CHAPTER

1

LOGISTICS AND THE SUPPLY CHAIN

Special logistics staffs handle the movement of items and displays for trade shows and special events. This sleek Mercedes racer is being loaded aboard a KLM Boeing 747.

Key Terms

- Channel intermediaries
- Cost trade-offs
- Economic utility
- FOB destination pricing
- FOB origin pricing
- Form utility
- Freight absorption
- Inbound logistics
- Landed costs
- Logistics
- Mass logistics
- Materials management
- Phantom freight
- Place utility
- Possession utility
- Postponement
- Power retailer
- Reverse logistics
- Stock-keeping units (SKUs)
- Stockouts
- Systems approach
- Tailored logistics
- Time utility
- Total cost approach

Learning Objectives

- To learn the definition of logistics
- To understand the economic importance of logistics
- To learn of recent events and their influences on logistics practices
- To gain an understanding of logistics practices within a firm
- To learn different pricing policies
- To know about logistics careers

ECONOMIC IMPACTS OF LOGISTICS

At this point, you may have limited awareness of, and knowledge about, logistics—the subject matter of this textbook. However, if that is the case, you're really not very different from lots of other people who inhabit this planet, and it might come as a surprise to you that logistics tends to have significant economic impacts. From a macroeconomic perspective, Table 1-1 summarizes U.S. logistics costs in relation to gross domestic product (GDP) for five-year time periods between 1960 and 2005. Note that logistics as a percentage of GDP has declined from approximately 15 percent in 1960 to less than 10 percent in 2005 and that annual aggregate logistics costs now approach $1.2 trillion. Although absolute and relative logistics costs in relation to GDP vary from country to country (logistics expenditures in China are estimated to be about 19 percent),[1] logistics is most definitely an important component in any country's economy.

Continuing with a macro perspective, logistics can also play an important role in a nation's economic growth and development. Hannigan and Mangan pointed out that logistics, particularly improvements in transportation efficiency, played a key role in the explosive growth of Ireland's economy in the mid- and late-1990s (they had a GDP increase of 62 percent in this period). According to Hannigan and Mangan, future growth of Ireland's economy will not be

[1]Paul Page, "The China Effect," *Traffic World*, May. 8, 2006, 19–21.

TABLE 1-1 The Cost of the Business Logistics System in Relation to Gross Domestic Product (GDP)

	In $ Billion				
Year	*Inventory Carrying Costs*	*Transportation Costs*	*Administrative Costs*	*Total U.S. Logistics Cost*	*Logistics As a Percentage of GDP*
1960	31	44	3	78	14.7
1965	38	64	4	106	14.7
1970	56	91	6	153	14.7
1975	97	116	9	222	13.5
1980	220	214	17	451	16.1
1985	227	274	20	521	12.4
1990	283	351	25	659	11.4
1995	302	441	30	773	10.4
2000	377	590	39	1,006	10.1
2005	393	744	46	1,183	9.5

Sources: Rosalyn Wilson and Robert Delaney, Twelfth Annual *State of Logistics Report*, 2001; Rosalyn Wilson, Seventeenth Annual *State of Logistics Report*, 2006.

possible without improvements to its logistical capabilities.[2] In a similar fashion, both the Chinese government and the private sector recognize that as China's labor cost advantage shifts to other countries, logistics efficiency becomes an essential component to fueling an economy that has been expanding at between 8 and 10 percent per year.[3]

Apart from the previous examples of macro-level economic impacts, the economic impacts of logistics can affect individual consumers such as you. These impacts can be illustrated through the concept of **economic utility,** which is the value or usefulness of a product in fulfilling customer needs or wants. The four general types of economic utility are possession, form, time, and place. Logistics clearly contributes to time and place utilities.

Possession utility refers to the value or usefulness that comes from a customer being able to take possession of a product. Possession utility can be influenced by the payment terms associated with a product. Credit and debit cards, for example, facilitate possession utility by allowing the customer to purchase products without having to produce cash or a cash equivalent. Likewise, automotive leases allow customers to take possession of a more desirable model than would be possible with conventional automotive loans.

Form utility refers to a product's being in a form that (1) can be used by the customer and (2) is of value to the customer. Although form utility has generally been associated with production and manufacturing, logistics can also contribute to form utility. For example, to achieve production economies (i.e., lower cost per unit), a soft-drink company may produce thousands of cases of a certain type of soft drink (e.g., diet cola). You're not likely to purchase diet cola by the thousands of cases (unless you're having a really big social event!) but rather in smaller lot sizes, such as a six- or twelve-pack. Through *allocation,* which will be discussed more fully in

[2]Kevin Hannigan and John Mangan, "The Role of Logistics and Supply Chain Management in Determining the Competitiveness of a Peripheral Economy," *Irish Marketing Review* 14, no. 1 (2001): 35–42.

[3]Peter Tirschwell, "In China, Full Speed Ahead," *Journal of Commerce*, April 17, 2006, 38.

Chapter 2, logistics can break the thousands of cases of diet cola into the smaller quantities that are desired by customers.

Place utility refers to having products available *where* they are needed by customers; products are moved from points of lesser value to points of greater value. Continuing with the diet cola example, place utility is increased by moving the soda from a point of lesser value (e.g., stored in a warehouse) to a point of greater value (e.g., on a supermarket shelf).

Closely related to place utility is **time utility,** which refers to having products available *when* they are needed by customers. It's important to recognize that different products have different sensitivities to time; three-day late delivery of perishable items likely has more serious consequences than three-day late delivery of nonperishable items.

Note that simultaneous achievement of possession, form, place, and time utility goes a long way toward facilitating—but not guaranteeing—customer satisfaction. Consider the experience of a former student who used an online service to order Valentine's Day flowers for his out-of-state girlfriend. The online service facilitated possession utility by allowing for a secured payment by credit card. A healthy arrangement of the correct bouquet (form utility) arrived at the girlfriend's residence on Valentine's Day (place and time utility). The problem: The greeting card that accompanied the flowers had a wrong name for the girlfriend (but the right name for the boyfriend)!

LOGISTICS: WHAT IT IS

Now that you have a better understanding of the economic impacts of logistics, it's important to define what logistics is. Since approximately 1980, tremendous—and rapid—change has occurred in the business logistics field. One consequence of this rapid change is that business logistics has been referred to by a number of different terms, each having slightly different meanings. In recent years, some of the terms used to refer to business logistics have included (but are not limited to) the following:

- Business logistics
- Distribution
- Industrial distribution
- Logistics
- Logistics management
- Materials management
- Physical distribution
- Supply chain management

In essence, each of these terms is associated with managing the flows of goods and information from a point of origin to a point of consumption.

Although the aforementioned terms are similar, they aren't the same: from a managerial perspective, this poses a potential problem of comparing apples to oranges as opposed to comparing apples to apples or oranges to oranges. For example, suppose that one organization defines logistics to include two activities—transportation and inventory management—whereas a second organization defines logistics to include three activities—transportation, inventory management, and warehousing. It seems reasonable that the second organization's total cost of logistics would be higher than the first organization's (because the second organization's logistics encompasses more activities). However, it would be a mistake to conclude that, because of the higher total costs, the second organization is less effective or efficient with respect to logistics because the two organizations have different definitions of logistics.

In an effort to avoid potential misunderstanding about the meaning of **logistics,** this book adopts the current definition promulgated by the Council of Supply Chain Management Professionals (CSCMP), one of the world's most prominent organizations for logistics professionals. According to the CSCMP, "Logistics 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."[4]

Let's analyze this definition in closer detail. First, logistics is part of supply chain management. We'll talk about supply chains and supply chain management in greater detail in Chapter 2, but the key point for now is that logistics is part of a bigger picture in the sense that the supply chain focuses on coordination among business functions (such as marketing, production, and finance) within and across organizations. The fact that logistics is explicitly recognized as part of supply chain management means that logistics can affect how well (or how poorly) an individual firm—and its associated supply chain(s)—can achieve goals and objectives.

The CSCMP definition also indicates that logistics "plans, implements, and controls." Of particular importance is the word *and,* which suggests that logistics should be involved in all three activities—planning, implementing, controlling—and not just one or two. Some suggest, however, that logistics is more involved in the implementation than in the planning of certain logistical policies.[5]

Note that the CSCMP definition also refers to "efficient and effective forward and reverse flows and storage." Broadly speaking, effectiveness can be thought of as, "How well does a company do what they say they're going to do?" For example, if a company promises that all orders will be shipped within 24 hours of receipt, what percentage of orders are actually shipped within 24 hours of receipt? In contrast, efficiency can be thought of as how well (or poorly) company resources are used to achieve what a company promises it can do. For instance, some companies use premium or expedited transportation services—which cost more money—to cover for shortcomings in other parts of its logistics system.

With respect to forward and reverse flows and storage, logistics has traditionally focused on forward flows and storage, that is, those directed *toward* the point of consumption. Increasingly, however, the logistics discipline has recognized the importance of reverse flows and storage **(reverse logistics),** that is, those that *originate* at the point of consumption. Although the majority of the discussion in this book focuses on forward logistics, the relevance and importance of reverse logistics continues to grow as more companies recognize its tactical and strategic implications.[6] Reverse logistics is also likely to gain attention in the future as more companies recognize it as an opportunity for competitive advantage.[7]

The CSCMP definition also indicates that logistics involves the flow and storage of "goods, services, and related information." Indeed, in the contemporary business environment, logistics is as much about the flow and storage of information as it is about the flow and storage of

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[4]*www.cscmp.org.*

[5]Paul R. Murphy, Richard F. Poist, and Charles D. Braunschwieg, "Role and Relevance of Logistics to Corporate Environmentalism: An Empirical Assessment," *International Journal of Physical Distribution and Logistics Management* 25, no. 2 (1995): 5–19; Paul R. Murphy and Richard F. Poist, "Socially Responsible Logistics: An Exploratory Study," *Transportation Journal* 41, no. 4 (2002): 23–35.

