CHAPTER

13

Supply Chain Management

When suppliers fail to deliver products or services as promised, buyers search for a new supplier. Organizational buyers assign great importance to supply chain processes that eliminate the uncertainty of product delivery. Supply chain management assures that product, information, service, and financial resources all flow smoothly through the entire value-creation process. Business marketers invest considerable financial and human resources in creating supply chains to service the needs and special requirements of their customers. After reading this chapter, you will understand:

1. **the role of supply chain management in business marketing strategy.**
2. **the importance of integrating both firms and functions throughout the entire supply chain.**
3. **the critical role of logistics activities in achieving supply chain management goals.**
4. **the importance of achieving high levels of logistics service performance while simultaneously controlling the cost of logistics activities.**

Johnson Controls is a major supplier to the automotive industry of a variety of components, including dashboards, seats, and consoles. For Chrysler's Jeep Liberty, for example, Johnson Controls supplies complete cockpit modules, seating systems, overhead consoles, and several electronic components. The cockpit module alone consists of 11 major components—from mechanical, electrical, and audio systems to the instrument panel trim. The company integrates parts from 35 suppliers, assembles the complete cockpit, and delivers it to Chrysler as one module—all within what is called the "204-minute broadcast window." As soon as Chrysler notifies the company that it has received an order for a Jeep Liberty, Johnson Controls has 204 minutes to build and deliver that cockpit to the Chrysler plant 9 miles away with any one of 200 different color and interior combinations or options.[1] The company performs that operation 900 times a day, just for that one model.

Interestingly, this choreographed supply chain sequence takes place daily at several Johnson Controls plants around the world for a number of auto manufacturers, such as Mercedes, Buick, and Pontiac. How does Johnson Controls make this happen? The firm applies effective *supply chain management processes* that include (1) integrated computer systems that provide production schedules and demand forecasts to all supply chain members, and (2) collaborative program-management tools that allow manufacturers and suppliers to synchronize activities and respond to events in real time. From the time a component system is engineered to when it is sold, Johnson Controls has adopted processes that tightly connect engineering, manufacturing, procurement, marketing, and sales. Because supply chain partners manufacture components of the firm's interior modules, Johnson Controls works closely with them to design the right product, at the right cost, and deliver it at the right time.

These efforts at Johnson Controls are part of an innovative approach to tightening distribution processes, bolstering links with suppliers and customers, and integrating production and marketing that is referred to as **supply chain management (SCM)**. As new business strategies evolve, SCM is one of the predominant management approaches driving many organizations.[2] Bill Copacino, a noted supply chain consultant, puts the importance of SCM in focus:[3]

> In almost every industry, supply chain management has become a much more important strategic and competitive variable. It affects all of the shareholder value levers—cost, customer service, asset productivity, and revenue generation. Yet we are seeing a growing gap in performance between the leading and the average companies. The best are getting better faster than the average companies across almost every industry. For instance, Dell operates with 60 to 100 inventory turns, more than two or three times most of its competitors. So, clearly, the performance gap is widening, and we see this happening in almost every industry segment. The leading *supply chain* performers are applying new technology, new innovations, and new process thinking to great advantage. The average-performing companies and the laggards have a limited window of opportunity in which to catch up.

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[1] Lorie Toupin, "Needed: Suppliers Who Can Collaborate throughout the Supply Chain," Supply Chain Automotive Supplement to *Supply Chain Management Review* 6 (July–August, 2002): p. 6.

[2] Peter C. Brewer and Thomas W. Speh, "Using the Balanced Scorecard to Measure Supply Chain Performance," *Journal of Business Logistics* (Spring 2000): p. 75.

[3] Bill Copacino, "Supply Chain Challenges: Building Relationships," *Harvard Business Review* 81 (July 2003): p. 69.

This chapter describes the nature of SCM, explains its important goals, discusses the factors that lead to successful supply chain strategies, and demonstrates how logistics management is a key driver of supply chain success. Once SCM has been defined, the chapter highlights how the business marketer's logistics processes form the core of the SCM strategy. The logistical elements are described in terms of their interface within the distribution channel and how they must be integrated to create desired customer service standards. The chapter then addresses the role of logistics in purchasing decisions, the types of logistics services buyers seek, and the design of effective logistics processes.

The Concept of Supply Chain Management

A supply chain encompasses all the activities associated with moving goods from the raw materials stage through to the end user (for example, a personal computer buyer). A formal definition of SCM is:

> Supply chain management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Central to SCM are the coordination and collaboration activities performed with channel partners, which may include suppliers, intermediaries, third party service providers, and customers. In essence, supply chain management integrates supply and demand management within and across companies.[4]

The supply chain includes a variety of firms, ranging from those that process raw materials to make component parts to those engaged in wholesaling. Included also are organizations engaged in transportation, warehousing, information processing, and materials handling. The critical processes involved in SCM include the following:

1. Customer Relationship Management
2. Supplier Relationship Management
3. Customer Service Management
4. Demand Management
5. Order Fulfillment
6. Manufacturing Flow Management
7. Product Development and Commercialization
8. Returns Management[5]

Successful SCM coordinates and integrates these processes into a seamless level of performance. Effective supply chain management requires the careful integration of these processes across several different organizations in the supply chain.

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[4]CSCMP Definition of Supply Chain Management, accessed at http://cscmp.org/aboutcscmp/definitions/definitions.asp, August 2008.

[5]Douglas Lambert (ed.), *Supply Chain Management* (Sarasota, FL: Supply Chain Management Institute, 2008), p. 10.

Importantly, supply chain management can improve overall company performance in two fundamental ways: revenue enhancement and cost reduction. Supply chain management can—and should—play an important role in each of those areas. For example, supply chain management can play a leadership role in creating a more responsive supply chain, thereby helping the company to win more business (and increase revenues) from customers. Similarly, supply chain management can take the lead in applying good processes to better manage and lower costs across the entire enterprise, not just those typically assigned to procurement, manufacturing, or logistics.[6]

Supply chains should be managed in an integrated manner. Integrated SCM focuses on managing relationships, information, and material flow across organizational borders to cut costs and enhance flow. When the multicompany nature of the supply chain focus is combined with a process-flow approach to business, the critical role that SCM assumes becomes clear. Rather than merely handling order fulfillment, SCM is instrumental in a full range of activities from product development and new-product-launch strategies to fulfillment and recycling. To that end, SCM must be fully integrated into business strategy and fine-tuned throughout the product's life cycle.[7] Leading supply chain–oriented firms focus intensely on monitoring actual user demand instead of forcing into markets products that may or may not sell quickly. In so doing, they minimize the flow of raw materials, finished product, and packaging materials, thereby reducing inventory costs across the entire supply chain.

Partnerships: The Critical Ingredient

Thomas Stalkamp, former CEO of Chrysler, notes that many old-line U.S. industrial firms are hampered by the fact that the atmosphere between the parties in supply chains is more adversarial than it needs to be. He refers to this old-line, nonintegrated approach to business as "adversarial commerce."[8] Fueling the movement to SCM has been the recognition by many firms that adversarial commerce is costly and limits the ability of all supply chain members to compete in the global marketplace.

Integrating activities across the supply chain requires close working relationships. SCM may require that all firms in the supply chain share sensitive and proprietary information about customers, actual demand, point-of-sale transactions, and corporate strategic plans. SCM involves significant joint planning and communication; firms often create teams of personnel that cut across functional and firm boundaries to coordinate the movement of product to market. In other words, achieving the real potential of SCM requires integration not only among departments within the organization but also with external partners.

A wonderful example of the effect of integration among supply chain partners is the case of Avnet, a huge electronics distributor. Avnet developed a program to integrate its supply chain processes with those of a major manufacturer supplier and with the major component supplier to that manufacturer. By sharing demand and production information, the participants raised on-time delivery from 80 percent to

[6]Robert A. Rudzki, "Supply Chain Management Transformation: A Leader's Guide," *Supply Chain Management Review* 12 (March, 2008): p. 14.

[7]Laura Rock Kopczak and M. Eric Johnson, "The Supply Chain Management Effect," *MIT Sloan Management Review* 44 (Spring 2003): p. 28.

[8]Thomas T. Stallkamp, "Ending Adversarial Commerce," *Supply Chain Management Review* 9 (October 2005): pp. 46–52.

100 percent of all orders, increased inventory turnover by a factor of 5, and tripled the return on materials! The collaboration of all supply chain partners is required to achieve such performance results.

Traditional, nonintegrated approaches to managing product and information flows are expensive and time-consuming. Such approaches often involve much higher transportation and handling costs, and they demand considerable time from salespeople, buyers, and others in the organization. For example, material is often moved around too much—one major computer manufacturer reported that some of the components it used had traveled 250,000 miles before they reached the ultimate buyer. Furthermore, traditional transactions processes create excess inventory in the pipeline leading to the customer. In the pharmaceutical industry, for example, firms that have not adopted SCM incur higher inventory-carrying costs and provide lower levels of customer service than their competitors.

