

# Chapter

# 1

## *Business Logistics/Supply Chain—A Vital Subject*

*Physical distribution is simply another way of saying "the whole process of business."*<sup>1</sup>

—PETER DRUCKER, 1969

### INTRODUCTION

As far back as history records, the goods that people wanted were not produced where they wanted to consume them, or these goods were not accessible when people wanted to consume them. Food and other commodities were widely dispersed and were only available in abundance at certain times of the year. Early peoples had the choice of consuming goods at their immediate location or moving the goods to a preferred site and storing them for later use. However, because no well-developed transportation and storage systems yet existed, the movement of goods was limited to what an individual could personally move, and storage of perishable commodities was possible for only a short time. This limited movement-storage system generally constrained people to live close to the sources of production and to consume a rather narrow range of goods.

Even today, in some areas of the world consumption and production take place only within a very limited geographic region. Striking examples can still be observed in the developing nations of Asia, South America, Australia, and Africa, where some of the population live in small, self-sufficient villages, and most of the goods needed by the

<sup>1</sup>Peter F. Drucker, "Physical Distribution: The Frontier of Modern Management," in Donald J. Bowersox, Bernard J. LaLonde, and Edward Smykay (eds.), *Readings in Physical Distribution Management* (New York: Macmillan, 1969), p. 4.

residents are produced or acquired in the immediate vicinity. Few goods are imported from other areas. Therefore, production efficiency and the economic standard of living are generally low. In this type of economy, a well-developed and inexpensive logistics system would encourage an exchange of goods with other producing areas of the country, or even the world.

### Example

Suppose that consumers in the United States and South Korea buy DVD recorders and computer software. In the coming year, about the same number of consumers will purchase a word processing program and a television set. Because of the differences in local labor costs, tariffs, transportation, and product quality, the effective price to the consumers differs, as shown in Table 1-1. A consumer in South Korea and one in the United States (in this case, the economy of both countries) must pay a total of \$1,450.00 to fill their needs.

Now, if each economy trades with the other those goods with which it has a cost advantage, both consumers and their economies will be better off. South Korea has low labor costs for making DVD recorders, whereas the United States has an advantage in producing low-cost, high-quality software. With the availability of inexpensive and reliable transportation, there is an economic advantage to specializing in the product that can be produced most cheaply and buying the remaining product from the other country. With reasonable transportation costs, South Korea can place DVD recorders in the United States at a price below the locally produced and locally transported product. Conversely, the United States has the design and production cost advantage for software and can incur a reasonable transportation charge to place software in South Korea and at a price below what is available locally. The revised economic picture can be seen in Table 1-2. Both consumers in the countries save  $\$1,450 - 1,200 = \$250$ . Expensive transportation would preclude the countries from trading with each other and realizing their comparative economic advantages by making the landed price of imported products higher than those available locally.

As logistics systems improved, consumption and production began to separate geographically. Regions would specialize in those commodities that could be produced most efficiently. Excess production could be shipped economically to other producing (or consuming) areas, and

**Table 1-1**  
Consumer Prices to Buy Only Locally Produced Products

CONSUMER IN	DVD RECORDER	WORD PROCESSING SOFTWARE	TOTAL
South Korea	\$250.00	\$500.00	\$ 750.00
United States	400.00	300.00	700.00
The economies			\$1,450.00

**Table 1-2**  
**The Benefits of**  
**Trading Products**  
**When Transportation**  
**Is Inexpensive**

CONSUMER IN	DVD RECORDER	WORD PROCESSING SOFTWARE	TOTAL
South Korea	\$250.00	\$350.00 <sup>a</sup>	\$ 600.00
United States	300.00 <sup>b</sup>	300.00	600.00
The economies			<u>\$1,200.00</u>

<sup>a</sup> Imports from the United States  
<sup>b</sup> Imports from South Korea

needed goods not produced locally were imported. This exchange process follows the *principle of comparative advantage*.

This same principle, when applied to world markets, helps to explain the high level of international trade that takes place today. Efficient logistics systems allow world businesses to take advantage of the fact that lands, and the people who occupy them, are not equally productive. Logistics is the very essence of trade. It contributes to a higher economic standard of living for us all.

To the individual firm operating in a high-level economy, good management of logistics activities is vital. Markets are often national or international in scope, whereas production may be concentrated at relatively few points. Logistics activities provide the bridge between production and market locations that are separated by time and distance. Effective management of these activities is the major concern of this book.