[6]Dale S. Rogers and Ronald Tibben-Lembke, "An Examination of Reverse Logistics Practices," *Journal of Business Logistics* 22, no. 2 (2001): 129–148.

[7]James Stock, Thomas Speh, and Herbert Shear, "Many Happy (Product) Returns," *Harvard Business Review* 80, no. 7 (2002): 16–17.

goods. The importance of information in contemporary logistics is captured by Fred Smith, CEO and chairman of FedEx (a leading logistics service provider), who believes that "information about the package is as important as the package itself."[8]

Finally, the CSCMP definition indicates that the purpose of logistics is "to meet customer requirements." This is important for several reasons, with one being that logistics strategies and activities should be based on customer wants and needs, rather than the wants, needs, and capabilities of other parties. Although a customer focus might seem like the proverbial no-brainer, one implication of such a focus is that companies actually have to communicate with their customers to learn about their needs and wants. It suffices to say that, even today, some companies continue to be hesitant about communicating with their customers.

A second reason for the importance of meeting customer requirements is the notion that because different customers have different logistical needs and wants, a one-size-fits-all logistics approach **(mass logistics)**—in which every customer gets the same type and levels of logistics service—will result in some customers being overserved while others are underserved. Rather, companies should consider **tailored logistics** approaches, in which groups of customers with similar logistical needs and wants are provided with logistics service appropriate to these needs and wants.[9]

The principles in this textbook are generally applicable not only to for-profit organizations but also to the workings of governmental and nonprofit entities. For instance, from a governmental perspective, logistics is quite germane to the armed forces, which shouldn't be surprising, given that logistics was first associated with the military. Moreover, the Asian earthquake and tsunami in late 2004 provides an excellent example of the relevance of logistics to nonprofit organizations. In a relatively short time period, a variety of humanitarian organizations, with the help of private-sector companies, were able to deliver relief supplies such as food and medicine to the region and distribute them to the affected population.[10]

THE INCREASED IMPORTANCE OF LOGISTICS

The formal study of business logistics, and predecessor concepts such as traffic management and physical distribution, has existed since the second half of the twentieth century. Quite frankly, from approximately 1950 to 1980, limited appreciation was shown for the importance of the logistics discipline. Since 1980, however, increasing recognition has been given to the topic, and several key reasons are discussed next.

A Reduction in Economic Regulation

During the 1970s and the 1980s, widespread reductions in economic regulation (commonly referred to as *deregulation*) relaxed government control of carriers' rates and fares, entry and exit, mergers and acquisitions, and more. These controls were particularly onerous in the U.S. transportation industry in the sense that price competition was essentially nonexistent, and customers were pretty much forced to accept whatever service the carriers chose to provide. This meant that logistics managers had relatively little control over one of the most important cost components in a logistics system (see Table 1-1).

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[8]Jonathan Reiskin, "Carriers Invest in Web Sites, Software, Networks," *Transport Topics*, May 8, 2006, 10.

[9]Joseph B. Fuller, James O'Conor, and Richard Rawlinson, "Tailored Logistics: The Next Advantage," *Harvard Business Review* 71, no. 3 (1993): 87–98.

[10]Stephen Tierney, "Industry Responds in Time of Need," *Supply Chain Europe*, February 2005, 22.

Reductions in economic regulation in the U.S. airfreight, railroad, and trucking industries allowed individual carriers flexibility in pricing and service. This flexibility was important to logistics for several reasons. First, it provided companies with the ability to implement the tailored logistics approach discussed earlier, in the sense that companies could specify different service levels, and prices could be adjusted accordingly. Second, the increased pricing flexibility allowed large buyers of transportation services to reduce their transportation costs by leveraging large amounts of freight with a limited number of carriers.

Although the preceding discussion has focused on lessened economic regulation in the United States, it appears that deregulation has had similar effects in other countries. For example, lessened economic regulation of transportation has been identified as a primary reason for a reduction in the cost of freight transportation in Ireland.[11] Likewise, privatization of water ports has been found to improve their operational efficiency.[12]

Changes in Consumer Behavior

A common business adage suggests that "change is the only constant." Although changes in consumer behavior are commonly the purview of the psychology and marketing disciplines, such changes have important logistical implications as well. Several examples of changes in consumer behavior (market demassification, changing family roles, and rising customer expectations) and their possible logistical implications are discussed next.

The concept of *market demassification* suggests that, in contrast to mass markets, an ever-increasing number of market segments has distinct preferences. One way to address market demassification is through mass customization, which refers to the ability of a company to deliver highly customized products and services that are designed to meet the needs and wants of individual segments or customers. In mass customization, one size does not fit all needs, and this means that logistics systems must be flexible rather than rigid. To this end, logistics service providers such as FedEx and UPS offer a variety of delivery options to prospective customers. For example, next-day service—which used to mean delivery sometime during the next business day—can now be purchased in terms of delivery by the end of the next business day, delivery by midafternoon of the next business day, delivery by midmorning of the next business day, and delivery by early morning of the next business day. As a general rule, the earlier the delivery time, the more expensive the transportation cost.

In terms of *changing family roles*, fifty years ago less than 30 percent of U.S. adult women were in the workforce; today, by contrast, approximately 60 percent are in the working world.[13] One consequence from this has been an increasing emphasis on the convenience associated with a family's shopping experiences. This convenience is manifested in various ways to include extended store hours, home delivery of purchased items, and ready-to-eat–ready-to-cook foods. Each of these has logistics-related implications. With extended store hours—some stores are now open 24 hours—retailers must address issues such as the optimal delivery times for replenishment trucks and when to replenish merchandise. Although home delivery certainly adds to the purchaser's convenience, one challenge is the coordination of delivery times with the

[11]Hannigan and Mangan, 2001.

[12]Jose Tongzen and Wu Heng, "Port Privatization, Efficiency, and Competitiveness: Some Empirical Evidence from Container Ports (Terminals)," *Transportation Research—Part A* 39, no. 5 (2005): 405–424.

[13]Philip Kotler and Gary Armstrong, *Marketing Principles*, 11th ed. (Upper Saddle River, NJ: Prentice Hall, 2006), Chapter 1.

purchaser's ability to receive the item(s). Finally, the growth in ready-to-eat–ready-to-cook foods means that some food processors have added high-volume cooking systems at their production facilities. In addition, ready-to-eat–ready-to-cook foods have different packaging requirements, such as reusable bags.[14]

As for *rising customer expectations*, it should come as no surprise that customer expectations tend to increase through time, which means that a satisfactory level of performance in the past might not be considered as so today. Consider that a made-to-order, direct-to-consumer personal computer was unheard of as recently as 25 years ago. Today this concept, pioneered by Dell Computer, has become ubiquitous in the personal computer industry and has profoundly changed distribution channels and supply chains in the sense that make-to-order has much different production and inventory requirements than does make-to-stock. Moreover, Dell was able to produce made-to-order, direct-to-customer computers in a very short period of time, and its time-compressed, high-customization model has raised consumer expectations in other industries as well. For example, one company is focusing on build-to-order automobiles that will be *produced and delivered* to customers within 14 days of ordering.[15]

Technological Advances

Prior to the start of every academic year, Beloit College (Wisconsin) releases an annual survey concerning what members of the incoming freshmen class know about the year of their birth. If you were born in the mid-1980s or later, you may not remember a world without personal computers or digital cameras. In addition, you probably haven't used (and may have never seen, except in pictures) a self-correcting electric typewriter. We're not trying to take a stroll down memory lane. Rather, our point is that tremendous technological advances—in the course of your lifetime—have had profound influences for business management and, by extension, for business logistics.

From a logistical perspective, some of the most important technological advances have involved computer hardware and software in the sense that management of logistics involves a tremendous amount of data. The sheer magnitude of these data makes manual analysis a difficult and time-consuming process; technological advances in computer hardware, software, and capacity have allowed logisticians to make faster, more informed, and more accurate decisions with respect to customer service, transportation, inventory management, and other logistics activities.

The Internet—virtually unknown and unused until the mid-1990s—has also proved to be a powerful tool for improving logistical effectiveness and efficiency. Although Internet applications can be used for many logistical activities, research suggests the heaviest use of the Internet involves purchasing or procurement and transportation. Typical purchasing-related Internet applications include checking vendor price quotes and vendor negotiations, whereas claims management and pickup and delivery are common transportation uses.[16] With respect to pickup and delivery, for example, UPS drivers now carry wireless handheld computers that instantaneously warn if a mistake (such as picking up an incorrect shipment) is about to occur. UPS estimates that this system is saving over 75,000 miles of travel per day to correct pickup and delivery errors.[17]

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[14]L. Patrick, "Cooked Products Ring the Register," *High-Volume Cooking*, March 2006, 12–13.

[15]Ken Cottrill, "Custom Built," *Traffic World*, July 22, 2002, 13–14.

[16]Richard A. Lancioni, Michael A. Smith, and Hope J. Schau, "Strategic Internet Application Trends in Supply Chain Management," *Industrial Marketing Management* 32, no. 3 (2003): 211–217.

[17]Reiskin, 2006.