Firms and their suppliers can create highly competitive supply chains by collaborating. Failure to collaborate can result in inefficiencies such as increases in material cost, distortion of information as it moves through a supply chain, or slow response to product design and development. By entering into long-term supply chain partnerships, firms can eliminate many of these problems and ensure ongoing improvement.[9] Until some type of partnership is in place, the true benefits of supply chain integration cannot be achieved. Dell, for example, strives to maintain long-term relationships with high-reliability suppliers, such as Sony, so that items like monitors can be shipped from the supplier (Sony's factory) directly to the customer. The result is that Dell is able to fulfill customer orders in real time.[10] Industry experts recognize Dell as an elite performer in SCM.[11]

Not only do effective supply chains conduct business as partners, they also openly share information. Intelligence about the customer and what the customer has ordered is transmitted upstream so that every organization in the supply chain has it and can respond accordingly. When information is made immediately available to supply chain members, Tier 1 and Tier 2 suppliers can act immediately, eliminating the delays that created inefficiencies in the past. This allows the supply chain to reduce inventories (safety stocks) and speed up cash flow. Figure 13.1 depicts the stages that companies go through when forming intercompany networks. Note that in Stage 3, the "Extended Enterprise," companies have successfully aligned both their internal and external processes. This is the ultimate goal of SCM.

Supply Chain Management: A Tool for Competitive Advantage

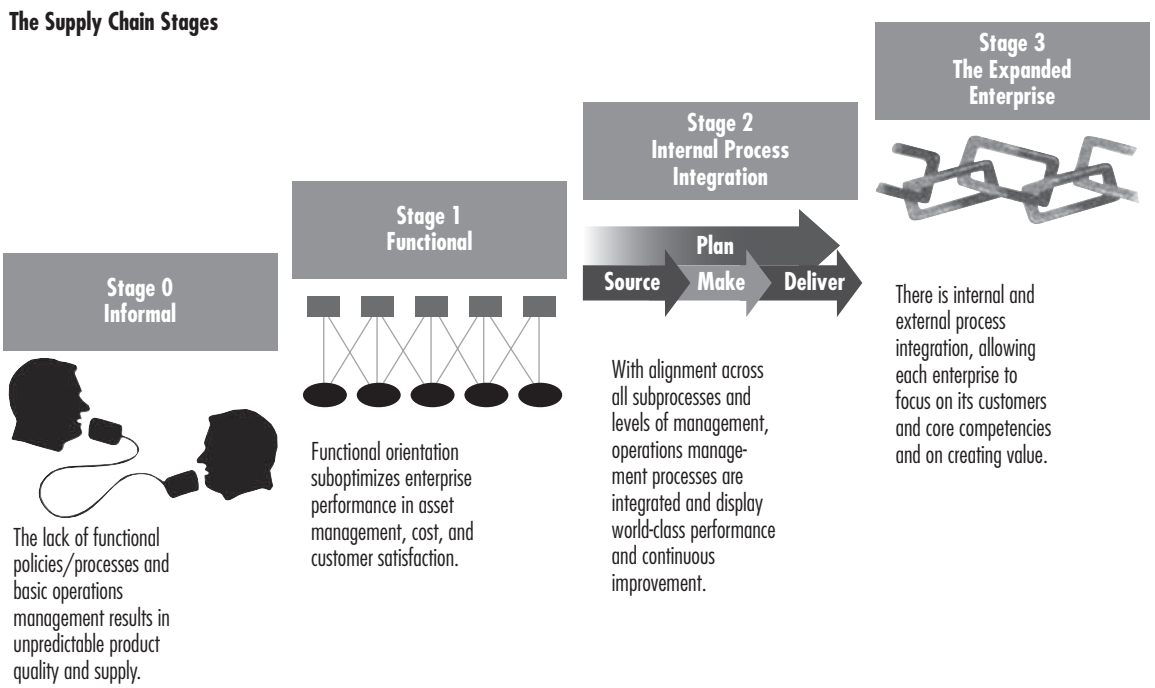
The supply chain can be a powerful competitive weapon, as market leaders like Dell, Grainger, and Hewlett-Packard have demonstrated. Other best-in-class supply chain performers include Johnson Controls, Inc. (JCI), profiled at the outset of this chapter, and Motorola. In recognizing Johnson Controls as a world-class supply chain performer, AMR Research observed: "JCI's continued success proves demand-driven supply chain

[9] Anupam Agrawal and Arnoud De Meyer, "Managing Value in Supply Chain—Case Studies on Alternate Structures," *INSEAD Working Papers Collection* (28, 2008): p. 1.

[10] S. Chopra and J. A. Van Mieghan, "Which e-Business Is Right for Your Supply Chain?" *Supply Chain Management Review* 4 (July–August 2000): p. 34.

[11] Thomas A. Stewart and Louise O'Brien, "Execution Without Excuses," *Harvard Business Review* 83 (March 2005): p. 110.

FIGURE 13.1 | **Stages Firms Go Through in Adopting Supply Chain Management**



SOURCE: Tom Brunell, "Managing a Multicompany Supply Chain," *Supply Chain Management Review* (Spring 1999): p. 49. Reprinted with permission of *Supply Chain Management Review*, a Cahners publication.

can work anywhere in the supply chain, provided outside-in thinking is applied from the customer backward into manufacturing and engineering."[12] For Motorola, incorporating supply chain management into all phases of the design, sourcing, manufacturing, and distribution processes helped the company to enhance its market position across sectors. Supply chain management is now recognized by Motorola's top management as an important source of competitive advantage and shareholder value creation.[13]

As a primary interface point with the customer, SCM can offer value in the form of competitively superior delivery and value-added services, as defined by customers. Best-in-class SCM practices provide advantages, including 10 to 30 percent higher on-time delivery performance, a 40 to 65 percent (or 1- to 2-month) advantage in cash-to-cash cycle time, and 50 to 80 percent less standing inventory, which all translates into 3 to 6 percent of a company's revenue. For a $100 million company, earnings improvements of up to $6 million are achievable by thoroughly adopting SCM practices.[14] However, SCM, as a source of competitive advantage, is not simply a way to reduce cost, but also a way to boost revenues.[15]

[12] Tony Friscia, Kevin O'Marah, Debra Hofman, and Joe Souza, "The AMR Research Supply Chain Top 25 for 2007," accessed at http://www.amrresearch.com/content/ on May 31, 2007.

[13] William Hoffman, "Squeezing Supply Chains," *Traffic World* 127 (July 7, 2007): p. 16.

[14] Bill Faherenwald, "Supply Chain: Managing Logistics for the 21st Century," *Business Week*, December 28, 1998, Special Section, p. 3.

[15] Charles Batchelor, "Moving Up the Corporate Agenda," *The Financial Times*, December 1, 1998, p. 1.

Supply Chain Management Goals

SCM is both a boundary- and function-spanning endeavor. The underlying premise of SCM is that waste reduction and enhanced supply chain performance come only with both intrafirm and interfirm functional integration, sharing, and cooperation. Thus, each firm within the supply chain must tear down functional silos and foster true coordination and integration of marketing, production, procurement, sales, and logistics. Furthermore, actions, systems, and processes among *all* the supply chain participants must be integrated and coordinated. Firmwide integration is a necessary, but not sufficient, condition for achieving the full potential benefits of SCM. Integration must be taken to a higher plane so that functions and processes are coordinated across all the organizations in the supply chain. SCM is undertaken to achieve four major goals: waste reduction, time compression, flexible response, and unit cost reduction.[16] These goals have been articulated in several contexts associated with SCM, and they speak to the importance of both interfunctional and interfirm coordination.

Waste Reduction Firms that practice SCM seek to reduce waste by minimizing duplication, harmonizing operations and systems, and enhancing quality. With respect to duplication, firms at all levels in the supply chain often maintain inventories. Efficiencies can be gained for the chain as a whole if the inventories can be centralized and maintained by just a few firms at critical points in the distribution process. With a joint goal of reducing waste, supply chain partners can work together to modify policies, procedures, and data-collection practices that produce or encourage waste.[17] Typically, waste across the supply chain manifests itself in excess inventory. Effective ways to address this are through postponement and customization strategies, which push the final assembly of a completed product to the last practical point in the chain. Dell provides an excellent illustration of how to reduce waste through effective "waste" management strategies. The company's build-to-order model produces a computer only when there is an actual customer order. Dell works with its suppliers to achieve a system where inventory turns are measured in hours rather than days. Because Dell does not maintain stocks of unsold finished goods, it has no need to conduct "fire sales." The result: Waste has been eliminated both on the component side and on the finished-goods side.