## BUSINESS LOGISTICS DEFINED

Business logistics is a relatively new field of integrated management study in comparison with the traditional fields of finance, marketing, and production. As previously noted, logistics activities have been carried out by individuals for many years. Businesses also have continually engaged in move-store (transportation-inventory) activities. The newness of the field results from the concept of *coordinated* management of the related activities, rather than the historical practice of managing them separately, and the concept that logistics adds value to products or services that are essential to customer satisfaction and sales. Although coordinated logistics management has not been generally practiced until recently, the idea of coordinated management can be traced back to at least 1844. In the writings of Jules Dupuit, a French engineer, the idea of trading one cost for another (transportation costs for inventory costs) was evident in the selection between road and water transport:

The fact is that carriage by road being quicker, more reliable and less subject to loss or damage, it possesses advantage to which businessmen often attach a considerable value. However, it may well be that the saving of

0 fr.87 induces the merchant to use the canal; he can buy warehouses and increase his floating capital in order to have a sufficient supply of goods on hand to protect himself against slowness and irregularity of the canal, and if all told the saving of 0 fr.87 in transport gives him an advantage of a few centimes, he will decide in favor of the new route . . .<sup>2</sup>

The first textbook to suggest the benefits of coordinated logistics management appeared around 1961,<sup>3</sup> in part explaining why a generally accepted definition of business logistics is still emerging. Therefore, it is worthwhile to explore several definitions for the scope and content of the subject.

A dictionary definition of the term *logistics* is:

The branch of military science having to do with procuring, maintaining, and transporting materiel, personnel, and facilities.<sup>4</sup>

This definition puts logistics into a military context. To the extent that business objectives and activities differ from those of the military, this definition does not capture the essence of business logistics management. A better representation of the field may be reflected in the definition promulgated by the Council of Logistics Management (CLM), a professional organization of logistics managers, educators, and practitioners formed in 1962 for the purposes of continuing education and fostering the interchange of ideas. Its definition:

Logistics is that part of the supply chain process that plans, implements, and controls the efficient, effective flow and storage of goods, services, and related information from the point of origin to the point of consumption in order to meet customers' requirements.<sup>5</sup>

This is an excellent definition, conveying the idea that product flows are to be managed from the point where they exist as raw materials to the point where they are finally discarded. Logistics is also concerned with the flow of services as well as physical goods, an area of growing opportunity for improvement. It also suggests that logistics is a *process*, meaning that it includes all the activities that have an impact on making goods and services available to customers when and where they wish to acquire them. However, the definition implies that logistics is part of the supply chain process, not the entire process. So, what is the supply chain process or, more popularly, supply chain management?

*Supply chain management* (SCM) is a term that has emerged in recent years that captures the essence of integrated logistics and even goes beyond it. Supply chain

<sup>2</sup>Jules Dupuit, "On the Measurement of the Utility of Public Works," reprinted in *International Economic Papers*, No. 2, translated from the French by R. H. Barback (London: Macmillan and Co., Ltd., 1952), p. 100.

<sup>3</sup>Edward W. Smykay, Donald J. Bowersox, and Frank H. Mossman, *Physical Distribution Management: Logistics Problems of the Firm* (New York: Macmillan, 1961).

<sup>4</sup>*Webster's New Encyclopedic Dictionary* (New York: Black Dog & Leventhal Publishers, 1993), p. 590.

<sup>5</sup>From the by laws of the Council of Logistics Management, accessed at CLM's Web site <http://www.clm1.org>.

management emphasizes the logistics interactions that take place *among* the functions of marketing, logistics, and production within a firm and those interactions that take place between the legally separate firms within the product-flow channel. Opportunities for cost or customer service improvement are achieved through *coordination* and *collaboration* among the channel members where some essential supply chain activities may not be under the direct control of the logistician. Although early definitions such as physical distribution, materials management, industrial logistics, channel management, and even rhocrematics, all terms used to describe logistics, have promoted this broad scope for logistics, there was little attempt to implement logistics beyond a company's own enterprise boundaries, or even beyond its own internal logistics function. Now, retail firms are showing success in sharing information with suppliers, which in turn agree to maintain and manage inventories on retailers' shelves. Channel inventories and product stockouts are lower. Manufacturing firms operating under just-in-time production scheduling build relationships with suppliers for the benefit of both companies by reducing inventories. Definitions of the supply chain and supply chain management reflecting this broader scope are:

The *supply chain (SC)* encompasses all activities associated with the flow and transformation of goods from the raw materials stage (extraction), through to the end user, as well as the associated information flows. Materials and information flow both up and down the supply chain.

*Supply chain management (SCM)* is the integration of these activities, through improved supply chain relationships, to achieve a sustainable competitive advantage.<sup>6</sup>