The Growing Power of Retailers

Another influence on logistics involves the emergence of **"power retailers"** such as Wal-Mart, Home Depot, and Best Buy that often wield greater power than the companies that supply them. Power retailers, which can be found in various retail formats (e.g., mass merchandisers, category killers), are characterized by large market share and low prices. Furthermore, power retailers are often the largest customers for some of their suppliers; for example, Wal-Mart accounts for over 15 percent of Procter & Gamble's annual sales.[18]

Many power retailers explicitly recognize superior logistics as an essential component of their corporate strategies, and because of this, their logistical practices are often viewed as a barometer for emerging logistics trends. In the 1990s, for example, Wal-Mart and Warner-Lambert were the first two companies to explore collaborative planning, forecasting, and replenishment (CPFR), a practice in which trading partners share planning and forecasting data to better match up supply and demand. Since then, there have been hundreds of successful (e.g., increased sales, reduced inventory levels) CPFR initiatives, although to be fair, not all CPFR initiatives have been successful. Power retailers have also been logistical trendsetters with respect to focusing on improved inventory turnover (the number of times inventory sells in one year). This emphasis on inventory turnover forces suppliers to be more efficient in the sense that they should focus on providing those products that will be bought by consumers, as opposed to supplying slower-moving products that sit on store shelves for extended periods of time. In fact, some Wal-Mart suppliers will not introduce new products into the commercial marketplace without input from Wal-Mart during the new product development process.

Globalization of Trade

Although countries have traded with each other for thousands of years, globalization's impact is greater today than ever before. Consider that world trade expanded from approximately $7.6 trillion to approximately $12.6 trillion between 2001 and 2005, which represents an increase of over 65 percent.[19] World trade is projected to continue its meteoric increase in the coming years, even in the face of record energy prices and geopolitical uncertainties.

Although many factors, such as rising standards of living and multicountry trade alliances, have contributed to the growth of global trade, it's safe to say that logistics has played a key role, too. Having said this, one should recognize that international logistics is much more challenging and costly than domestic logistics. With respect to challenges, the geographic distances between buyers and sellers are often greater (which may translate into longer transit times), and monitoring logistics processes is sometimes complicated by differences in business practices, culture, and language. As for costs, the greater geographic distances tend to result in higher transportation costs, and documentation requirements can be quite costly as well.[20]

THE SYSTEMS AND TOTAL COST APPROACHES TO LOGISTICS

Logistics is a classic example of the systems approach to business problems. From a companywide perspective, the **systems approach** indicates that a company's objectives can be realized by recognizing the mutual interdependence of the major functional areas of the firm, such as marketing,

[18]Jagmohan Raju and Z. John Zhang, "Channel Coordination in the Presence of a Dominant Retailer," *Management Science* 24, no. 2 (2005): 254–262.

[19]"World Economic Outlook," *www.imf.org*.

[20]Donald F. Wood, Anthony P. Barone, Paul R. Murphy, and Daniel L. Wardlow, *International Logistics*, 2nd ed. (New York: AMACOM, 2002).

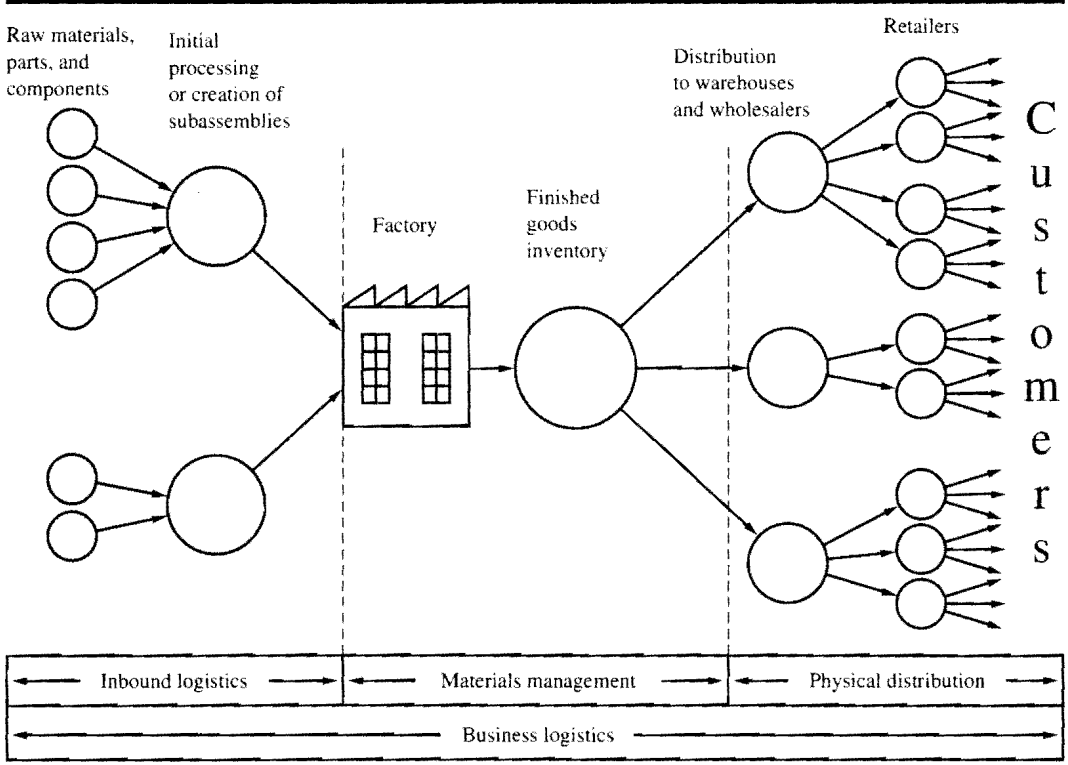
production, finance, and logistics. One implication of the systems approach is that the goals and objectives of the major functional areas should be compatible with the company's goals and objectives. This means that *one logistics system does not fit all companies* because goals and objectives vary from one firm to another.

A second implication is that decisions made by one functional area should consider the potential implications on other functional areas. For example, implementation of the marketing concept, which focuses on satisfying customer needs and wants, has resulted in a marked increase of the number of **stock-keeping units (SKUs)** or line items of inventory (each different type or package size of a good is a different SKU) offered for sale by many companies. From a logistics perspective, the proliferation of SKUs means (1) more items to identify, (2) more items to store, and (3) more items to track.

Just as the major functional areas of a firm should recognize their interdependence, so too should the various activities that comprise the logistics function (what we'll call *intrafunctional logistics*). The logistics manager should balance each logistics activity to ensure that none is stressed to the point where it becomes detrimental to others.

This can be illustrated by referring to Figure 1-1, which indicates that business logistics is made up of **inbound logistics** (movement and storage of materials into a firm), **materials management**

FIGURE 1-1 Control Over the Flow of Inbound and Outbound Movements



In this drawing, the circles represent buildings where inventories are stored, and the lines with arrows represent movement performed by carriers, a stop-and-start process. Current thought deals more with flows, possibly in different volumes and at different speeds, but without the inventory standing still. The supply chain extends to both the left and right of this diagram and includes the suppliers' suppliers and the customers' customers.

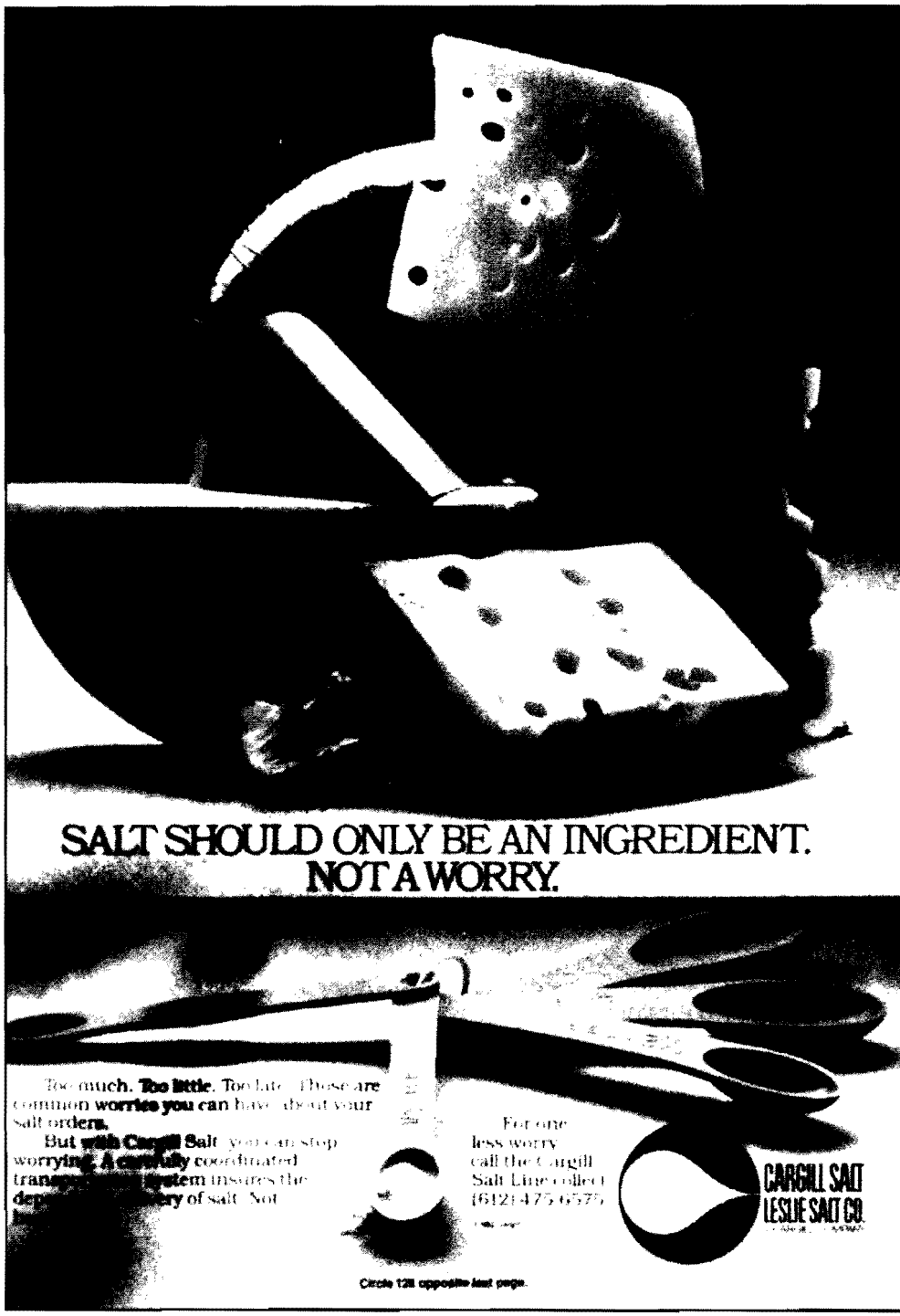


FIGURE 1-2 The Utilization of Logistics Service as a Major Selling Point

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(movement and storage of materials and components within a firm), and **physical distribution** (storage of finished product and movement to the customer). Intrafunctional logistics attempts to coordinate inbound logistics, materials management, and physical distribution in a cost-efficient manner that supports an organization's customer service objectives. Figure 1-2, an advertisement for Cargill salt, shows how a company can differentiate a commodity product (salt) by stressing a dependable logistics system.