Time Compression Another critical goal of SCM is to compress order-to-delivery cycle time. When production and logistics processes are accomplished in less time, everyone in the supply chain is able to operate more efficiently, and a primary result is reduced inventories throughout the system. Time compression also enables supply chain partners to more easily observe and understand the cumulative effect of problems that occur anywhere in the chain and respond quickly. Reduced cycle time also speeds the cash-to-cash cycle for all chain members, enhancing cash flow and financial performance throughout the system. Time compression means that information and products flow smoothly and quickly, thus permitting all parties to respond to customers in a timely manner while maintaining minimal inventory. Many industrial distributors like W.W. Grainger have designed supply chains that are able to respond

[16] Brewer and Speh, "Using the Balanced Scorecard," p. 76.

[17] Kate Vitasek, Karl B. Manrodt, and Jeff Abbott, "What Makes a LEAN Supply Chain?" *Supply Chain Management Review* 9 (October 2005): pp. 39–45.

to customer orders with "same-day" delivery, allowing customers to reduce inventories and to rest assured that timely delivery support is available to solve unexpected problems.

Flexible Response The third goal of SCM is to develop flexible response throughout the supply chain. Flexible response in order handling, including how orders are handled, product variety, order configuration, order size, and several other dimensions, means that a customer's unique requirements can be met cost-effectively. To illustrate, a firm that responds flexibly can configure a shipment in almost any way (for example, different pallet patterns or different product assortments) and do it quickly without problems for the customer. Flexibility also may mean customizing products in the warehouse to correspond to a customer's need for unique packaging and unitization. The key to flexibility is to meet individual customer needs in a way that the customer views as cost-effective and the supply chain views as profitable.

Unit Cost Reduction The final goal of SCM is to operate logistics in a manner that reduces cost per unit for the end customer. Firms must determine the level of performance the customer desires and then minimize the costs of providing that service level. The business marketer should carefully assess the balance between level of cost and the degree of service provided. The goal is to provide an appropriate value equation for the customer, meaning that cost in some cases is higher for meaningful enhancements in service. Cost cutting is not an absolute, but the SCM approach is focused on driving costs to the lowest possible level for the level of service requested. For example, shipping product in full truckload quantities weekly is less expensive than shipping pallet quantities every day; however, when a customer like Honda wants daily deliveries to minimize inventories, the SCM goal is to offer daily shipments at the lowest possible cost. SCM principles drive down costs because they focus management attention on eliminating activities that unnecessarily add cost, such as duplicate inventories, double and triple handling of the product, unconsolidated shipments, and uncoordinated promotions, such as special sales.

Hau Lee, an internationally recognized expert, points out that supply chain efficiency is necessary, but it is not enough to ensure that firms do better than their rivals. Only companies that build agile, adaptable, and aligned supply chains get ahead of the competition.[18] Efficient supply chains often become uncompetitive because they do not adapt to changes in market structures: Supply chains need to keep adapting so they can adjust to changing customer needs. In addition, low-cost supply chains are not always able to respond to sudden and unexpected changes in markets—like a shift in resource availability or the effect of a natural disaster. Finally, excellent supply chain companies align the interests of all the firms in their supply chain with their own—if any company's interests differ from those of the other organizations in the supply chain, its actions do not maximize the chain's performance.

Benefits to the Final Customer

A well-managed supply chain ultimately creates tangible benefits for customers throughout the supply chain. When the supply chain reduces waste, improves cycle

[18] Hau L. Lee, "The Triple-A Supply Chain," *Harvard Business Review* 82 (October 2004): pp. 102–112.

Inside Business Marketing

When the Chain Breaks

It began on a stormy evening in New Mexico in March 2000 when a bolt of lightning hit a power line. The temporary loss of electricity knocked out the cooling fans in a furnace at a Philips semiconductor plant in Albuquerque. A fire started, but was put out by staff within minutes. The damage seemed to be minor: eight trays of wafers containing the miniature circuitry to make several thousand chips for mobile phones had been destroyed. After a good clean-up, the company expected to resume production within a week. That is what the plant told its two biggest customers, Sweden's Ericsson and Finland's Nokia, who were vying for leadership in the booming mobile-handset market. Nokia's ***supply-chain*** managers had realized within two days that there was a problem when their computer systems showed some shipments were being held up. Delays of a few days are not uncommon in manufacturing and a limited number of back-up components are usually held to cope with such eventualities. But whereas Ericsson was content to let the delay take its course, Nokia immediately put the Philips plant on a watch list to be closely monitored in case things got worse.

They did. Semiconductor fabrication plants have to be kept spotlessly clean, but on the night of the fire, smoke and soot had contaminated a much larger area of the plant than had first been thought. Production would be halted for weeks. By the time the full extent of the disruption became clear, Nokia had already started locking up all the alternative sources for the chips.

That left Ericsson with a serious parts shortage. The company, having decided some time earlier to simplify its supply chain by single-sourcing some of its components, including the Philips chips, had no plan B. This severely limited its ability to launch a new generation of handsets, which in turn contributed to huge losses in the Swedish company's mobile-phone division. This has become a classic case study for supply-chain experts and risk consultants.

SOURCE: Adapted from "When the Chain Breaks," *The Economist*, 379 (June 17, 2006): p. 18.
Parts of this article were taken from Yossi Sheffi, *The Resilient Enterprise*, (Boston: MIT Press, 2005) and Martin Christopher, *Logistics and Supply Chain Management* (London: Financial Times Prentice Hall, 2005).

time and flexible response, and minimizes costs, these benefits should flow through to ultimate customers. Thus, a key focus of the supply chain members is monitoring how much the customer is realizing these important benefits and assessing what may be preventing them from doing so. A supply chain's customer can be viewed on several dimensions, and it is important to focus on each. A producer of electronic radio parts views the radio manufacturer as an absolutely critical customer, but the auto manufacturer that installs the radio in a car is equally important, if not more so, and ultimately the final buyer of the automobile must be satisfied. Thus, different demands, desires, and idiosyncrasies of customers all along the supply chain must be understood and managed effectively. As the Inside Business Marketing example at the Phillips semiconductor plant suggests, uncontrollable events can create havoc in a supply chain, and both suppliers and customers need to focus attention on creating detailed contingency plans for overcoming unplanned disruptions.

The Financial Benefits Perspective

Innovative supply chain strategies that couple physical goods movement with financial information sharing can open the door to greater end-to-end supply chain cost

savings, better balance sheets, lower total costs, higher margins, and a more stable supply chain with everyone sharing the savings.[19] When supply chain partners are achieving their goals and the benefits are flowing through to customers, supply chain members should succeed financially. The most commonly reported benefits for firms that adopt SCM are lower costs, higher profit margins, enhanced cash flow, revenue growth, and a higher rate of return on assets. Because activities are harmonized and unduplicated, the cost of transportation, order processing, order selection, warehousing, and inventory is usually reduced. A study to validate the correlation between supply chain integration and business success shows that best-practice SCM companies have a 45 percent total supply chain cost advantage over their median supply chain competitors.[20] Cash flows are improved because the total cycle time from raw materials to finished product is reduced. The leading firms also enjoy greater cash flow—they have a cash-to-order cycle time exactly half that of the median company. On the other hand, recent evidence suggests that the stock market punishes firms that stumble in SCM. For example, one study showed that supply chain glitches can result in an 8.6 percent drop in stock price on the day the problem is announced and up to a 20 percent decline within 6 months.[21]

Information and Technology Drivers

Supply chains could not function at high levels of efficiency and effectiveness without powerful information systems. Many of the complex Internet supply chains maintained by companies like Hewlett-Packard and Cisco could not operate at high levels without sophisticated information networks and interactive software. The Internet—and Internet technology—is the major tool business marketers rely on to manage their lengthy and integrated systems. In addition, a host of software applications play a key role in helping a supply chain operate at peak efficiency.

Supply Chain Software SCM software applications provide real-time analytical systems that manage the flow of products and information through the supply chain network.[22] Of course, many supply chain functions are coordinated, including procurement, manufacturing, transportation, warehousing, order entry, forecasting, and customer service. Much of the software is focused on each one of the different functional areas (for example, inventory planning or transportation scheduling). However, the trend is to move toward software solutions that integrate several or all of these functions. The result is that firms can work with a comprehensive "supply chain suite" of software that manages flow across the supply chain while including all of the key functional areas. Several firms producing Enterprise Resource Planning (ERP) software—such as SAP or Oracle—have developed applications that attempt to integrate functional areas and bridge gaps across the supply chain.

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[19] Aura Drakšaitė and Vytautas Snieška, "Advanced Cost Saving Strategies of Supply Chain Management in Global Markets," *Economics and Management* (2008): p. 113

[20] Brad Ferguson, "Implementing Supply Chain Management," *Production and Inventory Management Journal* (Second Quarter, 2000): p. 64.

[21] Robert J. Bowman, "Does Wall Street Really Care about the Supply Chain?" *Global Logistics and Supply Chain Strategies* (April 2001): pp. 31–35.