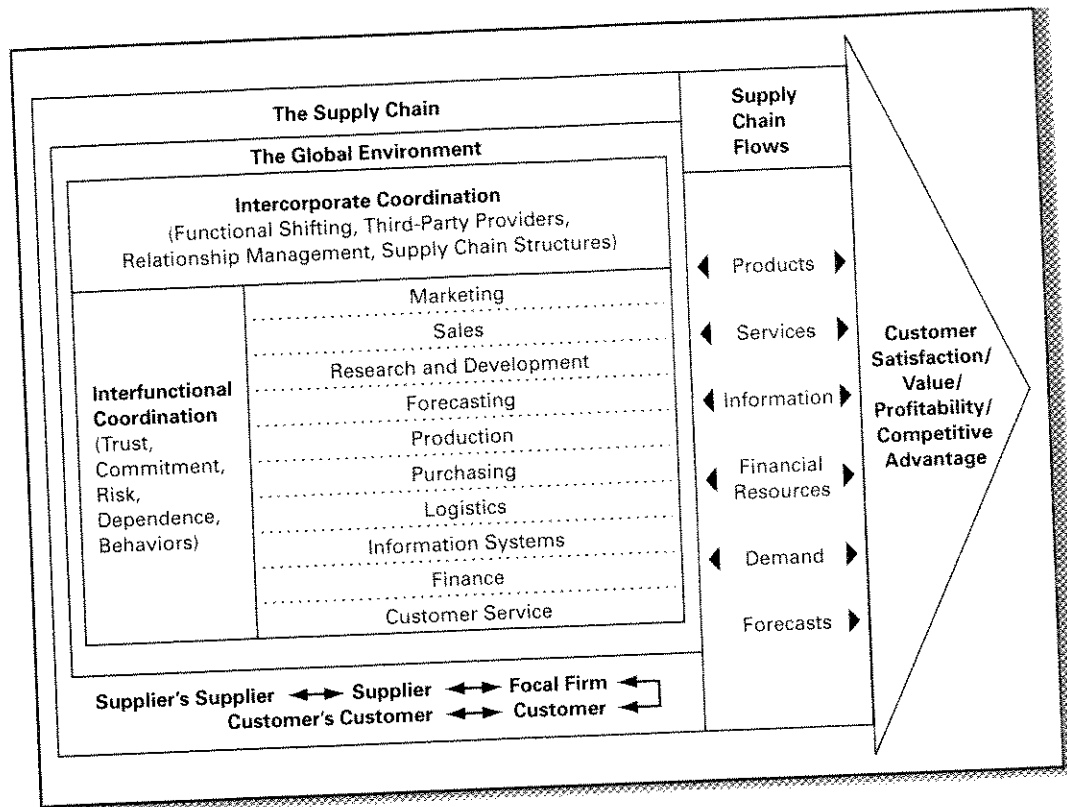
After careful study of the various definitions being offered, Mentzer et al. propose the broad and rather general definition as follows:

Supply chain management is defined as the systematic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole.<sup>7</sup>

The supply chain management model in Figure 1-1 viewed as a pipeline shows the scope of this definition. It is important to note that supply chain management is about the coordination of product flows across functions and across companies to achieve competitive advantage and profitability for the individual companies in the supply chain and the supply chain members collectively.

<sup>6</sup>Robert B. Handfield and Ernest L. Nichols Jr., *Introduction to Supply Chain Management* (Upper Saddle River, NJ: Prentice-Hall, 1999), p. 2.

<sup>7</sup>John T. Mentzer, William DeWitt, James S. Keebler, Soonhong Min, Nancy W. Nix, Carlo D. Smith, and Zach G. Zacharia, "Defining Supply Chain Management," *Journal of Business Logistics*, Vol. 22, No. 2 (2001), pp. 1-25.



**Figure 1-1** A Model of Supply Chain Management

Source: Mentzer et al., "Defining Supply Chain Management," *Journal of Business Logistics*, Vol. 22, No. 2 (2001), p. 19. Reproduced with permission of the Council of Logistics Management.

It is difficult, in a practical way, to separate business logistics management from supply chain management. In so many respects, they promote the same mission:

To get the right goods or services to the right place, at the right time, and in the desired condition, while making the greatest contribution to the firm.

Some claim that supply chain management is just another name for integrated business logistics management (IBLM) and that the broad scope of supply chain management has been promoted over the years. Conversely, others say that logistics is a subset of SCM, where SCM considers additional issues beyond those of product flow. For example, SCM may be concerned with product pricing and manufacturing quality. Although SCM promotes viewing the supply channel with the broadest scope, the reality is that firms do not practice this ideal. Fawcett and Magan found that companies that do practice supply chain integration limit their scope to one tier upstream and one tier downstream.<sup>8</sup> The focus seems to be concerned with creating

<sup>8</sup>Stanley E. Fawcett and Gregory M. Magan, "The Rhetoric and Reality of Supply Chain Integration," *International Journal of Physical Distribution & Logistics Management*, Vol. 32, No. 5 (2002), pp. 339-361.

seamless processes within their own companies and applying new information technologies to improve the quality of information and speed of its exchange among channel members. The boundary between the logistics and supply chain management terms is fuzzy. For the purposes of this text, integrated business logistics management and SCM will be referred to interchangeably. The focus will be on managing the product and service flows in the most efficient and effective manner, regardless of descriptive title. This includes integrating and coordinating with other channel members and service providers to improve supply chain performance when practical to do so.