Inbound logistics, materials management, and physical distribution can be coordinated in many ways. One way is by using the same truck to deliver materials and component parts and to pick up finished goods. Although this may appear to be little more than common sense—and *common sense is one of the keys to being an effective logistics manager*—consider the case of the company that used the same trucking company to deliver materials and parts to one of its production plants as well as to take finished products from the facility. Unfortunately, one truck would arrive early in the morning to deliver the materials and components, and another truck would arrive in the late afternoon to pick up the finished products. How could this happen? Quite simply: The inbound logistics group and the outbound logistics group were unaware that they were using the same trucking company—the two groups never communicated!

Logistics managers use the **total cost approach** to coordinate inbound logistics, materials management, and physical distribution in a cost-efficient manner. This approach is built on the premise that all relevant activities in moving and storing products should be considered as a whole (i.e., their total cost), not individually. Use of the total cost approach requires an understanding of **cost trade-offs;** in other words, changes to one logistics activity cause some costs to increase and others to decrease.

The key to the total cost approach is that all relevant cost items are considered simultaneously when making a decision. The objective is to find the approach with the lowest total cost that supports an organization's customer service requirements. For example, a decision to use expedited transportation translates into higher transportation costs. At the same time, expedited transportation allows a company to reduce its inventory carrying costs and may also reduce the cost of failing to serve particular customers.[21] Although a company's transportation costs increase when utilizing expedited transportation, the costs of other logistics activities decrease; as a result, the total costs of logistics activities decrease—without negatively affecting customer service.

When used in the logistics decision-making process, the total cost concept approach forms what is commonly called the *total logistics concept*. This concept is unique not because of the activities performed, but because of the integration of all activities into a unified whole that seeks to minimize distribution costs in a manner that supports an organization's customer service objectives. The total logistics concept can be extended to include a firm's suppliers and customers, such as in supply chain management, which will be covered in Chapter 2.

LOGISTICAL RELATIONSHIPS WITHIN THE FIRM

From a companywide perspective, the system and total cost approaches to logistics require an understanding of logistics and its relationships with other functional areas. A later chapter is devoted specifically to purchasing, so our discussion here focuses on logistical relationships with finance, marketing, and production.

[21] Peter Bradley, "Speed Curbs Inventory," *Logistics Management*, November 2001, 45–47.

Finance

The logistics department regularly interfaces with the finance area, in part because logistical decisions are only as good as the quality of cost data with which they are working. The finance staff, which is concerned with predicting future cash flows, is dependent on logistics for information concerning the status of finished products that are somewhere between the end of the firm's production line and the purchaser's receiving dock.

The finance staff is often charged with the responsibility of allocating the firm's limited funds to projects desired by the various operating departments. As such, the finance department is often instrumental in approving capital budgeting decisions that affect logistics, such as the acquisition of materials handling equipment (e.g., forklifts) and packaging equipment (e.g., a shrink-wrap machine). In such situations, finance personnel may decide between purchasing or leasing the relevant equipment, assuming they have approved the decision to acquire it.

Inventory is another area of interest for finance managers, in part because in financial terms inventory is recorded as an asset: all assets of a firm must be paid for by either short-term (hopefully) or long-term financing. One aspect of concern with respect to inventory is its valuation; should inventory be valued in terms of LIFO (last in, first out) or FIFO (first in, first out)? A second concern is that finance often measures inventory in terms of its cost or value in dollars, whereas logistics tends to measure inventory in terms of units.

A third inventory-related concern involves the concept of *inventory float*, which refers to the cash flow associated with holding inventory.[22] In general terms, the inventory costs are for the time period from when one pays a vendor until the time one collects from the customer for the same goods. Unfortunately, there can be a mismatch between inventory turnover (how many times products sell during a time period) and its associated cash flows; suppose, for example, that the inventory turnover is four weeks whereas the lag between paying vendors and collecting from customers is six weeks.

Marketing

Contemporary marketing places a heavy emphasis on customer satisfaction, and logistics strategies can facilitate customer satisfaction through reducing the cost of products, which can translate into lower prices as well as bringing a broader variety of choices closer to where the customer wishes to buy or use the product. Logistics strategies offer a unique way for a company to differentiate itself among competitors, and logistics now offers an important route for many firms to create marketing superiority.

As such, outbound logistics can be a positive (or negative) marketing asset, with key relationships between outbound logistics and the four primary components of the marketing mix. The following discussion about logistics and marketing focuses on the marketing mix, sometimes referred to as the *four Ps* of marketing (place, price, product, and promotion).

Place Decisions

One important marketing concern is place. Decisions regarding place involve two types of networks: logistics and the marketing channel (which is discussed in greater detail later in this chapter). Logistics decisions concern the most effective way to move and store the product from where it is produced to where it is sold. An effective logistics system can provide positive support by enabling the firm to attract and utilize what it considers to be the most productive

[22]Joseph Cavinato, "What Does Your Inventory Really Cost?" *Distribution*, March 1988, 68–72.

channel and supply chain members. Frequently, the channel members are in a position to pick and choose which manufacturer's products they wish to merchandise. If a manufacturer is not consistently able to provide a certain product at the right time, in the right quantities, and in an undamaged condition, the channel members may end their relationship with the supplier or cease active promotion of the supplier's product.

From a marketing perspective, place decisions may also involve new strategies for reaching new customers. An increasingly popular strategy in the retailing industry involves a concept known as *co-branding*, which refers to one location where customers can purchase products from two or more name-brand retailers. Yum! Brands, for example, is the parent company of A&W All American Food, KFC, Long John Silver's, Pizza Hut, and Taco Bell, and you may have eaten at a site where either two or three of these brands are available. From a marketing perspective, co-branding can (1) offer potential customers convenience (satisfying multiple needs in one place), (2) increase customer spending per transaction, and (3) boost brand awareness.[23] Logistical challenges with co-branding include the costs and timing of product delivery. Yum! has addressed these issues by scheduling one delivery per location, which requires co-loading trailers with products for all five chains.

Price Decisions

It is good business sense, and common sense, to recognize that a firm cannot be profitable and grow—in fact, it can be doomed—if it does not control its logistics costs. Obviously, the price of a product must cover relevant production, marketing, distribution, and general administrative costs, and firms with serious waste in their logistics systems will be faced with several choices, none of which is particularly attractive. One choice would be to pass on the higher logistics costs to customers, thus increasing product price. A second option would be to keep price the same but reduce product quality or quantity, which might result in customer defections. Alternatively, a firm could absorb the higher costs, which would cause a decrease in product contribution margins.

Because transportation costs can account for up to 50 percent of a product's total logistics costs,[24] transportation cost factors become important in determining the method used to quote the firm's selling price. A firm can control its transportation costs by using one of several pricing methods, the two most common being **FOB origin** and **FOB destination** (delivered) **pricing systems**. An FOB origin price does not include any transportation costs to the purchaser. With this type of pricing, the purchaser is responsible for the selection of the transportation mode(s) and carrier(s) because the buyer assumes the expense of the transportation from a factory or warehouse. This system of pricing is easy for the seller to administer and always yields the same net return from each sale.

Marketers don't necessarily like FOB origin pricing because it is extremely difficult to adopt uniform retail prices on a regional or national basis. Because each purchaser is a different distance from a factory or warehouse, their **landed costs**—the price of the product at the source plus transportation costs to its destination—are different. Because purchasers tend to have a predetermined margin based on total landed costs, the end result is that each purchaser ends up with a different retail price.

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[23]Rhonda Bauer, "Co-branding: Growing Family or Family Feud?" *Franchising World*, May–June 2002, 22–23.

[24]Scott Swenseth and Michael Godfrey, "Incorporating Transportation Costs into Inventory Replenishment Decisions," *International Journal of Production Economics* 77, no. 2 (2002): 113–130.

In an FOB destination system, the seller quotes the purchaser a price that includes both the price of the product and the transportation cost to the purchaser's receiving dock, and the seller has the prerogative to select the mode(s) and carrier(s) to deliver the product. An average amount of transportation cost is added to the cost of each product, with the idea being that the average transportation cost reflects the cost of shipping the goods to a point that is the average distance from the seller's place of business. Note that with FOB destination, each purchaser ends up with the same landed cost.

Under FOB destination pricing, buyers located relatively close to the seller's point (closer than average) pay more than their share of freight charges, which is called **phantom freight.** The opposite situation occurs when the buyer actually pays lower freight charges than the seller incurs in shipping the product, which is known as **freight absorption.** Phantom freight and freight absorption are illustrated in Figure 1-3 for shipments originating in Omaha.

