginal costs for fulfilling an additional order. Therefore, economies of scale are realized as the order volume grows. Understanding the supply chain benefits of scale provide insight into Bezos' strategy to expand into different product lines and offer a wide assortment of inventory to achieve scale in fulfillment operations.

6.2.4 Scope

Amazon.com offers millions of items for sale in a wide variety of product categories. The company utilizes its different operating models to support its business strategy of providing a large selection of items. The Amazon.com as a seller model (see Chapter 5) holds a competitive advantage from an inventory selection standpoint when compared to traditional retailers. This is because inventory is aggregated at a distribution center level where there is

more flexibility to distribute inventory to meet specific customer order requirements. In traditional retail settings, inventory is required to be in the store and on the shelf to ensure a sale. A stockout occurs if a customer requests a product at any one store that has no inventory of that product available. Aggregating inventory at the DC level allows more flexibility to distribute goods from centralized inventory while reducing the need for safety stock. This allows Amazon.com to carry a much wider selection than physical retailers while maintaining a competitive inventory turnover advantage.

Amazon.com also provides a platform for third parties to sell merchandise to its customers through its Merchants@ and Marketplace programs. Through this model customers are able to find products on Amazon.com, even when Amazon.com does not carry the inventory or does not have the inventory available. The number of sellers on Amazon.com is approaching 900,000 (CIBC World Markets, 2005). This network allows Amazon.com to further increase the selection that is has available without incurring inventory or logistics costs. This creates a supply chain of information rather than inventory, where Amazon.com receives much higher margins than their standard business model.

Amazon.com further supports its selection through partnerships with other retailers. Amazon.com provides the e-commerce platform and order fulfillment for Target.com. Target owns the inventory in the Amazon.com distribution center and Amazon.com is responsible for fulfillment (Amazon.com 2004 10-K Form, 2005). This is another variation of Amazon.com's business model that allows more inventory selection, without a greater investment in inventory, although there is an opportunity cost to carrying the inventory in the warehouse. Another form of partnership is through the use of drop shippers. Drop shippers include publishers, manufacturers, and book distributors, who carry inventory and are called upon to deliver items

directly to Amazon.com customers. In this process of disintermediation, inventory does not pass through the Amazon.com DC, which helps to keep distribution and inventory carrying costs low.

The scope of Amazon.com's multi-tier partner network creates a supply chain network that supports a selection of millions of products without excess inventory carrying costs. Amazon.com can draw upon the inventory in its distribution centers, its distributors, or from publishers and manufacturers to fill customer orders. The processes within this innovative network further characterize Amazon.com's ability to leverage the scope of its supply chain design.

6.2.5 Service

Amazon.com notes customer centricity as a core value of the company. The customer service experience during the online browsing and purchasing process is part of what differentiates Amazon.com from other online competitors. It also supports the notion of convenience noted in Amazon.com's strategy statement. In addition to the front-end experience, Amazon.com incorporates its service initiatives to improve supply chain performance.

Amazon.com attributes a portion of its decreasing fulfillment costs to an improvement in order accuracy, which in turn has decreased its customer service calls (Amazon.com 2004 10-K Form). Amazon.com has invested heavily in technology and processes that ensure that logistics service levels are met. Amazon.com utilizes its technology infrastructure to provide customers with immediate visibility regarding an expected ship date for an order. Customer visibility is further supported through emails that indicate when an order has been shipped. Furthermore, when drop shippers provide fulfillment services, they are provided with Amazon.com packaging to present a seamless customer service experience to customers (Maltz et al., 2004).

Amazon.com also offers guarantees for third-party shipper service, which contributes to costs, but supports their focus on service.