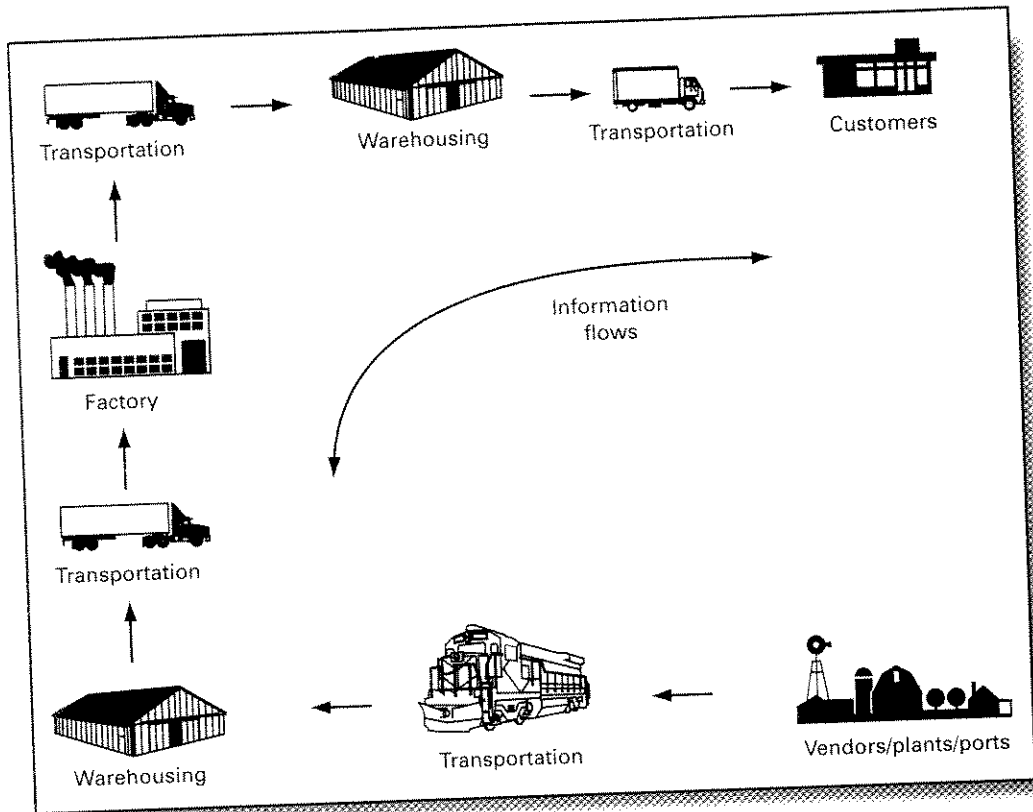
## THE SUPPLY CHAIN

Logistics/SC is a collection of functional activities (transportation, inventory control, etc.), which are repeated many times throughout the channel through which raw materials are converted into finished products and consumer value is added. Because raw material sources, plants, and selling points are not typically located at the same places and the channel represents a sequence of manufacturing steps, logistics activities recur many times before a product arrives in the marketplace. Even then, logistics activities are repeated once again as used products are recycled upstream in the logistics channel.

A single firm generally is not able to control its entire product flow channel from raw material source to points of the final consumption, although this is an emerging opportunity. For practical purposes, the business logistics for the individual firm has a narrower scope. Usually, the maximal managerial control that can be expected is over the immediate physical supply and physical distribution channels, as shown in Figure 1-2. The *physical supply channel* refers to the time and space gap between a firm's immediate material sources and its processing points. Similarly, the *physical distribution channel* refers to the time and space gap between the firm's processing points and its customers. Due to the similarities in the activities between the two channels, physical supply (more commonly referred to as materials management) and physical distribution comprise those activities that are integrated into business logistics. Business logistics management is now popularly referred to as supply chain management.<sup>9</sup> Others have used terms such as *value nets*, *value stream*, and *lean logistics* to describe a similar scope and purpose. The evolution of the management of product flows toward SCM is captured in Figure 1-3.

Although it is easy to think of logistics as managing the flow of products from the points of raw material acquisition to end customers, for many firms there is a *reverse logistics channel* that must be managed as well. The life of a product, from a logistics viewpoint, does not end with delivery to the customer. Products become obsolete, damaged, or nonfunctioning and are returned to their source points for repair or disposition. Packaging materials may be returned to the shipper due to

<sup>9</sup>Some proponents of supply chain management include pricing within its scope. Business logistics management rarely does this.



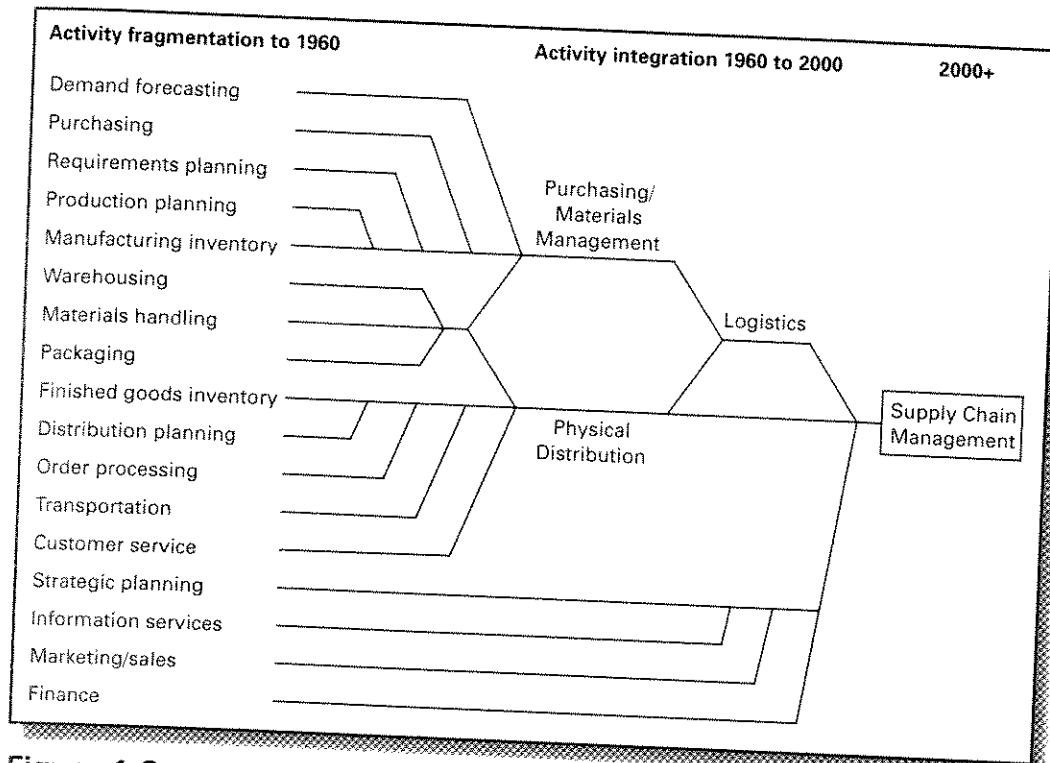
**Figure 1-2** The Immediate Supply Chain for an Individual Firm