[22] Steven Kahl, "What's the 'Value' of Supply Chain Software?" *Supply Chain Management Review* 3 (Winter 1999): p. 61.

SCM software creates the ability to transmit data in real time and helps organizations *transform* supply chain processes into competitive advantages. Equipping employees with portable bar code scanners that feed a centralized database, FedEx is a *best-practices* leader at seamlessly integrating a variety of technologies to enhance all processes across an extended supply chain.[23] The company uses a real-time data transmission system (via the bar code scanners used for every package) to assist in routing, tracking, and delivering packages. The information recorded by the scanners is transmitted to a central database and is made available to *all* employees and customers. Each day FedEx's communications network processes nearly 400,000 customer service calls and tracks the location, pickup time, and delivery time of 2.5 million packages! FedEx is electronically linked so tightly with some customers that when the customer receives an order, FedEx's server is notified to print a shipping label, generate an internal request for pickup, and then download the label to the customer's server. The label, with all the needed customer information, is printed at the customer's warehouse and applied to the package just before FedEx picks it up. This tight electronic linkage adds significant efficiency to the customer's supply chain process and allows FedEx to deliver on its promises.[24]

Successfully Applying the Supply Chain Management Approach

The nature of the firm's supply chain efforts often depends on the nature of the demand for its products. Marshall Fisher suggests that products can be separated into two categories: "functional" items, like paper, maintenance supplies, and office furniture, for example; or "innovative" items, like cell phones, the BlackBerry, or other high-tech products. The importance of this distinction is that functional items require different supply chains than do innovative products.[25]

Functional products typically have predictable demand patterns, whereas innovative products do not. The goal for functional products is to design a supply chain with efficient physical distribution; that is, it minimizes logistics and inventory costs and assures low-cost manufacturing. Here, the key information sharing takes place within the supply chain so that all participants can effectively orchestrate manufacturing, ordering, and delivery to minimize production and inventory costs.

Innovative products, on the other hand, have less predictable demand, and the key concern is reacting to short life cycles, avoiding shortages or excess supplies, and taking advantage of high profits during peak demand periods. Rather than seeking to minimize inventory, supply chain decisions center on the questions of where to *position* inventory, along with production capacity, in order to hedge against uncertain demand. The critical task is to capture and distribute timely information on

[23] Sandor Boyson and Thomas Corsi, "The Real-Time Supply Chain," *Supply Chain Management Review* 5 (January–February 2001): p. 48.

[24] For a related discussion, see Pierre J. Richard and Timothy M. Devinney, "Modular Strategies: B2B Technology and Architectural Knowledge," *California Management Review* 47 (Summer 2005): pp. 86–113.

[25] Marshall Fisher, "What Is the Right Supply Chain for Your Product?" *Harvard Business Review* 75 (March–April 1997): p. 106.

B2B Top Performers

Making Supplier Relationships Work

During the past decade, Toyota and Honda have struck remarkable partnerships with some of the same suppliers who describe their relationships with the Big Three U.S. automakers as adversarial. Of the 2.1 million Toyota/Lexuses and the 1.6 million Honda/Acuras sold in North America in 2003, Toyota manufactured 60 percent and Honda 80 percent in North America. Moreover, the two companies source about 70 to 80 percent of the costs of making each automobile from North American suppliers. Despite the odds, Toyota and Honda have managed to replicate in an alien Western culture the same kind of supplier webs they developed in Japan. Consequently, they enjoy the best supplier relations in the U.S. automobile industry, have the fastest product development processes, and reduce costs and improve quality year after year. Toyota claims that over 60 percent of its innovations come from ideas provided by their suppliers! Hence, they understand the importance of maintaining excellent supplier relationships.

Both firms:

- understand how their suppliers work and develop deep knowledge of the degree of efficiency and effectiveness that particular suppliers demonstrate.
- turn supplier rivalry into an opportunity by rewarding quality, innovation, and cost-reduction initiatives.
- actively supervise suppliers and help them improve their operational capabilities.
- continuously and intensively share information with suppliers.
- conduct joint improvement activities to advance mutual goals.

Rather than excelling on one dimension, Toyota and Honda win by applying all of them as a system for continuously improving supplier relationships.

SOURCE: Jeffrey K. Liker and Thomas Y. Choi, "Building Deep Supplier Relationships," *Harvard Business Review* 82 (December 2004): pp. 104–113.

customer demand to the supply chain. When designing the supply chain, firms should concentrate on creating *efficient* processes for functional products and *responsive* processes for innovative products.

Successful Supply Chain Practices

Most successful supply chains have devised approaches for participants to work together in a partnering environment. Supply chains are not effective and, in reality, are *not* supply chains when the participants are adversaries. Supply chain partnerships form the foundation. Highly effective supply chains feature integrated operations across supply chain participants, timely information sharing, and delivering added value to the customer. As testimony to the importance of supply chain partnerships, the Malcolm Baldrige National Quality Award Committee recently made "key supplier and customer partnering and communication mechanisms" a separate category it would use to recognize the best companies in the United States.[26] In considering the economic value created across *the supply chain*, one expert observes, "You should

[26]Jeffrey K. Liker and Thomas Y. Choi, "Building Deep Supplier Relationships," *Harvard Business Review* 82 (December 2004): p. 104.

go for the best return on net assets for the supply chain, and trade off costs between income statements and balance sheets to see that *everybody* shares in that gain."[27] For the supply chain partners to work as a unit, this enlightened perspective of collaboration is mandatory.

For the supply chain partnership to succeed, the partners need to clearly define their strategic objectives, understand where their objectives converge (and perhaps diverge), and resolve any differences.[28] Because the supply chain strategy drives all the important processes in each firm as well as those that connect the firms, managers in both organizations must participate in key decisions and support the chosen course. Once key participants specify and endorse supply chain strategies, performance metrics can be established to track how well the supply chain is meeting its common goals. The metrics used to measure performance are tied to the strategy and must be linked to the performance evaluation and reward systems for employees in each of the participating firms. Without this step, individual managers would not be motivated to accomplish the broad goals of the supply chain.

Logistics as the Critical Element in Supply Chain Management

Nowhere in business marketing strategy is SCM more important than in logistics.

> Logistics management is that part of supply chain management that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirements. Logistics management activities typically include inbound and outbound transportation management, fleet management, warehousing, materials handling, order fulfillment, logistics network design, inventory management, supply/demand planning, and management of third-party logistics services providers. To varying degrees, the logistics function also includes sourcing and procurement, production planning and scheduling, packaging and assembly, and customer service. It is involved in all levels of planning and execution—strategic, operational and tactical. Logistics management is an integrating function, which coordinates and optimizes all logistics activities, as well as integrates logistics activities with other functions including marketing, sales, manufacturing, finance, and information technology.[29]

Effective business marketing demands efficient, systematic delivery of finished products to channel members and customers. The importance of this ability has elevated the logistics function to a place of prominence in the marketing strategy of many business marketers.

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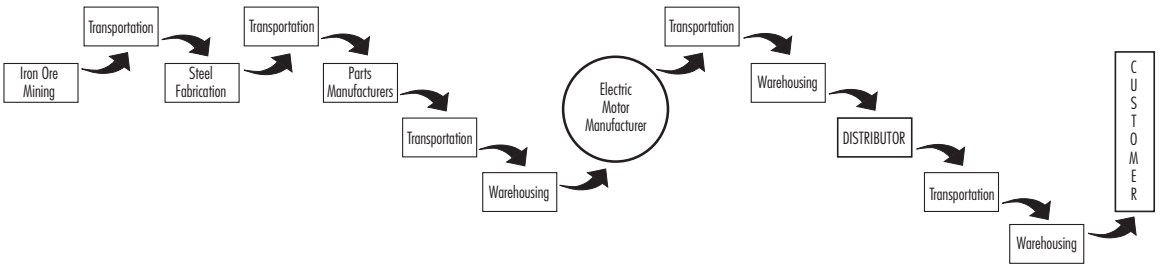
[27] Richard H. Gamble, "Financing Supply Chains," *businessfinancemag.com* (June 2002): p. 35.

[28] Peter C. Brewer and Thomas W. Speh, "Adapting the Balanced Scorecard to Supply Chain Management," *Supply Chain Management Review* 5 (March–April 2001): p. 49.

[29] CSCMP Definition of Logistics, accessed at http://cscmp.org/aboutcscmp/definitions/definitions.asp on August 2008.

FIGURE 13.2 | **Supply Chain for Electric Motors**



Distinguishing Between Logistics and Supply Chain Management

Logistics is the critical element in SCM. In fact, there is considerable confusion over the difference between the discipline of SCM and logistics. As our definition stated, SCM is focused on the *integration of* all *business processes* that add value for customers.