Service window management is a process where Amazon.com balances cost and logistics customer service. Amazon.com currently offers free shipping on most orders for $25 or more. The program helps to drive revenue increases through customer satisfaction and potentially increasing the size of an order to meet the free shipping threshold. Additionally, the program allows Amazon.com to create a service window that allows the company to increase the lead time in the promised delivery date to the customer. On orders without free shipping, different service options are offered to customers with varying lead times. Amazon.com leverages the service window to create supply chain efficiencies. Distribution center planning and processes can be made for efficient through aggregating batches over a longer lead time. Additionally, transportation cost efficiencies can be obtained through planning over a longer lead time in carrier and transportation type selection.

6.2.6 Enablers – Collaboration and Technology

In the survey of current internet retail literature, we noted the importance of supplier retailer collaboration and technology in enabling retail success. Amazon.com's operating models are built on collaboration through technology between the many partners in its extended supply chain. Amazon.com utilizes technology to link with its drop shippers to understand inventory availability for order sourcing. Additionally, Amazon.com creates a supply chain platform that links third-party shippers and buyers. Technology innovation is a core principle at Amazon.com in creating customer value from the front-end shopping experience to the logistics behind order fulfillment. Investments in the Amazon.com website as well as supply chain

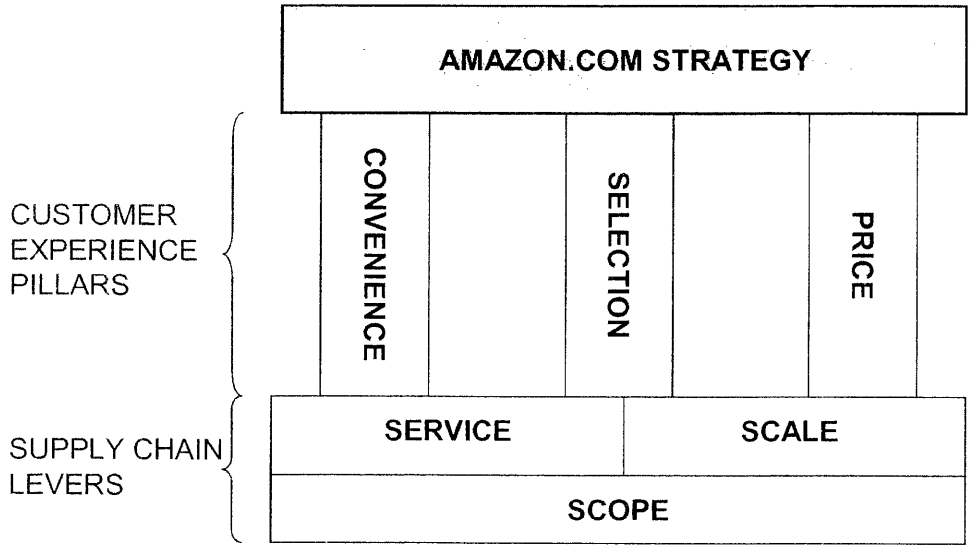
support applications, such as their advanced warehouse management system (WMS), help to enable their operational and strategic supply chain initiatives.

6.2.7 Tailored Business Processes: Amazon.com Supply Chain Strategy Linkage to Competitive Strategy

As noted with respect to Wal-Mart, Porter (1996) stresses the fit between organizational activities and their cross-reinforcing nature as lasting sources of competitive advantage. Amazon.com utilizes scale, scope, and service in an integrated manner to ensure product availability and drive down supply chain costs to provide the selection, convenience, and low price experience on which they compete.

Figure 6-2 Amazon.com Business Strategy and Supply Chain Model

This figure shows how the supply chain levers of scale, scope, and service support Amazon.com's three customer experience pillars of convenience, selection, and price to support Amazon.com's strategy.



Amazon.com's initiatives in achieving economies of scale in fulfillment and transportation are supported and reinforced by service window management initiatives. These initiatives lead to lower costs for Amazon.com that can be utilized to improve profits or pass savings onto customers through lower prices. Scope and service fit together to allow a customer to find a vast selection of merchandise on Amazon.com with seamless fulfillment. This supports

Amazon.com's goal of customer-centricity and convenience from the front-end shopping experience through final delivery of product. As the scale of volume sales grows and the scope of selection through partners grows, Amazon.com's supply chain enables the business goals of continued growth and improved profitability.