Marketers find FOB destination pricing attractive for several reasons. The first is that it enables a company to expand the geographic area to which its product is sold because distant customers in a region do not pay the full costs of transportation. Second, because each purchaser has the same landed costs, it is much easier for a company to apply a uniform retail price on a regional or national basis. Third, product distribution is managed by the seller, who can control the logistics network, making it function in a manner that is most beneficial to the firm's overall objectives.

There are also several drawbacks to FOB destination pricing. As pointed out previously, the seller is responsible for product distribution, which means that it is the seller's responsibility to understand the various distribution activities and the trade-offs among them. This understanding cannot be learned in a short period of time. A second drawback is that this pricing system essentially discriminates based on a company's location; in essence, those firms located closer to the seller subsidize the transportation costs of those firms located further from the seller. Some sellers, to avoid alienating these customers, will allow them to order FOB origin if they so desire.

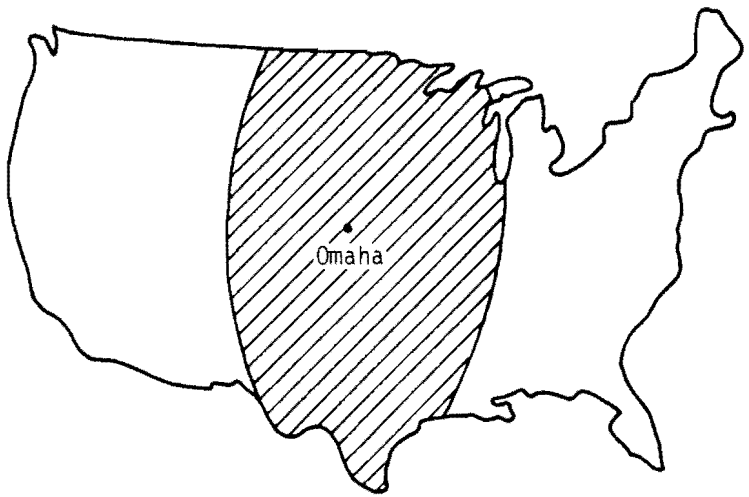
An important consideration with both FOB origin and destination pricing involves the terms of sale, or when the freight charges are paid. *Freight prepaid* refers to a situation in which the applicable charges are paid at the time a shipment is tendered to a carrier, whereas *freight collect* refers to charges being paid at the time of shipment delivery.[25] As such, there are three payment options for FOB origin and three for FOB destination:

- *FOB origin, freight collect:* The buyer pays freight charges and owns the goods in transit. This is the most common FOB origin term.
- *FOB origin, freight prepaid:* The seller pays the freight charges, but the buyer owns the goods in transit.
- *FOB origin, freight prepaid and charged back:* The seller pays the freight charges in advance but bills the buyer for them. The buyer owns the goods in transit.
- *FOB destination, freight prepaid:* The seller pays the freight charges and also owns the goods in transit. This is what is generally referred to as *FOB destination pricing.*
- *FOB destination, freight collect:* The buyer pays the freight charges when the goods arrive, and the seller owns the goods while they are in transit.
- *FOB destination, freight prepaid and charged back:* The seller owns the goods in transit, prepays the freight charges, and bills the buyer for the freight charges.

[25]Ira Breskin, "More Retailers Go 'Freight Collect' on Inbound Shipments," *Logistics Management,* May 2004, 22–24.

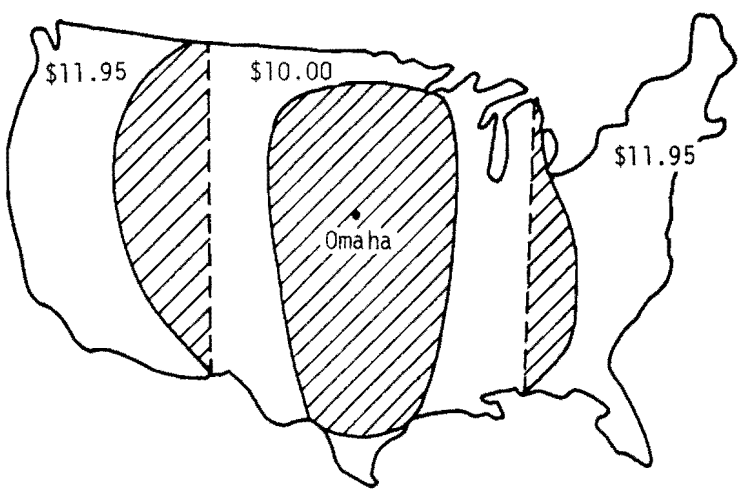
National Single-Zone Pricing

Every customer in the United States pays $11 per unit.



Multiple-Zone Pricing

There are three zones: The midwestern zone, paying $10.00 per unit, and the East Coast and West Coast zones, paying $11.95 per unit.



Phantom freight paid by buyers

Freight absorbtion by seller

FIGURE 1-3 Phantom Freight and Freight Absorption

Logistics managers play an important role in product pricing. They are expected to know the costs of providing various levels of customer service and therefore must be consulted to determine the trade-offs between costs and customer service. Because many distribution costs produce per unit savings when larger volumes are handled, the logistics manager can also help formulate the firm's quantity discount pricing policies.

Product Decisions

A number of potential interfaces are possible in terms of product decisions between marketing and logistics. For example, as noted earlier, the marked increase in product offerings—which allows for more customer choice—creates logistical challenges in terms of identification, storage, and tracking.

Another product interface between marketing and logistics involves the amount of particular SKUs to hold. Marketers often prefer to carry higher quantities of particular items because this reduces the likelihood of **stockouts** (being out of an item at the same time there is demand for it). From a logistics perspective, higher quantities of inventory (1) necessitate additional storage space and (2) increase inventory carrying costs.

Product design, which is often the purview of marketers, can also have important implications for logistical effectiveness and efficiency. For example, long-necked glass beverage containers might be more distinctive than aluminum cans; however, from a logistics perspective, long-necked bottles take up more space and are more likely to be damaged than aluminum cans.

Promotion Decisions

Many promotional decisions require close coordination between marketing and logistics. One important situation concerns the availability of highly advertised products, particularly when a company is running pricing campaigns that lower the price of certain items. Few things are more damaging to a firm's goodwill than being stocked out of items that are heavily promoted in a sales campaign. In addition, in some instances imbalances of product supply and demand can be viewed as *bait and switch tactics*—that is, enticing customers with the promises of a low-priced product, only to find that it is unavailable, but that a higher-priced substitute product is readily available.

Once a decision is made to introduce a new product, the logistics staff assumes responsibility for having the product in place on the scheduled release date—not earlier, not later. In certain industries, such as music, motion pictures, and books, the ease of technological piracy has added to the complexity of having a product in place on the scheduled release date. For example, in an effort to lessen potential piracy with the November 2001 U.S. release of the *Harry Potter and the Sorcerer's Stone* motion picture, the distributors divided each print of the film into two separate shipments "so that no single shipment contained the entire version of the film."[26]

Production

Perhaps the most common interface between production and logistics involves the length of production runs. In many cases, the production people favor long production runs of individual products because this allows the relevant fixed costs to be spread over more units, thus resulting in a lower production cost per unit. Long production runs generate large amounts of inventory, and it is often a logistics staff responsibility to store and track the inventory. Another consideration with long production runs is that sometimes excessive inventory for particular products

[26]David Biederman, "Logistics Wizards Deliver," *Traffic World*, November 26, 2001, 8.

occurs because of limited (or no) demand for them. At a minimum, these products (sometimes referred to as *dead stock*) add to a company's inventory carrying costs and also take up space that could be used to store other products. A situation is known to have occurred in which forklift drivers would periodically move dead stock of about 150 refrigerators from one warehouse area to another, just to ensure that the refrigerators did not sit in the same place for an extended period of time!

Increasing utilization of the **postponement** concept (the delay of value-added activities such as assembly, production, and packaging until the latest possible time[27]) also influences the interface between production and logistics. More specifically, some value-added activities (e.g., case packing, case labeling) that were traditionally performed at a production plant are now performed in warehousing facilities. As a result, warehousing facilities may need to add new types of equipment and be configured differently to allow specific value-added activities to take place.[28]

MARKETING CHANNELS

Another concept that is useful to studying the marketing relationships between and among firms is to look at marketing channels. The marketing channels concept describes the institutional setting by which goods and services move forward. One takes a broad look at existing transactions and how the markets in which they are carried out were formed. Marketing is a series of processes performed by a coordinated group of firms that facilitate exchange.

> Marketing channels can be viewed as sets of interdependent organizations involved in the process of making a product or service available for use or consumption. From the outset, it should be recognized that not only do marketing channels satisfy demand by supplying goods and services at the right place, quantity, quality, and price, but they also stimulate demand through promotional activities of the units (e.g., retailers, manufacturers' representatives, sales offices, and wholesalers) constituting them. Therefore, the channel should be viewed as an orchestrated network that creates value for the consumer through the generation of form, possession, time, and place utilities.[29]

The principal, traditional actors in the marketing channel are the manufacturer, the wholesaler, and the retailer. Each in turn assumes ownership of the inventory of goods. Each also assumes risks associated with temporary inventory ownership. The channel members in this arrangement, carrying out this task, can also be referred to as the *ownership channel*. The same or related parties also get together in other channel arrangements, and these channels are called the *negotiations channel*, the *financing channel*, the *promotions channel*, and the *logistics channel*. The logistics channel handles the physical flow of product, which is the principal topic of this book. All channels and channel activities can be graphed as networks.