The 1990s witnessed the rising importance of time-based competition, rapidly improving information technology, expanding globalization, increasing attention to quality, and the changing face of interfirm relationships. These trends combined to cause companies to expand their perspective on logistics to include all the firms involved in creating a finished product and delivering it to the buyer or user on time and in perfect condition. For example, the supply chain for electric motors would include raw material suppliers, steel fabricators, component parts manufacturers, transportation companies, the electric motor manufacturer, the distributor of electric motors, the warehouse companies that store and ship components and finished products, and the motor's ultimate buyer. Figure 13.2 graphically depicts such a supply chain. The SCM concept is an integrating philosophy for coordinating the total flow of a supply channel from supplier to ultimate user. Logistics is critical, however, to business marketers, because regardless of the orientation to the entire supply chain, the firm relies on its logistics system to deliver product in a timely, low-cost manner.

Managing Flows

The significance of the supply chain perspective in logistical management is that the business marketing manager focuses attention on the performance of *all participants* in the supply chain. The manager also coordinates their efforts to enhance the timely delivery of the finished product to the ultimate user at the lowest possible cost. Inherent in the supply chain approach is the need to form close *relationships* with the supply chain participants, including vendors, transportation suppliers, warehousing companies, and distributors. The focus of logistics in the SCM for business marketers is the *flow of product* through the supply chain, with *timely information* driving the entire process.

Product flow in the reverse direction is also important in business supply chains. Many companies, like Xerox and Canon, routinely remanufacture products that are worn out or obsolete. Effective linkages and processes must be in place to return such products to a facility in order to remanufacture or retrofit them. If the reverse supply

chains are operating effectively, companies can sometimes realize higher margins on the remanufactured products than they do on new items.[30]

The Strategic Role of Logistics

In the past, logistics was viewed simply as a cost of doing business and a function whose only goal was higher productivity. Today, many companies view logistics as a critical strategic weapon because of its tremendous effect on a customer's operation. For many business marketers, logistics is their *primary* marketing tool for gaining and maintaining competitive superiority. These firms typically recognize that logistics performance is an important part of marketing strategy, and they exploit their logistics competencies. Companies that incorporate logistics planning and management into long-term business strategies can achieve significant benefits, which create real value for the company. Nucor Steel enjoys strong customer loyalty because it can deliver steel to a construction site within a 2- to 4-hour window and offload the truck in the sequence in which the steel beams will be used on the job! This advantage is significant because storage space is limited at most construction sites in urban areas. This strong value-added service allows Nucor to achieve higher levels of profitability than its competitors.

Sales-Marketing-Logistics Integration

The rising value of logistics as a strategic marketing weapon has fostered the integration of the sales, marketing, and logistics functions of many business marketers. In progressive firms, unified teams of sales, production, logistics, information systems, and marketing personnel develop integrated logistics programs to offer to potential customers. Sales calls are made by teams of specialists from each area, and the teams tailor logistics solutions to customer problems. United Stationers, one of the largest U.S. office products distributors, brings operations and salespeople together to meet with the company's resellers in an effort to create customer-responsive logistics service. As a result of its efforts, United guarantees customers that orders placed by 7:00 p.m. will be received before noon on the following day. Customers can dial into United's mainframe computer and place orders electronically. The company considers all of its logistics people to be part of the sales function. Some firms have taken the integration even further. Baxter Healthcare warehouse workers team up with warehouse personnel at the hospitals that Baxter serves. During visits to the customer warehouse, the Baxter warehouser evaluates the operation, looking for ways to improve packing so shipments are easier to unload and unpack. As a result, Baxter warehousers have become salespeople.

Just-in-Time Systems

To serve a customer, business marketers must be prepared to deliver their products frequently and with precise timing. The reason is the widespread adoption by manufacturing firms, like Honda of America, of the **just-in-time (JIT)** inventory principle. Under this principle, suppliers carefully coordinate deliveries with the manufacturer's

[30]James Stock, Thomas W. Speh, and Herbert Shear, "Many Happy (Product) Returns," *Harvard Business Review* 80 (July 2002): p. 14.

production schedule—often delivering products just hours before they are used. The objective of a JIT system is to eliminate waste of all kinds from the production process by requiring the delivery of the specified product at the precise time, and in the exact quantity needed. Importantly, the quality must be perfect—there is no opportunity to inspect products in the JIT process. Because JIT attempts to relate purchases to production requirements, the typical order size shrinks, and more frequent deliveries are required. Increased delivery frequency presents a challenge to the business marketing production and logistics system. However, business marketers will have to meet this challenge, as many competitors now compete on the basis of inventory turns and speed to market.[31]

Just-in-Time Relationship A significant effect of JIT purchasing has been to drastically reduce the number of suppliers manufacturers use. Suppliers who are able to meet customers' JIT requirements find their share of business growing.[32] Meeting JIT requirements often represents a marketing edge and may mean survival for some suppliers. The relationship between JIT suppliers and manufacturers is unique and includes operational linkages that unite the buyer and seller. As a result, suppliers find that the relationships are longer lasting and usually formalized with a written contract that may span up to 5 years.

Elements of a Logistical System Table 13.1 presents the controllable variables of a logistical system. Almost no decision on a particular logistical activity can be made without evaluating its effect on other areas. The system of warehouse facilities, inventory commitments, order-processing methods, and transportation linkages determines the supplier's ability to provide timely product availability to customers. As a result of poor supplier performance, customers may have to bear the extra cost of higher inventories, institute expensive priority-order-expediting systems, develop secondary supply sources, or, worst of all, turn to another supplier.

Total-Cost Approach

In the management of logistical activities, two performance variables must be considered: (1) total distribution costs and (2) the level of logistical service provided to customers. The logistical system must be designed and administered to achieve that combination of cost and service levels that yields maximum profits. Logistical costs vary widely for business marketers, depending on the nature of the product and on the importance of logistical service to the buyer. Logistical costs can consume 16 to 36 percent of each sales dollar at the manufacturing level, and logistical activities can consume more than 40 percent of total assets. Thus, logistics can have a significant effect on corporate profitability. How, then, can the marketer manage logistical costs?

The **total-cost**, or trade-off, **approach** to logistical management guarantees to minimize total logistical costs in the firm and within the channel. The assumption is that costs of individual logistical activities are interactive; that is, a decision about one logistical variable affects all or some of the others. Management is thus concerned

[31] Andrew Tanzer, "Warehouses That Fly," *Forbes*, October 18, 1999, p. 121.

[32] Peter Bradley, "Just-in-Time Works, but. . . ." *Purchasing* 118 (September 1995): p. 36.

TABLE 13.1 | **CONTROLLABLE ELEMENTS IN A LOGISTICS SYSTEM**

Elements	Key Aspects
Customer service	The "product" of logistics activities, *customer service* relates to the effectiveness in creating time and place utility. The level of customer service provided by the supplier has a direct impact on total cost, market share, and profitability.
Order processing	Order processing triggers the logistics process and directs activities necessary to deliver products to customers. Speed and accuracy of order processing affect costs and customer service levels.
Logistics communication	Information exchanged in the distribution process guides the activities of the system. It is the vital link between the firm's logistics system and its customers.
Transportation	The physical movement of products from source of supply through production to customers is the most significant cost area in logistics, and it involves selecting modes and specific carriers as well as routing.
Warehousing	Providing storage space serves as a buffer between production and use. Warehousing may be used to enhance service and to lower transportation costs.
Inventory control	Inventory is used to make products available to customers and to ensure the correct mix of products is at the proper location at the right time.
Packaging	The role of packaging is to provide protection to the product, to maintain product identity throughout the logistics process, and to create effective product density.
Materials handling	Materials handling increases the speed of, and reduces the cost of, picking orders in the warehouse and moving products between storage and the transportation carriers. It is a cost-generating activity that must be controlled.
Production planning	Utilized in conjunction with logistics planning, production planning ensures that products are available for inventory in the correct assortment and quantity.
Plant and warehouse location	Strategic placement of plants and warehouses increases customer service and reduces the cost of transportation.

SOURCE: Adapted from James R. Stock and Douglas M. Lambert, *Strategic Logistics Management*, 5th ed. (Homewood, IL: McGraw-Hill, 2000).

with the efficiency of the entire system rather than with minimizing the cost of any single logistical activity. The interactions among logistical activities (that is, transportation, inventory, warehousing) are described as cost trade-offs because a cost increase in one activity is traded for a large cost decrease in another activity, the net result being an overall cost reduction.