Amazon.com focuses on operational excellence in its supply chain operations, and extends its efforts to include operational innovation. In revisiting Porter (1996), operational excellence is an important component of strategy, but it is not sufficient. Hammer (2004) discusses operational innovation as doing different activities than competitors or doing the same activities differently. Amazon.com's unique supply chain models support and reinforce one another to create a retail supply chain based on operational innovation. The players and the processes in the Amazon.com supply chain are similar to those in traditional retail supply chains. However, the interaction between Amazon.com and its suppliers and the processes that support supply chain design, inventory placement, and supply chain processes are uniquely tailored to Amazon.com's business model.

6.3 Conclusion

Wal-Mart and Amazon.com compete in similar ways. Selection, convenience, and price are both essential to these companies. Although their strategies are similar, Wal-Mart's primary operational goal is supply chain efficiency to drive costs down and support their Every Day Low Price (EDLP) strategy. Amazon.com's primary operational goal is to provide a high level of service, where a customer can always find the product for which they are browsing, and self-select the level of delivery service and cost they are willing to incur. Additionally, Wal-Mart and Amazon.com's different operating models require different supply chain structures and processes to support their initiatives. Wal-Mart's capital investments in information technology and

infrastructure, relationships with vendors, and commitment to process efficiency through product profile analysis support the efficiency, service, and asset utilization goals that they strive to balance. Amazon.com's use of scale, scope, and service through unique operating models, partnerships, and supply chain process efficiencies enables them to provide selection, convenience, and competitive pricing. Both of these companies achieve supply chain excellence through focusing supply chain initiatives on specific goals that support and reinforce their long-term competitive business strategies.

7 Commonality, Transferability, and Future Research

This chapter synthesizes our research by discussing the commonality between Wal-Mart and Amazon.com supply chain practices, introducing opportunities for the transferability of supply chain initiatives between the case study companies and other companies in the retail industry, and highlighting the opportunities for transferability of supply chain initiatives to other industries. Finally, we identify opportunities for future research within the retail industry, as well as future research on Wal-Mart and Amazon.com.

7.1 Wal-Mart and Amazon.com Supply Chain Commonality

Wal-Mart and Amazon.com are very different companies. Wal-Mart is the largest retailer in the world with thousands of retail store locations, where customers select product from store shelves for purchase. Amazon.com is the largest internet retailer in the world, serving individual customers with product deliveries from their own distribution centers and partner inventories. Despite their differences, there are many similarities between the two companies, starting with their business strategies. Both companies compete on selection, convenience, and price. Wal-Mart and Amazon.com support their strategies through a variety of supply chain strategies and practices. Although the way Wal-Mart and Amazon.com execute their supply chain strategies differs due to their different operating models, there are several themes that are

common among their approaches to supply chain management. The sections below will identify several areas where Wal-Mart and Amazon.com share common principles in utilizing supply chain management to support their business strategies.

Wal-Mart and Amazon.com both have supply chain strategies, processes, and initiatives that are linked to supporting their competitive business strategies. Wal-Mart has built large stores to ensure a wide selection of merchandise is available to customers. The wide selection of available merchandise supports customer convenience where customers can perform one-stop shopping to find all the items they need. Amazon.com has built a multi-tier inventory network to ensure that product is available, which is all presented through an innovative, easy-to-navigate online customer interface. Additionally, Wal-Mart and Amazon.com focus on having products available when demanded. On-shelf availability is much more involved for Wal-Mart, where the product has to be ordered from vendors, pass through distribution centers, and be available on a specific store shelf to ensure availability. Amazon.com on the other hand searches their own inventory, drop shipper inventory, and third party inventory to ensure that products are available for customers that request them. Finally, the two companies focus on operational efficiency to lower costs and then pass those savings onto customers in order to promote growth. Although the execution processes that these companies utilize differ, both Wal-Mart and Amazon.com support employ supply chain designs, processes, and initiatives that directly support their business strategies.