environmental regulations or because it makes good economic sense to reuse them. The reverse logistics channel may utilize all or a portion of the forward logistics channel or it may require a separate design. The supply chain terminates with the final disposition of a product. The reverse channel must be considered to be within the scope of logistics planning and control.

### Example

The reverse logistics channel comes into play when a customer buys a toaster from a retailer. The customer takes the toaster home and finds it defective. The customer returns it to the retailer, who gladly refunds the purchase price. The retailer now has a defective toaster in in-store inventory. The retailer sends it to a central return center. Upon receipt, the toaster's Universal Product Code (UPC) is scanned for identification in the return center's database. The database determines that the toaster has a return-to-vendor disposition. The database credits the store inventory for the toaster and creates a charge back to the manufacturer for the cost of the toaster. The toaster is shipped back to the manufacturer. The retailer has made a cost recovery for this





**Figure 1-3** Evolution of Logistics Toward Supply Chain

Source: John Yuva, "Collaborative Logistics: Building a United Network," *Inside Supply Management*, Vol. 13, No. 5 (May 2002), p. 50 (with modification).

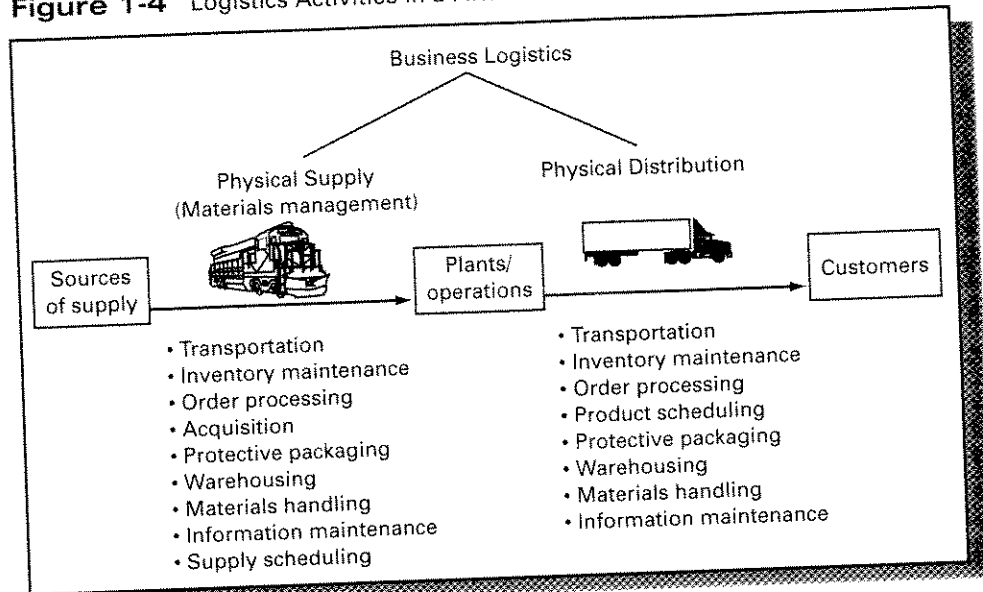
defective asset. The toaster is received at the manufacturer's return center. The manufacturer scans the toaster into its database and determines that it has a refurbish disposition. The toaster is repaired and sent for resale on the secondary market. The manufacturer has now gained value for this defective asset.<sup>10</sup>

## THE ACTIVITY MIX

The activities to be managed that make up business logistics (supply chain process) vary from firm to firm, depending on a firm's particular organizational structure, management's honest differences of opinion about what constitutes the supply chain for its business, and the importance of individual activities to its operations. Follow

<sup>10</sup>Jerry A. Davis, Jerome G. Lawrence, Peter Rector, and Herbert S. Shear, "Reverse Logistics Pipeline," *Annual Conference Proceedings* (San Diego, CA: Council of Logistics Management, October 8-11, 1995), p. 427.