Calculating Logistics Costs

Activity-Based Costing

The activity-based costing (ABC) technique is used to precisely measure the costs of performing specific activities and then trace those costs to the products, customers, and channels that consumed the activities.[33] This is a powerful tool in managing the logistics operations of a supply chain. ABC provides a mechanism to trace the cost of performing logistics services for the customers that use these services, making it easier to assess the appropriate level of customer service to offer. Firms using ABC analysis can obtain more accurate information about how a particular customer or a specific product contributes to overall profitability.[34]

Total Cost of Ownership

Total cost of ownership (TCO) determines the total costs of acquiring and then using a given item from a particular supplier (see Chapter 2). The approach identifies costs—often buried in overhead or general expenses—that relate to the costs of holding inventory, poor quality, and delivery failure.[35] A buyer using TCO explicitly considers the costs that the supplier's logistics system either added to, or eliminated from, the purchase price and would take a long-term perspective in evaluating cost.[36] Thus, a supplier particularly efficient at logistics might be able to reduce the buyer's inventory costs and the buyer's expenses of inspecting inbound merchandise. As a result, the total cost of ownership from that supplier would be lower than the cost from other suppliers that were not able to rapidly deliver undamaged products. Increasing acceptance of the TCO approach will cause logistics efficiency to become an even more critical element of a business marketer's strategy.

Business-to-Business Logistical Service

Many studies have shown that logistics service is often just as important as product quality as a measure of supplier performance. In many industries, a quality product at a competitive price is a given, so customer service is the key differentiator among competitors. In one industry, for example, purchasing agents begin the buying process by calling suppliers with the best delivery service to see whether they are willing to negotiate prices. Because it is so important to customers, reliable logistics service can lead to higher market share and higher profits. A study by Bain and Company showed that companies with superior logistics service grow 8 percent faster, collect a 7 percent price premium, and are 12 times as profitable as firms with inferior service levels.[37]

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[33] Bernard J. LaLonde and Terrance L. Pohlen, "Issues in Supply Chain Costing," *International Journal of Logistics Management* 7 (1, 1996): p. 3.

[34] Thomas A. Foster, "Time to Learn the ABCs of Logistics," *Logistics* (February 1999): p. 67.

[35] Lisa Ellram, "Activity-Based Costing and Total Cost of Ownership: A Critical Linkage," *Journal of Cost Management* 8 (Winter 1995): p. 22.

[36] Bruce Ferrin and Richard E. Plank, "Total Cost of Ownership Models: An Exploratory Study," *Journal of Supply Chain Management* 38 (Summer 2002): p. 18.

[37] Mary Collins Holcomb, "Customer Service Measurement: A Methodology for Increasing Customer Value through Utilization of the Taguchi Strategy," *Journal of Business Logistics* 15 (1, 1994): p. 29.

TABLE 13.2 | **COMMON ELEMENTS OF LOGISTICS SERVICE**

Elements	Description
Delivery time	The time from the creation of an order to the fulfillment and delivery of that order encompasses both order-processing time and delivery or transportation time.
Delivery reliability	The most frequently used measure of logistics service, delivery reliability focuses on the capability of having products available to meet customer demand.
Order accuracy	The degree to which items received conform to the specification of the order. The key dimension is the incidence of orders shipped complete and without error.
Information access	The firm's ability to respond to inquiries about order status and product availability.
Damage	A measure of the physical conditions of the product when received by the buyer.
Ease of doing business	A range of factors, including the ease with which orders, returns, credits, billing, and adjustments are handled.
Value-added services	Such features as packaging, which facilitates customer handling, or other services such as prepricing and drop shipments.

SOURCE: Reprinted with permission from Jonathon L. S. Byrnes, William C. Copacino, and Peter Metz, "Forge Service into a Weapon with Logistics," *Transportation & Distribution, Presidential Issue* 28 (September 1987): p. 46.

These facts, together with the extensive spread of just-in-time manufacturing, make it clear that logistical service is important to organizational buyers.

Logistical service relates to the availability and delivery of products to the customer. It comprises the series of sales-satisfying activities that begin when the customer places the order and that end when the product is delivered. Responsive logistical service satisfies customers and creates the opportunity for closer and more profitable buyer-seller relationships.[38] Logistical service includes whatever aspects of performance are important to the business customer (Table 13.2). These service elements range from delivery time to value-added services, and each of these elements can affect production processes, final product output, costs, or all three.

Logistics Service Impacts on the Customer

Supplier logistical service translates into product availability. For a manufacturer to produce or for a distributor to resell, industrial products must be available at the right time, at the right place, and in usable condition. The longer the supplier's delivery time, the less available the product; the more inconsistent the delivery time, the less available the product. For example, a reduction in the supplier's delivery time permits a buyer to hold less inventory because needs can be met rapidly. The customer

[38] Arun Sharma, Dhruv Grewal, and Michael Levy, "The Customer Satisfaction/Logistics Interface," *Journal of Business Logistics* 16 (2, 1995): p. 1.

reduces the risk that the production process will be interrupted. Consistent delivery enables the buyer to program more effectively—or routinize—the purchasing process, thus lowering buyer costs. Consistent delivery-cycle performance allows buyers to cut their level of buffer or safety stock, thereby reducing inventory cost. However, for many business products, such as those that are low in unit value and relatively standardized, the overriding concern is not inventory cost but simply having the products. A malfunctioning $0.95 bearing could shut down a whole production line.

Determining the Level of Service

Buyers often rank logistics service right behind "quality" as a criterion for selecting a vendor. However, not all products or all customers require the same level of logistical service. Many made-to-order products—such as heavy machinery—have relatively low logistical service requirements. Others, such as replacement parts, components, and subassemblies, require extremely demanding logistical performance. Similarly, customers may be more or less responsive to varying levels of logistical service.

Profitable Levels of Service In developing a logistical service strategy, business marketing strategists should assess the profit impact of the service options that they provide to customers. In nearly all industries, firms provide numerous supply chain services such as next-day delivery, customized handling, and specialized labeling. However, few companies actually trace the true costs of specialized services and the resulting effect on customer profitability (see Chapter 4).

To combat this unhealthy situation, some companies are now using *cost-to-serve* analytics to address the problem—among them are Dow Chemical, Eastman Chemical, and Georgia-Pacific (GP). GP used total-delivered-cost analysis to improve the performance of a major customer account.[39] By incorporating cost-to-serve data into the calculation of gross margin, GP's supply chain team determined that the costs to provide this customer with expedited transportation and distribution services were significantly reducing the account's profitability. In a top-to-top meeting with the customer, GP used the data to expose the root causes of the high costs and poor service, which included last-minute, uncoordinated promotional planning and purchasing across the customer's major business units and the customer's unwillingness to share inventory levels and positioning. Customers, once confronted with the data, are often willing to collaborate on ways to improve service, reduce costs, and restore profitability.

To recap, service levels are developed by assessing customer service requirements. The sales and cost of various service levels are analyzed to find the service level generating the highest profits. The needs of various customer segments dictate various logistical system configurations. For example, when logistical service is critical, industrial distributors can provide the vital product availability, whereas customers with less rigorous service demands can be served from factory inventories.

Logistics Impacts on Other Supply Chain Participants

A supplier's logistical system directly affects a distributor's ability to control cost and service to end users. Delivery time influences not only the customer's inventory

[39] Remko Van Hoek, "When Good Customers Are Bad," *Harvard Business Review* 83 (September 2005): p. 19.

requirements but also the operations of channel members. If a supplier provides erratic delivery service to distributors, the distributor is forced to carry higher inventory in order to provide a satisfactory level of product availability to end users.

Inefficient logistics service to the distributors either increases distributor costs (larger inventories) or creates shortages of the supplier's products at the distributor level. Neither result is good. In the first instance, distributor loyalty and marketing efforts will suffer; in the second, end users will eventually change suppliers. When Palm, Inc., developed the Palm Pilot, the firm created such an effective logistics system that its distributors in Latin America were able to offer the same level of after-sales service available in the United States, allowing Palm to reach sales exceeding $250 million in Latin America in a short time frame.[40] In some industries, distributors are expanding their role in the logistics process, which makes them even more valuable to their suppliers and customers. In the chemical industry, for example, the role of distributors is completely transforming as they offer logistics solutions—JIT delivery, repackaging, inventory management—to their customers.[41] The logistics expertise distributors provide enables their vendors (manufacturers) to focus on their own core competencies of production and marketing.

Business-to-Business Logistical Management

The elements of logistics strategy are part of a system, and as such, each affects every other element. The proper focus is the total-cost view. Although this section treats the decisions on facilities, transportation, and inventory separately, these areas are so intertwined that decisions in one area influence the others.

Logistical Facilities

The strategic development of a warehouse provides the business marketer with the opportunity to increase the level of delivery service to buyers, reduce transportation costs, or both. Business firms that distribute repair, maintenance, and operating supplies often find that the only way to achieve desired levels of delivery service is to locate warehouses in key markets. The warehouse circumvents the need for premium transportation (air freight) and costly order processing by keeping products readily available in local markets.

Serving Other Supply Chain Members The nature of the business-to-business (B2B) supply chain affects the warehousing requirements of a supplier. Manufacturers' representatives do not hold inventory, but distributors do. When manufacturers' reps are used, the supplier often requires a significant number of strategically located warehouses. On the other hand, a supply chain using distributors offsets the need for warehousing. Obviously, local warehousing by the distributor is a real service to the supplier. A few well-located supplier warehouses may be all that is required to service the distributors effectively.