Designing the most appropriate supply chains for different product and order profiles is another area where Wal-Mart and Amazon.com are similar. Wal-Mart follows one of three distribution processes, warehouse, assembly, and direct-to-store based on different product characteristics and demand profiles (see Chapter 5). Amazon.com analyzes its SKU and order

profile to improve efficiency in warehouse inventory storage, pick density, and outbound fulfillment efficiency. Again, the processes are different, but the principles are the same. These two companies understand the importance of profiling to balance supply chain initiatives of lowering costs while maintaining a high level of service.

The use of information technology (IT) as a competitive advantage is another area where Wal-Mart and Amazon.com are similar. Wal-Mart has invested in systems to streamline information sharing and product flow across the supply chain. Wal-Mart's Retail Link system provides suppliers with a single point of contact for point of sale information at Wal-Mart stores so that vendors can manage their information more actively. Additionally, transportation routing decisions and carrier selections are made through Retail Link when Wal-Mart is contracting transportation. Wal-Mart is also driving radio frequency identification (RFID) adoption through mandating pallet and case level tagging from major suppliers. Wal-Mart hopes that RFID will help drive efficiency in operational processes, reduce shrinkage through lost inventory and theft through better visibility, and allow more close collaboration with vendors. IT initiatives are focused on supporting specific business initiatives to drive down costs of coordinating with vendors, as well as inventory costs. Amazon.com has built their customer experience on IT capabilities. The Amazon.com personalized storefront helps customers find products they are looking for, provides recommendations, and offers content services such as "search inside the book" (Amazon.com 2003 Annual Report). Amazon.com has also invested significantly in systems for order sourcing decisions within their network, as well as integrating with their suppliers for drop shipping decisions. Their investment in supply chain systems is also shown with their advanced warehouse management system (WMS). Amazon.com leverages their position in the internet retail space, their information technology platform, and their brand to

incorporate third-party sellers. Although many retailers have made investments in technology, what separates Wal-Mart and Amazon.com from other retailers is the use of information to differentiate business processes in customer service or cost reduction.

Another area where Wal-Mart and Amazon.com are alike is the way they leverage vendor relationships to improve supply chain performance. Wal-Mart interacts very closely with suppliers through information sharing with Retail Link, and through initiatives aimed at overall channel optimization. Wal-Mart utilizes vendor managed inventory with their top suppliers, allowing the vendors to determine the proper order quantities to replenish to distribution centers and sometimes stores. Furthermore, Wal-Mart often utilizes collaborative planning forecasting and replenishment (CPFR) principles to move to co-managed inventory initiatives where Wal-Mart and the vendor work together to determine the most appropriate ordering and inventory decisions to balance cost and service. Amazon.com leverages relationships in a different way. Because the Amazon.com model delivers products from distribution centers directly to customers, Amazon.com is able to utilize suppliers as drop shippers in a process that is often transparent to customers. Additionally, Amazon.com is often able to leverage the inventories of manufacturers and book publishers to ship products directly to customers. Again, although the specific processes that each company utilizes are different, they both extract significant value through sharing information, leveraging capabilities, and coordinating with suppliers.