**Figure 1-4** Logistics Activities in a Firm's Immediate Supply Chain



along the supply chain as shown in Figure 1-2 and note the important activities that take place. Again, according to the CLM:

The components of a typical logistics system are: customer service, demand forecasting, distribution communications, inventory control, material handling, order processing, parts and service support, plant and warehouse site selection (location analysis), purchasing, packaging, return goods handling, salvage and scrap disposal, traffic and transportation, and warehousing and storage.<sup>11</sup>

Figure 1-4 organizes these components, or activities, according to where they are most likely to take place in the supply channel. The list is further divided into key and support activities, along with some of the decisions associated with each activity.

#### Key Activities

1. Customer service standards cooperate with marketing to:
  - a. Determine customer needs and wants for logistics customer service
  - b. Determine customer response to service
  - c. Set customer service levels
2. Transportation
  - a. Mode and transport service selection
  - b. Freight consolidation
  - c. Carrier routing

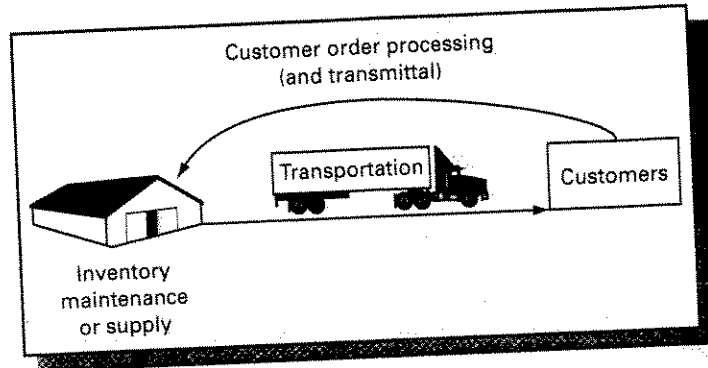
<sup>11</sup>*Careers in Logistics* (Oak Brook, IL: Council of Logistics Management), p. 3.

- d. Vehicle scheduling
- e. Equipment selection
- f. Claims processing
- g. Rate auditing
- 3. Inventory management
  - a. Raw materials and finished goods stocking policies
  - b. Short-term sales forecasting
  - c. Product mix at stocking points
  - d. Number, size, and location of stocking points
  - e. Just-in-time, push, and pull strategies
- 4. Information flows and order processing
  - a. Sales order-inventory interface procedures
  - b. Order information transmittal methods
  - c. Ordering rules

### Support Activities

- 1. Warehousing
  - a. Space determination
  - b. Stock layout and dock design
  - c. Warehouse configuration
  - d. Stock placement
- 2. Materials handling
  - a. Equipment selection
  - b. Equipment replacement policies
  - c. Order-picking procedures
  - d. Stock storage and retrieval
- 3. Purchasing
  - a. Supply source selection
  - b. Purchase timing
  - c. Purchase quantities
- 4. Protective packaging designed for:
  - a. Handling
  - b. Storage
  - c. Protection from loss and damage
- 5. Cooperate with production/operations to:
  - a. Specify aggregate quantities
  - b. Sequence and time production output
  - c. Schedule supplies for production/operations
- 6. Information maintenance
  - a. Information collection, storage, and manipulation
  - b. Data analysis
  - c. Control procedures

**Figure 1-5**  
The Critical  
Customer Service  
Loop



Key and support activities are separated because certain activities will generally take place in every logistics channel, whereas others will take place, depending on the circumstances, within a particular firm. The key activities are on the "critical" loop within a firm's immediate physical distribution channel, as shown in Figure 1-5. They contribute most to the total cost of logistics or they are essential to the effective coordination and completion of the logistics task.

Customer service standards set the level of output and degree of readiness to which the logistics system must respond. Logistics costs increase in proportion to the level of customer service provided, such that setting the standards for service also affects the logistics costs to support that level of service. Setting very high service requirements can force logistics costs to exceedingly high levels.

Transportation and inventory maintenance are the primary cost-absorbing logistics activities. Experience has shown that each will represent one-half to two-thirds of total logistics costs. Transportation adds *place* value to products and services, whereas inventory maintenance adds *time* value.

Transportation is essential because no modern firm can operate without providing for the movement of its raw materials or its finished products. This importance is underscored by the financial strains placed on many firms by such disasters as a national railroad strike or independent truckers' refusal to move goods because of rate disputes. In these circumstances, markets cannot be served, and products back up in the logistics pipeline to deteriorate or become obsolete.

Inventories are also essential to logistics management because it is usually not possible or practical to provide instant production or ensure delivery times to customers. They serve as buffers between supply and demand so that needed product availability may be maintained for customers while providing flexibility for production and logistics in seeking efficient methods for manufacture and distribution of the product.

Order processing is the final key activity. Its costs usually are minor compared to transportation or inventory maintenance costs. Nevertheless, order processing is an important element in the total time that it takes for a customer to receive goods or services. It is the activity triggering product movement and service delivery.