[40] Toby Gooley, "Service Stars," *Logistics* (June 1999): p. 37.

[41] Daniel J. McConville, "More Work for Chemical Distributors," *Distribution* 95 (August 1996): p. 63.

Outsourcing the Warehousing Function Operating costs, service levels, and investment requirements are essential considerations regarding the type of warehouse to use. The business firm may either operate its own warehouses or turn them over to a "third party"—a company that specializes in performing warehousing services. The advantages of third-party warehousing are flexibility, reduced assets, and professional management—the firm can increase or decrease its use of space in a given market, move into or out of any market quickly, and enjoy an operation managed by specialists. Third-party warehousing may sometimes supplement or replace distributors in a market.

Many third-party warehouses provide a variety of logistical services for their clients, including packaging, labeling, order processing, and some light assembly. Saddle Creek Corporation, a third-party warehouse company based in Lakeland, Florida, maintains warehouse facilities in a number of major markets. Clients can position inventories in all these markets while dealing with only one firm. Also, Saddle Creek can link its computer with the suppliers' computers to facilitate order processing and inventory updating. The Saddle Creek warehouse also repackages products to the end-user's order, label, and arrange for local delivery. A business marketer can ship standard products in bulk to the Saddle Creek warehouse—gaining transportation economies—and still enjoy excellent customer delivery service. The public or contract warehouse is a feasible alternative to the distributor channel when the sales function can be economically executed either with a direct sales force or with reps.

Transportation

Transportation is usually the largest single logistical expense, and with continually rising fuel costs, its importance will probably increase. Typically, the transportation decision involves evaluating and selecting both a mode of transportation and the individual carrier(s) that will ensure the best performance at the lowest cost. Mode refers to the type of carrier—rail, truck, water, air, or some combination of the four. Individual carriers are evaluated on rates and delivery performance.[42] The supply chain view is important in selecting individual carriers. Carriers become an integral part of the supply chain, and close relationships are important. One study found evidence that carriers' operating performance improved when they were more involved in the relationship between buyer and seller.[43] By further integrating carriers into the supply chain, the entire supply chain can improve its competitive position. In this section we consider (1) the role of transportation in industrial supply chains and (2) the criteria for evaluating transportation options.

Transportation and Logistical Service A business marketer must be able to effectively move finished inventory between facilities, to channel intermediaries, and to customers. The transportation system is the link that binds the logistical network together and ultimately results in timely delivery of products. Efficient warehousing does not enhance customer service levels if transportation is inconsistent or inadequate.

[42] For example, see James C. Johnson, Donald F. Wood, Danile L. Warlow, and Paul R. Murphy, *Contemporary Logistics*, 7th ed. (Upper Saddle River, NJ: Prentice Hall, 1998).

[43] Julie Gentry, "The Role of Carriers in Buyer-Supplier Strategic Partnerships: A Supply Chain Management Approach," *Journal of Business Logistics* 17 (2, 1996): p. 52.

Effective transportation service may be used in combination with warehouse facilities and inventory levels to generate the required customer service level, or it may be used in place of them. Inventory maintained in a variety of market-positioned warehouses can be consigned to one centralized warehouse when rapid transportation services exist to deliver products from the central location to business customers. Xerox is one company that uses premium airfreight service to offset the need for high inventories and extensive warehouse locations. The decision on transportation modes and particular carriers depends on the cost trade-offs and service capabilities of each. It is interesting that in the age of next-day delivery and express airfreight services, barges that weave their way through a maze of rivers, lakes, and channels are thriving.[44] A barge trip that takes 17 hours would take a train 4 hours and a truck 90 minutes for a similar trip. Although very slow (averaging 15 miles per hour), the barge offers huge cost advantages compared with truck and rail. For products like limestone, coal, farm products, and petroleum, the slow and unglamorous barge is an effective logistics tool.

Transportation Performance Criteria **Cost of service** is the variable cost of moving products from origin to destination, including any terminal or accessory charges. The cost of service may range from as little as $0.25 per ton-mile via water to as high as $0.50 per ton-mile via airfreight. The important aspect of selecting the transportation mode is not cost per se but cost relative to the objective to be achieved. Bulk raw materials generally do not require prepaid delivery service, so the cost of anything other than rail or water transportation could not be justified. On the other hand, although airfreight may be almost 10 times more expensive than motor freight, the cost is inconsequential to a customer who needs an emergency shipment of spare parts. The cost of premium (faster) transportation modes may be justified by the resulting inventory reductions.

Speed of service refers to the elapsed time to move products from one facility (plant or warehouse) to another facility (warehouse or customer plant). Again, speed of service often overrides cost. Rail, a relatively slow mode used for bulk shipments, requires inventory buildups at the supplier's factory and at the destination warehouse. The longer the delivery time, the more inventory customers must maintain to service their needs while the shipment is in transit. The slower modes involve lower variable costs for product movement, yet they result in lower service levels and higher investments in inventory. The faster modes produce just the opposite effect. Not only must a comparison be made between modes in terms of service but various carriers within a mode must be evaluated on their "door-to-door" delivery time.

Service consistency is usually more important than average delivery time, and all modes of transportation are not equally consistent. Although air provides the lowest average delivery time, generally it has the highest variability in delivery time relative to the average. The wide variations in modal service consistency are particularly critical in business marketing planning. The choice of transportation mode must be made on the basis of cost, average transit time, and consistency if effective customer service is to be achieved.

In summary, because business buyers often place a premium on effective and consistent delivery service, the choice of transportation mode is an important one—one

[44]Anna Wilde Mathews, "Jet-Age Anomalies, Slowpoke Barges Do Brisk Business," *The Wall Street Journal*, May 15, 1998, p. B1.

where cost of service is often secondary. However, the best decision on transportation carriers results from a balancing of service, variable costs, and investment requirements. The manager must also consider the transportation requirements of ordinary, versus expedited (rush order), shipments.

Inventory Management

Inventory management is the buffer in the logistical system. Inventories are needed in business channels because

1. Production and demand are not perfectly matched;
2. Operating deficiencies in the logistical system often result in product unavailability (for example, delayed shipments, inconsistent carrier performance);
3. Business customers cannot predict their product needs with certainty (for example, because a machine may break down or there may be a sudden need to expand production).

Inventory may be viewed in the same light as warehouse facilities and transportation: It is an alternative method for providing the level of service customers require, and the level of inventory is determined on the basis of cost, investment, service required, and anticipated revenue.

Quality Focus: Eliminate Inventories Today's prevalent total-quality-management techniques and just-in-time management principles emphasize the reduction or outright elimination of inventories. Current thinking suggests that inventories exist because of inefficiencies in the system: Erratic delivery, poor forecasting, and ineffective quality-control systems all force companies to hold excessive stocks to protect themselves from delivery, forecasting, and product failure. Instead, improved delivery, forecasting, and manufacturing processes should eliminate the need to buffer against failures and uncertainty. Information technology involving bar coding, scanner data, total quality processes, better transportation management, and more effective information flow among firms in the supply chain have made it possible to more carefully control inventories and reduce them to the lowest possible levels.

The Internet connectivity that unites the supply chain from an information standpoint has permitted substantial inventory reductions in several industries. One recent study showed that average inventory turnover for manufacturers has increased from 8 to more than 12 times per year.[45] Much of the credit for this improvement is attributed to more information sharing among the supply chain members, sophisticated inventory management software, and generally higher levels of supply chain coordination. Successful business marketing managers must develop quality processes that in themselves reduce or eliminate the need to carry large inventories, while coordinating and integrating a supply chain system that can function effectively with almost no inventory.

[45] Thomas W. Speh, *Changes in Warehouse Inventory Turnover* (Chicago: Warehousing Education and Research Council, 1999).

INSIDE BUSINESS MARKETING

The Profit Impact of Inventory Management

Deere & Company's core business is manufacturing equipment: agricultural, construction, commercial, and consumer equipment. For its supply chain practices, the firm enjoys an edge over its competitors in the industry, particularly in inventory management. The following illustration demonstrates the significance of this advantage.

On average, assume that Deere maintains 59 days' worth of sales in inventory and the worst firm in the industry maintains 137 days' worth of sales in inventory. Each 30 days' worth of inventory translates to a profit difference of 1.66 percent of sales in the industry. The difference between Deere and the worst competitor is 78 days' worth of inventory. To calculate the profit difference, the following calculations can be made:

Worst firm, inventories:	137 days
Deere & Company, inventories:	59 days
Difference:	*78 days*

Each *30 days* is worth *1.66 percent of sales* in profits. The difference between Deere and its "worst" competitor is 78/30 = *2.6 times*.

The difference in profitability is: $2.6 \times 1.66\% = 4.3\%$ *of sales*.