Leveraging scale is the final area where Wal-Mart and Amazon.com are similar. Wal-Mart leverages its scale to drive competitive purchase prices from vendors, and to gain distribution and transportation efficiencies. The scale of inventory that passes through Wal-Mart's network allows the company to leverage its private fleet to bring down per unit transportation costs. Order sizes from key vendors are typically large enough to warrant large

truckload shipments on a daily basis. In this way, Wal-Mart gets to leverage economies of scale without sacrificing service. As identified in Chapter 6 of this paper, Amazon.com uses creative distribution and transportation processes to create scale. The Amazon.com order profile of a large number of orders with a small number of units and a low volume per order inherently does not have scale. However, as the number of customers and orders increases, opportunities to create scale in distribution center processes are presented. By aggregating orders for outbound warehouse picking, sorting, and packing processes, Amazon.com is able to decrease the fulfillment cost per order. Managing the customer service window is another way in which Amazon.com creates scale. By offering lower cost or free shipping initiatives that provide customers with incentives to allow longer delivery lead times, Amazon.com is able to proactively plan their operations to create scale in distribution and transportation.

These examples provide some insight into the commonality in themes that Wal-Mart and Amazon.com share in their supply chain management practices. The processes may differ but share common principles. Through linking supply chain initiatives to business strategy, designing processes to support specific profiles, and through leveraging information technology, vendor relationships, and scale, Wal-Mart and Amazon.com are able to support their strategies through supply chain management.

7.2 Transferability of Best Practices within Wal-Mart, Amazon.com, and the Retail Industry

After identifying Wal-Mart and Amazon.com supply chain management practices, we have identified a few processes for potential transferability between the two companies, physical mass merchandise and internet retailers, and the retail industry in general.

Wal-Mart and Amazon.com's relationships with vendors are discussed as an area of commonality. However, the purpose and depth of coordination is an opportunity for process transferability between both companies. Wal-Mart has deep relationships with vendors for collaboration on ordering quantities and inventory management. Deepening inbound replenishment process collaboration is an opportunity to transfer a Wal-Mart.com practice to Amazon.com. For example, Amazon.com leverages major book distributors to ship products directly to customers. In some cases, Amazon.com carries the same products as their distributors. There are potential improvements in collaboration to determine exactly which inventory Amazon.com should carry and which inventory distributors should carry. Also, sharing demand and service window data to improve forecasts and inventory decisions is an opportunity for improvement. A potential process that is transferable from Amazon.com to Wal-Mart is the idea of leveraging third-party inventory through consignment. Wal-Mart employs vendor managed inventory with many vendors, but only uses consignment inventory in specific circumstances. Consignment inventory, where ownership transfers from vendor to Wal-Mart once the item is purchased at the shelf, is an opportunity for Wal-Mart to improve inventory turnover. Amazon.com's drop shipper practice is essentially a method of consignment inventory. Amazon.com does not pay to hold the inventory, and pays fees only when product is sold. Traditional retailing is different in that ownership typically changes from supplier to retailer once product arrives at retailer distribution centers. Wal-Mart currently utilizes consignment only on a very small scale with a limited number of product segments. Wal-Mart initiatives to implement RFID can help to provide the data visibility and control necessary to implement consignment inventory initiatives on a larger scale.

Amazon.com's supply chain processes are transferable to multi-channel retailers and pure-play internet retailers that are trying to launch or improve online operations. Amazon.com has evolved over time and focused on continuous improvement to emerge as a profitable internet retailer. Therefore, their supply chain processes and business model can serve as a template for other pure-play internet retailers and multi-channel retailers. Amazon.com's model of leveraging inventory directly from manufacturers, distributors, and partners can be leveraged by other retailers in their supply chain channels. Amazon.com's expertise in handling the e-commerce order profile can also be leveraged by traditional retailers in improving their online channel performance. Amazon.com's internet channel excellence is recognized by retailers that contract Amazon.com to manage their e-commerce front-end website and back-end fulfillment, while maintaining the merchandising functions. Other companies present an online website that utilizes Amazon.com as the back-end for inventory and fulfillment, such as Borders. An interesting trend to watch is the level at which Amazon.com retail partners end relationships with Amazon.com to launch their own web operations. As retailers become more familiar with the online channel, as well as learn from existing relationships, retailers may focus on operating their own online channels. For example, Circuit City recently announced its decision to end its relationship with Amazon.com ("Circuit City Ends Relationship with Amazon.com", 2005). Therefore, the transferability of Amazon.com's distribution practices may serve to hurt the company's long-term retail partnerships.