Although support activities may be as critical as the key activities in any particular circumstance, they are considered here as contributing to the logistics mission. In

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addition, one or more of the support activities may not be a part of the logistics activity mix for every firm. For example, products such as finished automobiles or commodities such as coal, iron ore, or gravel not needing the weather and security protection of warehousing will not require the warehousing activity, even though inventories are maintained. However, warehousing and materials handling are typically conducted wherever products are temporarily halted in their movement to the marketplace.

Protective packaging is a support activity of transportation and inventory maintenance as well as of warehousing and materials handling because it contributes to the efficiency with which these other activities are carried out. Purchasing and product scheduling often may be considered more a concern of production than of logistics. However, they also affect the overall logistics effort, and specifically they affect the efficiency of transportation and inventory management. Finally, information maintenance supports all other logistics activities in that it provides the needed information for planning and control.

The *extended supply chain* refers to those members of the supply channel beyond the firm's immediate suppliers or customers. They may be suppliers to the immediate suppliers or customers of the immediate customers and so on until raw material source points or end customers are reached. It is important to plan and control the previously noted activities and information flows if they affect the logistics customer service that can be provided and the costs of supplying this service. Management of the extended supply chain has the potential of improving logistics performance beyond that of just managing the activities within the immediate supply chain.

## IMPORTANCE OF LOGISTICS/ SUPPLY CHAIN

Logistics is about creating *value*—value for customers and suppliers of the firm, and value for the firm's stakeholders. Value in logistics is primarily expressed in terms of time and place. Products and services have no value unless they are in the possession of the customers when (time) and where (place) they wish to consume them. For example, concessions at a sports event have no value to consumers if they are not available at the time and place that the event is occurring, or if inadequate inventories don't meet the demands of the sports fans. Good logistics management views each activity in the supply chain as contributing to the process of adding value. If little value can be added, it is questionable whether the activity should exist. However, value is added when customers are willing to pay more for a product or service than the cost to place it in their hands. To many firms throughout the world, logistics has become an increasingly important value-adding process for a number of reasons.

### Costs Are Significant

Over the years, several studies have been conducted to determine the costs of logistics for the whole economy and for the individual firm. There are widely varying estimates of the cost levels. According to the International Monetary Fund (IMF),

**Table 1-3**  
Recent Average  
Physical Distribution  
Costs in Percent of  
Sales and \$/cwt.<sup>a</sup>

CATEGORY	PERCENT OF SALES	\$/CWT.
Transportation	3.34%	\$26.52
Warehousing	2.02	18.06
Customer service/order entry	0.43	4.58
Administration	0.41	2.79
Inventory carrying cost @ 18%/year.	1.72	22.25
Total distribution cost <sup>b</sup>	7.65%	\$67.71

<sup>a</sup> The statistics are for all firm types; however, they most closely represent manufacturing firms since they dominate the database.

<sup>b</sup> The authors of this survey claim the totals do not match the sum of the individual statistics due to a different number of data entries in each category.

Source: Herbert W. Davis and William H. Drumm, "Logistics Costs and Service Database—2002," *Annual Conference Proceedings* (San Francisco, CA: Council of Logistics Management, 2002) at www.clm1.org.

logistics costs average about 12 percent of the world's gross domestic product. Robert Delaney, who has tracked logistics costs for more than two decades, estimates that logistics costs for the U.S. economy are 9.9 percent of the U.S. gross domestic product (GDP), or \$921 billion.<sup>12</sup> For the firm, logistics costs have ranged from 4 percent to over 30 percent of sales.<sup>13</sup> The results from a cost survey of individual firms are shown in Table 1-3. Although the results show physical distribution costs at about 8 percent of sales, this survey does not include physical supply costs. Probably another one-third may be added to this total to represent average logistics costs for the firm at about 11 percent of sales. Over the last decade, physical distribution costs have ranged between 7 percent and 9 percent of sales. There may be a trend of increasing costs for individual firms, although Wilson and Delaney show over the same period that logistics costs as a percent of U.S. GDP have declined by about 10 percent.<sup>14</sup> Logistics costs, substantial for most firms, rank second only to the cost of goods sold (purchase costs) that are about 50 percent to 60 percent of sales for the average manufacturing firm. Value is added by minimizing these costs and by passing the benefits on to customers and to the firm's shareholders.

### Logistics Customer Service Expectations Are Increasing

The Internet, just-in-time operating procedures, and continuous replenishment of inventories have all contributed to customers expecting rapid processing of their

<sup>12</sup>Rosalyn Wilson and Robert V. Delaney, "11th Annual State of Logistics Report," *Cass Information Systems and ProLogis* (Washington, DC: National Press Club, June 5, 2000).

<sup>13</sup>For a history of these costs estimates, see Bernard J. LaLonde and Paul H. Zinszer, *Customer Service: Meaning and Measurement* (Chicago: National Council of Physical Distribution Management, 1976); Richard E. Snyder, "Physical Distribution Costs: A Two-Year Analysis," *Distribution Age* Vol. 62 (January 1963), pp. 50-51; and Wendall M. Stewart, "Physical Distribution: Key to Improved Volume and Profits," *Journal of Marketing* Vol. 29 (January 1965), p. 67.

<sup>14</sup>Wilson and Delaney, op. cit.