The difference between the worst firm and the best firm as a result of effectively managing inventories is equal to 4.3 percent of sales. If each firm has $1 billion in sales, the best-managed firm would have *$43 million more profits*, all other things being equal!

Inventory in Rapidly Changing Markets Many companies in rapidly changing high-tech industries must look at inventory characteristics like obsolescence, devaluation, price protection, and return costs.[46] For a company like Hewlett-Packard, with products that have very fast product life cycles, all four of these factors can significantly reduce profits if inventories are not managed effectively. H-P refers to these costs as "inventory-driven costs" (IDCs). In 1995, for example, H-P found that costs related to inventory equaled their PC business's *total operating margin*! For many of their products that are held in the supply chain by various resellers, the major inventory costs to H-P are price protection costs, as they must reimburse resellers for any loss in the market value of the products kept in inventory. Because the inventories of channel partners represent the largest component of inventory costs to H-P, managers are taking steps to improve SCM practices downstream in the channel. For example, H-P has introduced new processes such as vendor-managed inventory (VMI)—where H-P assists resellers in planning inventories and works with the marketing managers of those resellers to estimate and manage demand.

Third-Party Logistics

Using **third-party logistics firms** to perform logistics activities represents an important trend among business-to-business firms. These external firms perform a wide range of logistics functions traditionally performed within the organization.

[46]Gianpaolo Callioni, Xavier de Montgros, Regine Slagmulder, Luk N. Van Wassenhove, and Linda Wright, "Inventory-Driven Costs," *Harvard Business Review* 83 (March 2005): pp. 135–141.

Most companies use some type of third-party firm, whether for transportation, warehousing, or information processing. The strategic decision to outsource logistics is often made by top management. The functions the third-party company performs can encompass the entire logistics process or selected activities within that process. Third parties can perform the warehousing; they may perform the transportation function (for example, a truck line like Schneider National); or they may perform the entire logistics process from production scheduling to delivery of finished products to the customer (for example, Ryder Dedicated Logistics). Third parties enable a manufacturer or distributor to concentrate on its core business while enjoying the expertise and specialization of a professional logistics company. The results are often lower costs, better service, improved asset utilization, increased flexibility, and access to leading-edge technology. Recently, some firms have advocated the use of "Fourth-Party Logistics"—firms that own no assets but serve to manage several third parties that are employed to perform various logistics functions.[47]

Despite the advantages of third-party logistics firms, some firms are cautious because of reduced control over the logistics process, diminished direct contact with customers, and the problems of terminating internal operations. In analyzing the most effective and efficient way to accomplish logistics cost and service objectives, the business marketing manager should carefully consider the benefits and drawbacks of outsourcing part or all logistics functions to third-party providers. In an interesting application of third-party logistics, Caterpillar (the manufacturer of earthmoving equipment) formed a logistics services company to manage the parts distribution for other manufacturers.[48] The company applies the knowledge gained from its own experiences in distributing 300 families of products that require over 530,000 spare parts. Caterpillar transfers knowledge from the company's internal operations to customers and vice versa.

Future Focus: The Green Supply Chain Many experts predict that we will see a major expansion in "green" supply chain initiatives whereby companies are committing to design, source, manufacture, and manage the end-of-life stage for all of their products in an environmentally and socially responsible manner.[49] Other initiatives include developing green packaging and refurbishing products to avoid or minimize landfill waste. One study showed that for many manufacturers, between 40 and 60 percent of a company's carbon footprint resides upstream in its supply chain—from raw materials, transport, and packaging to the energy consumed in manufacturing processes. Therefore, any significant carbon-abatement activities will require collaboration with supply chain partners, first to comprehensively understand the emissions associated with products, and then to analyze abatement opportunities systematically.[50] A carefully orchestrated and cooperative approach among supply chain partners provides the foundation for tackling and solving these challenging environmental issues.

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[47] "Fourth Party Logistics: An Analysis," *Logistics Focus* 1 (3, Summer 2002): p. 16.

[48] Peter Marsh, "A Moving Story of Spare Parts," *The Financial Times*, August 29, 1997, p. 8.

[49] "Leading the Charge in Multi-Enterprise Supply Chains," *Global Logistics & Supply Chain Strategies* (January 17, 2008).

[50] Chris Brickman and Drew Ungerman, "Climate Change and Supply Chain Management," McKinsey Quarterly, accessed at http://www.mckinseyquarterly.com/Operations/Supply_Chain_Logistics on August 5, 2008.

Summary

Leading business marketing firms demonstrate superior capabilities in supply chain management. SCM focuses on improving the flow of products, information, and services as they move from origin to destination. A key driver to SCM is coordination and integration among all the participants in the supply chain, primarily through sophisticated information systems and management software. Reducing waste, minimizing duplication, reducing cost, and enhancing service are the major objectives of SCM. Firms successful at managing the supply chain understand the nature of their products and the type of supply chain structure required to meet the needs of their customers. In particular, effective supply chains integrate operations, share information, and above all, provide added value to customers.

Logistics is the critical function in the firm's supply chain because logistics directs the flow and storage of products and information. Successful supply chains synchronize logistics with other functions such as production, procurement, forecasting, order management, and customer service. The systems perspective in logistical management cannot be stressed enough—it is the only way to assure management that the logistical function meets prescribed goals. Not only must each logistical variable be analyzed in terms of its effect on every other variable but the sum of the variables must be evaluated in light of the service level provided to customers. Logistics elements throughout the supply chain must be integrated to assure smooth product flow. Logistical service is critical in the buyer's evaluation of business marketing firms and generally ranks second only to product quality as a desired supplier characteristic.

Logistics decisions must be based on cost trade-offs among the logistical variables and on comparisons of the costs and revenues associated with alternative levels of service. The optimal system produces the highest profitability relative to the capital investment required. Three major variables—facilities, transportation, and inventory—form the basis of logistical decisions B2B logistics managers face. The business marketer must monitor the effect of logistics on all supply chain members and on overall supply chain performance. Finally, the strategic role of logistics should be carefully evaluated: Logistics can often provide a strong competitive advantage.

Discussion Questions

1. What is supply chain management and what are the types of functions and firms that make up the typical supply chain?
2. Explain how an effective supply chain can create a strong competitive advantage for the firms involved in it.
3. Explain why cooperation among supply chain participants determines whether the supply chain is effective.
4. Explain the different elements of "waste" that exist in supply chains and how supply chain management focuses on eliminating the various elements of waste.
5. Describe the role the Internet plays in enhancing supply chain management operations.

6. Adopting the perspective of an organizational buyer, carefully illustrate how the most economical source of supply might be the firm that offers the highest price but also the fastest and most reliable delivery system.
7. Describe a situation in which total logistical costs might be reduced by doubling transportation costs.
8. A key goal in logistical management is to find the optimum balance of logistical cost and customer service that yields optimal profits. Explain.
9. Explain how consistent delivery performance gives the organizational buyer the opportunity to cut the level of inventory maintained.
10. An increasing number of manufacturers are adopting more sophisticated purchasing practices and inventory control systems. What are the strategic implications of these developments for business marketers wishing to serve these customers?

Internet Exercise

1. YRC Worldwide Inc. is a *Fortune* 500 transportation company and one of the largest transportation firms in the world. Go to http://www.yrcw.com/ and examine the online tools available on the Web site. Discuss how the various tools would help a B2B marketer enhance the logistics services that they provide to customers.

CASE

Managing Logistics at Trans-Pro

Logistics management is critical in determining the profitability of B2B channel members like industrial distributors. To be successful, the industrial distributor must maintain a very large inventory of its full product line and be able to deliver products promptly when a customer places an order—the major value-added service that the distributor provides to customers is product availability. By having an extensive variety of components and replacements parts available on a round-the-clock basis, the distributor's customers are able to minimize investments in inventory. In addition, customer firms can be certain that their operations will never be shut down because they cannot get a critical component. Because of the nature of the distributor's business, inventory costs often become the single largest expense and, as such, effective inventory management is a key driver of profitability.

Trans-Pro is a large industrial distributor of power transmission equipment—bearings, gears, v-belts, and the like. The company's management, cognizant of the criticality of effective inventory management, developed an incentive scheme for its 50 branch managers to minimize inventories. Each month, average inventory in the warehouse was measured and the branch managers were assessed a penalty for inventory levels that exceeded $2.5 million. For each increment of dollars above the threshold figure, the manager would be docked 1 percent of his or her monthly salary—a very strong incentive to carefully control inventory levels! In addition, Trans-Pro also demanded that customer service be absolutely outstanding. The goal was to deliver an order within 24 hours of receiving it. As might be expected, the managers did a superlative job in managing average monthly inventories. Rarely were any of the branches in excess of the mandated maximum level. Customer service levels approached 98 percent—that is, 98 percent of all orders were delivered within the 24-hour time period.

Discussion Question

1. Critique Trans-Pro's approach to managing logistics.