Information is also freely carried up and down, back and forth, and between channels. One of the functions of the channel system is to give each actor sufficient information to make a correct, rational decision. Information availability is important to a channel's functioning: Channels will fail if some of the actors feel that necessary information is lacking. Although

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[27]John J. Coyle, Edward J. Bardi, and C. John Langley, *The Management of Business Logistics: A Supply Chain Perspective*, 7th ed. (Mason, OH: South-Western, 2003).

[28]"Taking the Hit-or-Miss Out of Make-to-Order," *Modern Materials Handling*, Mid-May 1999, 14–16.

[29]Louis W. Stern and Adel I. El-Ansary, *Marketing Channels*, 4th ed. (Upper Saddle River, NJ: Prentice Hall, 1992), 1.

information flows in both directions, there is some bias in that most channel members are usually more concerned about buyers' needs than sellers' needs. New products, for example, are developed with customers in mind. Selling is carried out more aggressively and is considered more glamorous than procurement. Of course, one channel member's sale is another channel member's purchase.

It is safe to assume that over 99 percent of the decisions made within channels are for repeat purchases (also called *rebuys*); hence, many of the transactions are not strictly new but are either exact repeats or repeats with minor modifications from whatever was done yesterday or last week. There is also a stock of goodwill included in many transactions. People prefer doing business with people they like. This is especially true today, with the emphasis on collaboration and partnerships, rather than adversarial relationships, between buyers and sellers.

Established channels tend to operate with the same channel members over time. Only a few participants are in the action for the first time; when they join a channel, they must establish their credibility and learn that channel's rules of the game. Let us look more closely at how the three traditional parties—the manufacturer, the wholesaler, and the retailer—interact in each of the five mentioned channels.

The *ownership channel* covers movement of the title to the goods. The goods themselves might not be physically present or even exist. If a good is in great demand, one might have to buy it before it is produced, such as a commissioned piece of art or a scarce new consumer product. Sometimes, a product will not be made until there are sufficient financial commitments, which is often the case with new models of airline aircraft. The party owning the good almost always has the right to trade or sell it and bears the risks and costs associated with having it in inventory. Also, while owning the good, one can use it as collateral for a loan, although this may place some restrictions on its use or movement.

The *negotiations channel* is the one in which buy and sell agreements are reached. This could include transactions face-to-face or by telephone, e-mail, electronic data interchange, or almost any other form of communication. In many situations, no actual negotiations take place; the price for the product is stated, and one either buys at that price or does not. In some trades, auctions are used; in others, highly structured, organized trading takes place, such as markets for some commodities. One part of the negotiations covers how activities in the other channels are to be handled. For example, each buying party will specify the point and time of delivery and the point and time of payment. Even packaging design may be negotiated. (An old Henry Ford story is that suppliers of some parts were directed to ship in wooden crates built of good lumber and to very exacting specifications. It turned out that the empty crates were then partially disassembled and became floorboards in Ford Model Ts.)

The *financing channel* handles payments for goods. More importantly, it handles the company's credit. The multiple participants in the channel have different financial strengths, and often one must help another to keep the entire channel alive. For example, a newly opened retail store may have some of its goods placed on consignment, meaning that the wholesaler, not the store, owns them. The retailer will reimburse the wholesaler only for goods sold; the wholesaler bears nearly all the financial risks. Sometimes, in an effort to develop what it believes is a necessary new product line, a wholesaler will assist the manufacturer by putting up cash in advance along with an order. Alternatively, the wholesaler will place a large, firm order, and the manufacturer can take that order to a bank and use it as a basis for receiving a loan. The logistics channel is often designed so that a payment must be received to trigger the release of the order or part of the order. Credit is important to all parties in the channel, who frequently receive or extend it, and credit becomes an integral part of the negotiations. If bills are not paid when due or if credit is overextended, collection becomes a financing channel function.

The *promotions channel* is concerned with promoting a new or an existing product. This is probably most closely related to the financing channel because monetary allowances are often part of the promotion effort. However, the promotion channel and the logistics channel are linked in several ways. First, there may be special advertising materials, such as coupon books, floor advertising posters, or displays, which must be distributed with the promoted product. Second, some of the cartons or consumer packs may have special labeling, and their placement at retailers must coincide with other promotional efforts. Third, because logistics personnel handle order processing, they have instantaneous records of actual sales, which indicate the initial success of the promotional efforts.

As mentioned previously, the *logistics channel*, its components, and its functioning are the main topics of this book. The most significant contribution that the logistics channel makes to the overall channel process is the *sorting function*. This function involves rearranging the assortment of products as they flow through the channels toward the customer, taking large blocks of single products and rearranging them into quantities, assortments, and varieties that consumers prefer. The sorting function bridges "the discrepancy between the assortment of goods and services generated by the producer and the assortment demanded by the consumer. The discrepancy results from the fact that manufacturers typically produce a large quantity of a limited variety of goods, whereas consumers usually desire only a limited quantity of a wide variety of goods."[30] The sorting function has four steps, and these are important to understanding the concept of goods flowing through the logistics channel (and the supply chain):

- *Sorting out* is sorting a heterogeneous supply of products into stocks that are homogeneous.
- *Accumulating* is bringing together similar stocks from different sources.
- *Allocating* is breaking a homogeneous supply into smaller lots.
- *Assorting* is building up assortments of goods for resale, usually to retail customers.

These steps take place between the manufacturer and the consumer, which means that they are performed by the wholesaler, the retailer, or specialist intermediaries. In addition to the major actors or primary participants in a logistics channel, many less-well-known actors play minor but essential roles. They are called **facilitators** or **channel intermediaries.** Intermediaries make the entire system function better. They spring up and flourish in areas where communications and other interactions between major parties are not well meshed. In international transactions, for example, translators may be an important intermediary. Intermediaries also function in areas needing orderly routines, such as order processing, and in searching, for example, when customers are looking for products or producers are looking for customers. Intermediaries fill niches, they are very well focused, and they serve as buffers. Usually, they do not take an ownership position in the products or goods being handled.

The five channels discussed previously show where intermediaries function and fit. They are used only when needed, and most channel actors know when to rely on them. For example, in the ownership channel, the most common intermediary is the bank or finance company, which may assume temporary or partial ownership of goods as part of an ongoing transaction. Often, this is a condition for the extension of credit. Banks routinely loan funds to all parties in a channel, making it possible for goods to be manufactured, marketed, and sold.

Brokers, or intermediaries between a buyer and a seller, are associated with the negotiation channel. When one contracts with a trucker to carry a truckload of freight, one often uses

[30]Stern and El-Ansary, *Marketing Channels*, 6.

a broker. One reason brokers are used in this situation is that the individual trucker believes that his or her time is more profitably spent driving, rather than being on the phone trying to negotiate for the next load. It is easier for the trucker to let the broker find the load and then give the broker 10 to 15 percent off the top.

Intermediaries in the financing field are again often banks, who supply the credit necessary for a deal to be finalized. Sometimes insurance is also a requirement in the agreement, so insurance companies may also serve as intermediaries. Sometimes accountants are called in to verify certain information. For big-ticket items, such as ships or houses, the buyer almost always borrows money to finance part of the purchase. Providers of financing are intermediaries, as are those who bring together buyers, sellers, and sources of credit.

The promotions channel has intermediaries that aid with promotions, such as firms that design, build, and transport product exhibits for display at trade shows. Advertising agencies can handle the preparation and media placement of advertising materials, and firms often use public relations agencies to represent them to the news media. Some companies choose to outsource their personal selling functions by hiring an intermediary to provide them with a contract sales force. These promotion efforts handled by intermediaries must be coordinated with the firm's overall marketing communication activities.

The logistics channel has many intermediaries, and many are mentioned in this book. The most common is the freight forwarder, whose function is to assemble small shipments into larger shipments and then tender them in truckload or railcarload quantities to truck lines or to railroads. In international logistics, intermediaries abound; more than a hundred different types could be listed. One example of specialization is cargo surveyors, who specialize in coffee, devoting their careers to examining and arbitrating damage claims involving shipments of coffee beans.

ACTIVITIES IN THE LOGISTICAL CHANNEL

To successfully apply the systems and total cost approaches to logistics, it is essential to understand the various logistics activities. Keep in mind that because one logistics system does not fit all companies, the number of activities in a logistics system can vary from company to company. Activities that are considered to be logistics related include, but are not limited to, the following:

Customer service	Demand forecasting
Facility location decisions	Industrial packaging
Inventory management	Materials handling
Order management	Parts and service support
Production scheduling	Procurement
Returned products	Salvage and scrap disposal
Transportation management	Warehousing management

Customer Service

There can be many definitions of customer service, such as "keeping existing customers happy." Customer service involves making sure that the right person receives the right product at the right place at the right time in the right condition and at the right cost. Customer service is discussed in greater detail in Chapter 4.

Demand Forecasting

Demand forecasting refers to efforts to estimate product demand in a future time period. The growing popularity of the supply chain concept has prompted increasing collaboration among supply chain partners with respect to demand forecasting. Such collaboration can enhance efficiency by reducing overall inventory levels in a supply chain. We discuss demand forecasting in Chapter 4.

Facility Location Decisions

It's often said that the success of a retail store depends on three factors: location, location, and location. It can also be said that the success of a particular logistics system is dependent on the location of the relevant warehousing and production facilities. Facility location decisions are increasingly important as the configuration of logistics systems is altered due to the impacts of multinational trade agreements. Facility location decisions are covered in Chapter 8.

Industrial Packaging

Packaging can have both a marketing (consumer packaging) and logistical (industrial packaging) dimension. Industrial (protective) packaging refers to packaging that prepares a product for storage and transit (e.g., boxes, crates), and industrial packaging has important interfaces with the materials handling and warehousing activities. As such, Chapter 5 discusses industrial packaging in conjunction with materials handling.