An area where Wal-Mart and Amazon.com excel is leveraging scale to gain a supply chain advantage. In the commonality area of this chapter, we discussed Wal-Mart's scale advantage in purchasing, relationships, and operations. Also, we discussed Amazon.com's scale advantages through aggregation, batch processes, and service window management. The lesson

that is transferable to other retailers is that companies don't have to be of a large scale to leverage scale. Wal-Mart's 2003 revenues were $256 billion and Amazon.com 2004 revenues were $6.9 billion, yet they both leverage scale to improve supply chain performance. Effective supply chain planning, service window management, and understanding the tradeoff between cost and service can allow retailers to leverage scale to drive down supply chain costs in their organizations.

These examples of vendor relationship differentiation and collaboration, online channel management, and supply chain planning for scale show the transferability of best practices between Wal-Mart, Amazon.com, and other retailers.

7.3 Transferability of Supply Chain Concepts between Industries

Although the retail industry has some unique challenges, there are concepts and activities that are transferable between retail and other industries. Below, a few opportunities for the transfer of retail practices are discussed, including the concept of the "maestro" for partner collaboration, channel optimization, and process differentiation by product profile.

Collaborative efforts between retailers and suppliers have been a focal point in this thesis. However, this type of collaborative relationship is not possible for many of Wal-Mart's smaller suppliers due to a lack in human resources and information technology capabilities. As we have seen from other industries, the concept of a "maestro" (De Graves, 2004) is emerging. A maestro relationship is where a third party company coordinates relationships between smaller suppliers and larger wholesalers or retailers, regardless of the product type. The "maestro" concept has been seen in apparel through Li and Fung, who connect and manage individual

apparel manufacturers with larger apparel retailers. Amazon.com can be seen as a type of virtual maestro in the Amazon.com as intermediary model. Amazon.com coordinates the connection between individual sellers to internet consumers, and provides the technological means to make the retail transaction possible. As seen through industry interviews, maestros for Wal-Mart have been those who know mass merchandising and are able to advise smaller vendors on improvements in both internal and external structures and processes in order to establish and maintain a profitable relationship. Companies in industries that are not vertically integrated such as automotive and high-tech can benefit from maestros to coordinate with their smaller suppliers. By having a maestro coordinate the relationship, vendors do not necessarily have to invest heavily in IT and human resource capabilities, but can still benefit from a knowledgeable third party to create and manage a mutually beneficial relationship.

Shifting the focus from optimization at a company level to global supply chain optimization is another component of retail supply chains that is transferable to other industries. Through partnerships that Wal-Mart and Amazon.com have with their vendors, we see that the division between vendor and retailer is slowly becoming smaller by using supply chain visibility tools and collaborative efforts. Wal-Mart has become a leader in pushing for efficiency not only in their supply chain but in their suppliers' supply chains as well. Wal-Mart sees the benefit of the entire supply chain from source to consumer, instead of within the walls of Wal-Mart's DCs and retail outlets. The importance of global supply chain optimization can be seen as traditional supplier and retailer responsibilities have been shifting to those who can perform the activities most efficiently and cost effectively, in order to benefit the entire supply chain. Other industries that suffer from the old paradigm of silo-management could benefit from the collaborative efforts of some of the players in the retail industry, such as Wal-Mart and Amazon.com, who

attempt to coordinate with vendors to push waste out of the entire supply chain and increase profitability as a whole. Successes with global optimization in the retail industry illustrate the opportunity for the proliferation of overall channel optimization among other industries.