Inventory Management

Inventory refers to stocks of goods that are maintained for a variety of purposes, such as for resale to others, as well as to support manufacturing or assembling processes. When managing inventory, logisticians need to simultaneously consider three relevant costs—the cost of carrying (holding) product, the cost of ordering product, and the cost of being out of stock. Chapter 9 provides further discussion concerning inventory management.

Materials Handling

Materials handling refers to the short-distance movement of products within the confines of a facility (e.g., plant, warehouse). Because materials handling tends to add costs (e.g., labor costs, product loss, and product damage) rather than value to logistics systems, managers pursue cost-efficiency objectives such as minimizing the number of handlings and moving the product in a straight line whenever possible. Materials handling considerations are presented in Chapter 5.

Order Management

Order management refers to management of the activities that take place between the time a customer places an order and the time it is received by the customer. As such, order management is a logistics activity with a high degree of visibility to customers; order management is discussed in Chapter 4 (as is customer service).

Parts and Service Support

Parts and service support refers to after-sale support for products in the form of repair parts, regularly scheduled service, emergency service, and so on. These activities can be especially important for distributors of industrial products, and relevant considerations include the number and

location of repair part facilities, order management, and transportation.[31] Discussions of parts and service support appear in several chapters.

Production Scheduling

Production scheduling refers to determining how much to produce and when to produce it. As noted previously, a key interface between production and logistics involves the quantity to be produced, with increasing tension between make-to-stock (generally involving large production lots) and make-to-order (generally involving small production lots) philosophies. Production scheduling is discussed in several chapters.

Procurement

Procurement refers to the raw materials, component parts, and supplies bought from outside organizations to support a company's operations.[32] Procurement's direct link to outside organizations means that its strategic importance has increased as the supply chain management philosophy has become more popular. Procurement is discussed in more detail in Chapter 11.

Returned Products

Products can be returned for various reasons, such as product recalls, product damage, lack of demand, and customer dissatisfaction. The logistical challenges associated with returned products can be complicated by the fact that returned products often move in small quantities and may move outside forward distribution channels. This topic is examined in Chapter 13.

Salvage and Scrap Disposal

Salvage refers to "equipment that has served its useful life but still has value as a source for parts," whereas scrap refers to "commodities that are deemed worthless to the user and are only valuable to the extent they can be recycled."[33] Salvage and scrap disposal are prominent reverse logistics activities and are discussed in Chapter 11.

Transportation Management

Transportation can be defined as the actual physical movement of goods or people from one place to another, whereas transportation management (traffic management) refers to the management of transportation activities by a particular organization. As pointed out earlier, transportation can account for up to 50 percent of a firm's total logistics costs and thus represents the most costly logistics activity in many organizations. The transportation system is discussed in Chapter 6, and transportation management is discussed in Chapter 7.

Warehousing Management

Warehousing refers to places where inventory can be stored for a particular period of time. As noted previously, important changes have occurred with respect to warehousing's role in contemporary logistics and supply chain systems. Warehousing is discussed in Chapter 10.

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[31]Lisa H. Harrington, "Win Big with Strategic 3PL Relationships," *Transportation & Distribution*, October 1999 118–126.

[32]Donald J. Bowersox, David J. Closs, and M. Bixby Cooper, *Supply Chain Logistics Management* (Boston: McGraw-Hill Irwin, 2002).

[33]Glossary of Public Purchasing and Warehouse Inventory Terms, *fcn.state.fla.us/fcn/centers/purchase/standardmanual/glossary.htm*.

LOGISTICS CAREERS

The logistics manager has a highly complex and challenging position, in part because the logistician needs to be both a generalist and specialist. As a generalist, the logistician must understand the relationship between logistics and other corporate functions, both within and outside the firm. As a specialist, the logistician must understand the relationships between various logistics activities and must have some technical knowledge of the various activities.

In recent years, the job market for logisticians has been strong at both the undergraduate and MBA levels. Logistics-related jobs include, but are not limited to, logistics analyst, consultant, customer service manager, logistics engineer, purchasing manager, transportation manager, and warehouse operations manager.[34] Unlike twenty to thirty years ago, career paths in logistics can lead to the executive suite; indeed, the current CEO of Wal-Mart began his Wal-Mart career in the logistics area. Compensation levels for entry-level positions requiring an undergraduate degree in logistics range from the mid-$30K to the lower $50K level. Moreover, the median compensation for senior-level logisticians was approximately $230,000 in 2004.[35]

Because of the growing importance of logistics, a number of professional organizations are dedicated to advancing the professional knowledge of their members. The rationale for these professional associations is that the state of the art is changing so rapidly that professionals must educate and reeducate themselves on a regular basis. Some of the more prominent professional logistics organizations are summarized in the appendix to this chapter.

Summary

This chapter introduced the topic of logistics, which the CSCMP defines as "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."

The economic impacts of logistics were discussed along with reasons for the increased importance of logistics since 1980. Systems and total cost approaches to logistics were discussed, as were logistical relationships within a firm, with a particular focus on various interfaces between marketing and logistics. A brief description of a number of logistics activities was presented, and the chapter concluded with a brief look at logistics careers.

Questions for Discussion and Review

1. Did it surprise you that logistics can be such an important component in a country's economic system? Why or why not?
2. Distinguish between possession, form, time, and place utility.
3. How does logistics contribute to time and place utility?
4. How can a particular logistics system be effective but not efficient?
5. Explain the significance of the fact that the purpose of logistics is to meet customer requirements.
6. Explain how an understanding of logistics management could be relevant to your favorite charitable organization.
7. Discuss three reasons for why logistics has become more important since 1980.
8. Which reason for the increased importance of logistics do you believe is most important? Why?

[34] *www.cscmp.org.*

[35] Bernard LaLonde and James Ginter, "The Ohio State University 2004 Survey of Career Patterns in Logistics," retrieved from *www.cscmp.org.*

9. What are some practical implications of the idea that one logistics system does not fit all companies?
10. Distinguish between inbound logistics, materials management, and physical distribution.
11. What is the systems approach to problem solving? How is this concept applicable to logistics management?
12. Explain what is meant by the total cost approach to logistics.
13. Define what is meant by a cost trade-off. Do you believe that this concept is workable? Why or why not?
14. What are several areas in which finance and logistics might interface?
15. Briefly discuss each of the four basic aspects of the marketing mix and how each interfaces with the logistics function. In your opinion, which component of the marketing mix represents the most important interface with logistics? Why?
16. Why do marketers tend to prefer FOB destination pricing rather than FOB origin pricing?
17. What are several ways in which logistics and production might interface?
18. Briefly discuss the ownership, negotiations, financing, promotions, and logistics channels.
19. Discuss five activities that might be part of a company's logistics department.
20. Logistics managers must be both generalists and specialists. Why is this true? Does this help to explain why there tends to be an imbalance in the supply of, and demand for, logistics managers?

Suggested Readings

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CASES

CASE 1-1 SUDSY SOAP, INC.

Frank Johnson was outbound logistics manager for Sudsy Soap, Inc. He had held the job for the past five years and had just about every distribution function well under control. His task was made easier because shipping patterns and volumes were unchanging routines. The firm's management boasted that it had a steady share in "a stable market," although a few stockholders grumbled that Sudsy Soap had a declining share in a growing market.

The Sudsy Soap plant was in Akron, Ohio. It routinely produced 100,000 48-ounce cartons of powdered dish soap each week. Each carton measured about half a cubic foot, and each working day, 15 to 20 railcar loads were loaded and shipped to various food chain warehouses and to a few large grocery brokers. Johnson worked with the marketing staff to establish prices, so nearly all soap was purchased in railcar-load lots. Shipments less than a full carload did not occur very often.

Buyers relied on dependable deliveries, and the average length of time it took for a carton of soap to leave the Sudsy production line and reach a retailer's shelf was 19 days. The best time was 6 days (to chains distributing in Ohio), and the longest time was 43 days (to retailers in Alaska and Hawaii).

Sudsy Soap's CEO was worried about the stockholders' criticism regarding Sudsy's lack of growth, so he hired a new sales manager, E. Gerard Beever (nicknamed "Eager" since his college days at a Big Ten university). Beever had a one-year contract and knew he must produce. He needed a gimmick.

At his university fraternity reunion, he ran into one of his old fraternity roommates, who was now sales manager for an imported line of kitchen dishes manufactured in China and distributed by a firm headquartered in Hong Kong. The product quality was good, but competition was intense. It was difficult to get even a toehold in the kitchen dinnerware market. Beever and his contact shared a common plight: They were responsible for increasing market shares for products with very little differentiation from competitors' products. They both wished they could help each other, but they could not. The reunion ended and each went home.

The next week, Beever was surprised to receive an e-mail message from his old roommate:

> We propose a tie-in promotion between Sudsy Soap and our dishes. We will supply at no cost to you 100,000 each 12-inch dinner plates, 7-inch pie plates, 9-inch bread and butter plates, coffee cups, and saucers. Each week you must have a different piece in each package, starting with dinner plates in week 1, pie plates in week 2, and so on through the end of week 5. Recommend this be done weeks of October 3, October 10, October 17, October 24, and October 31 of this year. Timing important because national advertising linked to new television show we are sponsoring. We will give buyers of five packages of Sudsy Soap, purchased five weeks in a row, one free place setting of our dishes. Enough of your customers will want to complete table settings that they will buy more place settings from our retailers. Timing crucial. Advise immediately.

Beever was pleased to receive the offer but realized a lot of questions had to be answered before he could recommend that the offer be accepted. He forwarded the message to Johnson with an added note:

> Note attached message offering tie-in with dishes. Dishes are of good quality. What additional information do we need from dish distributor, and what additional information do you need before we know whether to recommend acceptance? Advise ASAP. Thanks. ■

QUESTIONS

1. Assume that you are Frank Johnson's assistant, and he asks you to look into various scheduling problems that might occur. List and discuss them.
2. What packaging problems, if any, might there be?
3. Many firms selling consumer goods are concerned with problems of product liability. Does the dish offer present any such problems? If so, what are they? Can they be accommodated?
4. Should the exterior of the Sudsy Soap package be altered to show what dish it contains? If so, who should pay for the extra costs?
5. Assume that you are another one of Johnson's assistants and your principal responsibility is managing the inventories of all the firm's inputs, finished products, packages, and outbound inventories. What additional work will the dish proposal cause for you?
6. You are Beever. Your staff has voiced many objections to the dish tie-in proposal, but you believe that much of the problem is your staff's reluctance to try anything innovative. Draft a message to the dish company that, although not accepting their proposal, attempts to clarify points that may be subject to misinterpretation and also takes into account some of your staff's legitimate concerns.

CASE 1-2 KIDDIELAND AND THE SUPER GYM

KiddieLand is a retailer of toys located in the Midwest. Corporate headquarters is in Chicago, and its 70 stores are located in Minnesota, Wisconsin, Michigan, Illinois, Indiana, Ohio, Iowa, and Kentucky. One distribution center is located in Columbus (for Kentucky, Indiana, Michigan, and Ohio) and one in Chicago (for Illinois, Iowa, Minnesota, and Wisconsin).

KiddieLand markets a full range of toys, electronic games, computers, and play sets. Emphasis is on a full line of brand-name products together with selected items sold under the KiddieLand brand. KiddieLand's primary competitors include various regional discount chains. The keys to KiddieLand's success have been a comprehensive product line, aggressive pricing, and self-service.

Donald Hurst is KiddieLand's logistics manager. He is responsible for managing both distribution centers, for traffic management, and for inventory control. Don's primary mission is to make sure all stores are in stock at all times without maintaining excessive levels of inventory.

One morning in late January, while Don was reviewing the new year's merchandising plan, he discovered that starting in March, KiddieLand would begin promoting the Super Gym Outdoor Children's Exercise Center. Don was particularly interested that the new set would sell for $715. In addition, the Super Gym is packaged in three boxes weighing a total of 450 pounds. "Holy cow!" thought Don. "The largest set we have sold to date retails for $159 and weighs only 125 pounds."

"There must be some mistake," thought Don as he walked down the hall to the office of Olga Olsen, KiddieLand's buyer for play sets. Olga was new on her job and was unusually stressed because both of her assistant buyers had just resigned to seek employment on the West Coast.

As soon as Olga saw Don, she exclaimed, "Don, my friend, I have been meaning to talk to you." Don knew right then that his worst fears were confirmed.

The next morning Don and Olga met with Randy Smith, Don's traffic manager; A. J. Toth, general manager for KiddieLand's eight Chicago stores; and Sharon Rabiega, Don's assistant for distribution services. Because the previous year had been unusually profitable, everyone was in a good mood because this year's bonus was 50 percent larger than last year's.

Nevertheless, A. J. got to the point: "You mean to tell me that we expect somebody to stuff a spouse, three kids, a dog, and 450 pounds of Super Gym in a small sedan and not have a conniption?"

Randy chimed in, "Besides, we can't drop ship Super Gyms from the manufacturer to the consumer's address because Super Gym ships only in quantities of 10 or more."

Olga was now worried. "We can't back out of the Super Gym now," she moaned. "I have already committed KiddieLand for 400 sets, and the spring–summer play set promotion went to press last week. Besides, I am depending on the Super Gym to make my gross margin figures."

"What about SUVs?" asked Toth. "They make up half the vehicles in our parking lots. Will the three packages fit inside them?"

By now the scope of the problem had become apparent to everyone at the meeting. At 3 P.M. Don summarized the alternatives discussed:

1. Purchase a two-wheeled trailer for each store.
2. Find a local trucking company that can haul the Super Gym from the KiddieLand store to the customer.
3. Stock the Super Gym at the two distribution centers and have the truck that makes delivery runs to the retail stores also make home deliveries.
4. Charge for delivery if the customer cannot get the Super Gym home.
5. Negotiate with the Super Gym manufacturer to ship directly to the customer.

When the meeting adjourned, everyone agreed to meet the following Monday to discuss the alternatives. On Thursday morning a record-breaking blizzard hit Chicago; everyone went home early. KiddieLand headquarters was closed on Friday because of the blizzard. By Wednesday, the same group met again.

Don started the meeting. "Okay," Don began, "let's review our options. Sharon, what did you find out about buying trailers for each store?"

"Well," Sharon began, "the best deal I can find is $1,800 per trailer for 70 trailers, plus $250 per store for an adequate selection of bumper hitches, and an additional $50 per year per store for licensing and insurance. Unfortunately, bumpers on the newest autos cannot accommodate trailer hitches."

"Oh, no," moaned Olga, "we only expect to sell 5.7 sets per store. That means $368 per Super Gym for delivery," she continued as she punched her calculator, "and $147 in lost gross margin!"

Next, Randy Smith summarized the second option. "So far we can get delivery within 25 miles of most of our stores for $38.21 per set. Actually," Randy continued, "$38.21 is for delivery 25 miles from the store. The rate would be a little less for under 25 miles and about $1.50 per mile beyond 25 miles."

A. J. Toth chimed in, "According to our marketing research, 85 percent of our customers drive less than 25 minutes to the store, so a flat fee of $40 for delivery would probably be okay."

Randy continued, "Most delivery companies we talked to will deliver twice weekly but not daily."

Sharon continued, "The motor carrier that handles shipments from our distribution centers is a consolidator. He said that squeezing an 18-wheeler into some subdivisions wouldn't make sense. Every time they try, they knock down a couple of mailboxes and leave truck tracks in some homeowner's lawn."

Olga added, "I talked to Super Gym about shipping direct to the customer's address, and they said forget it. Whenever they have tried that," Olga continued, "the customer gets two of one box and none of another."

"Well, Olga," Don interrupted, "can we charge the customer for delivery?"

Olga thought a minute. "Well, we have never done that before, but then we have never sold a 450-pound item before. It sounds like," Olga continued, "our choice is to either absorb $40 per set or charge the customer for delivery."

"That means $16,000 for delivery," she added.

"One more thing," Don said. "If we charge for shipping, we must include that in the copy for the spring–summer brochure."

Olga smiled. "We can make a minor insert in the copy if we decide to charge for delivery. However," she continued, "any changes will have to be made to the page proofs—and page proofs are due back to the printer next Monday." ■

QUESTIONS

1. List and discuss the advantages and disadvantages of purchasing a two-wheeled trailer for each store to use for delivering Super Gyms.
2. List and discuss the advantages and disadvantages of having local trucking companies deliver the Super Gym from the retail stores to the customers.
3. List and discuss the advantages and disadvantages of stocking Super Gyms at the distribution centers, and then having the truck that makes deliveries from the distribution center to the retail stores also make deliveries of Super Gyms to individual customers.
4. List and discuss the advantages and disadvantages of charging customers for home delivery if they are unable to carry home the Super Gym.
5. Which alternative would you prefer? Why?
6. Draft a brief statement (catalog copy) to be inserted in the firm's spring–summer brochure that clearly explains to potential customers the policy you recommended in question 5.
7. In the first meeting, A. J. asked about SUVs, but there was no further mention of them. How would you follow up on his query?

APPENDIX 1

LOGISTICS PROFESSIONAL ORGANIZATIONS

APICS—The Association for Operations Management *(www.apics.org)*

APICS "builds operations management excellence in individuals and enterprises through superior education and training, internationally recognized certifications, comprehensive resources, and a worldwide network of accomplished industry professionals." APICS offers three certification programs: Certified in Integrated Resource Management (CIRM), Certified in Production and Inventory Management (CPIM), and Certified Supply Chain Professional (CSCP).

American Society of Transportation and Logistics (AST&L) *(www.astl.org)*

AST&L was founded by industry leaders "to ensure a high level of professionalism and promote continuing education in the field of transportation and logistics." It offers one certification program, Certified in Transportation and Logistics (CTL), and has added a new entry-level designation, Professional Designation in Logistics and Supply Chain Management (PLS).

Council of Supply Chain Management Professionals *(www.cscmp.org)*

Formerly known as the Council of Logistics Management, the CSCMP is a nonprofit professional organization "that helps supply chain managers connect and collaborate . . . and become more effective professionals."

Delta Nu Alpha (DNA) *(www.deltanualpha.org)*

DNA is an "international organization of professional men and women in all areas and at all levels of transportation and logistics." Its primary focus is on education.

International Society of Logistics (SOLE) *(www.sole.org)*

The International Society of Logistics, formerly the Society of Logistics Engineers, is a "non-profit international professional society composed of individuals organized to enhance the art and science of logistics technology, education and management." It has one certification program: Certified Professional Logistician (CPL).

Supply Chain & Logistics Canada (SCL) *(www.sclcanada.org)*

SCL is a "non-profit organization of business professionals interested in improving their logistics and supply chain management skills through a comprehensive program of education, research and networking opportunities."

The Chartered Institute of Logistics and Transport in the UK—CILT (UK) *(www.ciltuk.org)*

CILT (UK) "is the professional body for transport, logistics and integrated supply-chain management."

Warehousing Education and Research Council (WERC) *(www.werc.org)*

WERC is a "professional organization focused exclusively on warehousing management, providing practical, how-to-information to help members grow professionally as they improve warehouse and company performance."