Processes designed to fit specific product and demand profiles are another area of transferability from our retail case studies to companies in other industries. Understanding the product and demand profiles through channel and customer segmentation is critical in retail as well as manufacturing industries. Designing the right process for a product and order profile, can increase service while simultaneously reducing costs. Although companies in other industries may not have the same supply chain structure or processes as Wal-Mart, understanding product characteristics and demand profiles to develop the right distribution strategy and reduce inventory are opportunities present in many supply chains. In distribution center environments where there are large volumes of small unit orders, such as fulfillment of service parts in the high-tech or automotive industries, the order fulfillment process can be optimized through internet retail order fulfillment practices. In previous chapters, we noted that Amazon.com can balance cost and service through understanding the service window to fulfill orders. The result is better planning for managing pick processes and shipment schedules. With the longer period to plan, the cost per order decreases. Other industries can benefit from this process by analyzing the balance between service promises and fulfillment and transportation costs.

The above examples are a subset of concepts and practices that can be leveraged across industries. In future research, the transferability of practices across industries represents a valuable future research extension to MIT Supply Chain 2020 Project research. Other future research proposals are discussed in the following section.

7.4 Future Research Proposals

Although portions of this thesis cover the overall retail industry, the case studies we evaluate more specifically evaluate the mass merchandise retailing and internet retailing segments of the retail industry. Thus, this thesis does not cover all major supply chain practices and concepts that are important within retail. This section identifies additional opportunities for future research as an extension of our research.

Although Supply Chain 2020 researches other retail industries, such as apparel, automotive, and grocery, there are other major areas of retailing that have not been covered that could be added to provide a more comprehensive view of the retail industry. Given the time constraints, the other areas of research not covered are larger retailers that Standard and Poor's identifies as the moderate retailers and smaller retailers who are niche focused in their product and service selections. Examples of the moderate retailers include department stores such as Federated Department Stores, and larger retail chains that sell durable products such as Home Depot. The product variety and characteristics, such as product sizes, demand and supply variability, and obsolescence, may differ within these retailers from mass merchandisers or internet retailers. Therefore, it would be interesting to analyze the differences and similarities of department store, small retailer, and mass merchandiser supply chain processes to mitigate supply chain risks and respond to supply chain challenges. The level of vendor collaboration for smaller retailers represents an interesting topic. Supplier power is greater with smaller retailers than it is with large mass merchandise retailers. Given this difference, how do smaller retailers respond to supply chain challenges with a more powerful supplier?

Continued research within the two case study companies is an opportunity as well. With Wal-Mart and Amazon.com being leaders in their respective retail segments, they will continue

to be appropriate case studies for supply chain initiatives that are taking place within mass merchandising and internet retailing. Within Wal-Mart, additional research could be done by quantitatively analyzing the supply chain initiatives mentioned in Chapter 5 to uncover the costs and benefits experienced as a result of their implementations. Particularly, an analysis of their paradigm shift and matrix of processes by product type could provide value. Amazon.com presents an interesting research topic in determining how to optimize their multi-tier inventory network to determine what inventory is carried by what entity and in what amount. With this research in hand, further research to determine how to segment inventory and make inventory policy decisions aimed at continuous cost and service improvement could be performed. As other internet retailers and brick-and-mortar retailers become stronger competitors to Amazon.com in internet fulfillment execution, determining an optimal to way to store and manage inventory becomes a larger challenge and a more lasting component to competitive advantage.

7.5 Conclusion

The retail industry has a large scope that could never be covered by a single thesis. Therefore, this thesis has taken the approach of looking at the overall industry when appropriate and analyzing at detailed information through case study analysis in mass merchandising and internet retailing. This thesis analyzed the major concepts available in the literature involving supply chain strategy, retail trends, and internet retail trends. Then the paper defined the major components of the retail industry and internet retailing segments, and explained where Wal-Mart and Amazon.com fit in the industry. Next, we analyzed their supply chains from a strategy, design, and process standpoint and linked their supply chains into their competitive business

strategy. Finally, this chapter has looked at the commonality between Wal-Mart and Amazon.com's supply chain practices, the transferability of those practices within the retail industries and across other industries, and identified topics for future research.

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