STANDARD PRODUCT MEASURES		1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Total order cycle Time, days												
		8	7	7	6	9	8	7	8	8	7	8
Product availability	percent orders	84	84	86	87	87	87	85	85	86	87	88
	percent line items	92	92	92	92	94	94	93	90	92	93	95

Source: Herbert W. Davis and William H. Drumm, "Logistics Costs and Service Database—2002," *Annual Conference Proceedings* (San Francisco, CA: Council of Logistics Management, 2002) at [www.clml.org](http://www.clml.org).

**Table 1-4** Average Customer Service Performance Measures for All Firms, Survey Years 1992–2002

requests, quick delivery, and a high degree of product availability. According to the Davis survey of hundreds of companies over the last decade, world-class competitors have average order cycle times (the time between when an order is placed and when it is received) of seven to eight days and line item fill rates of 90 percent to 94 percent.<sup>15</sup> LogFac summarizes world-class logistics performance for domestic companies as:

- Error rates of less than one per 1,000 orders shipped
- Logistics costs of well under 5 percent of sales
- Finished goods inventory turnover of 20 or more times per year
- Total order cycle time of five working days
- Transportation cost of one percent of sales revenue or less, if products sold are over \$5 per pound<sup>16</sup>

As might be expected, the average company performs below these cost and customer service benchmarks, when compared with the statistics in Tables 1-3 and 1-4.

### Supply and Distribution Lines Are Lengthening with Greater Complexity

The trend is toward an integrated world economy. Firms are seeking, or have developed, global strategies by designing their products for a world market and producing them wherever the low-cost raw materials, components, and labor can be found (e.g., Ford's Focus automobile), or they simply produce locally and sell internationally. In either case, supply and distribution lines are stretched, as compared with the producer who wishes to manufacture and sell only locally. Not only has the trend occurred naturally by firms seeking to cut costs or expand markets, but it is also being encouraged by political arrangements that promote trade. Examples of the latter are the European Union, the North America Free Trade Agreement (NAFTA)

<sup>15</sup>Herbert W. Davis and William H. Drumm, "Logistics Costs and Service 2001," *Annual Conference Proceedings*, (Kansas City, MO: Council of Logistics Management, 2001).

<sup>16</sup>"Logistics Rules of Thumb III," *LogFac*, [www.logfac.com](http://www.logfac.com) (2001).

**Figure 1-6**  
**Economic Benefit of Sourcing from Low-Cost Offshore Locations Rather Than from Higher-Cost Local Suppliers**

Source: "International Logistics: Battleground of the '90s" (Chicago: A. T. Kearney, 1988).

Domestic Sources		Foreign Sources	
Profit		Profit	
G & A		G & A	
Marketing		Marketing	
Logistics		Logistics	
Overhead		Tariffs	
Materials		Overhead	
		Materials	
Labor		Labor	

between Canada, the United States, and Mexico, and the economic trade agreement among several countries of South America (MERCOSUR).

Globalization and internationalization of industries everywhere will depend heavily on logistics performance and costs, as companies take more of a worldview of their operations. As this happens, logistics takes on increased importance within the firm since its costs, especially transportation, become a larger part of the total cost structure. For example, if a firm seeks foreign suppliers for the raw materials that make up its final product or foreign locations to build its product, the motivation is to increase profit. Material and labor costs may be reduced, but logistics costs are likely to increase due to increased transportation and inventory costs. The tradeoff, as shown in Figure 1-6, may lead to higher profit by reducing materials, labor, and overhead costs at the expense of logistics costs and tariffs. Outsourcing adds value, but it requires careful management of logistics costs and product-flow times in the supply channel.

### Example

Toyota has 35 manufacturing plants in 25 countries (excluding Japan) at which it produces nearly 900,000 vehicles annually. While exports were down by 9 percent in 1993, overseas production was up by 16 percent. In the case of Georgetown, Kentucky, where Camrys are built, Toyota uses the just-in-time concept to supply



parts from across the Pacific. The parts are loaded into ocean containers in Japan, shipped across the Pacific, and transferred to trains on the West Coast of the United States for relay to Georgetown, where they feed an assembly line that turns out 1,000 Camrys a day. Deliveries are scheduled to the minute in order to keep inventories low. Due to the long supply lines and the associated uncertainties, supply channels must be more carefully managed than if all production were local.<sup>17</sup>

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## Logistics/SC Is Important to Strategy

Firms spend a great deal of time finding ways to differentiate their product offerings from those of their competitors. When management recognizes that logistics/SC affects a significant portion of a firm's costs and that the result of decisions made about the supply chain processes yields different levels of customer service, it is in a position to use this effectively to penetrate new markets, to increase market share, and to increase profits. That is, good supply chain management can generate sales, not just reduce costs. Consider how Wal-Mart used logistics as the core of its competitive strategy to become the world's number one merchandise retailer.

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### Example

**Wal-Mart Wins with Logistics** Kmart and Wal-Mart are two retail merchandise chains that, a few years back, looked alike, sold the same products, sought the same customers, and even had similar names. When the race began, people were quite familiar with the "big red K," whose stores dotted metropolitan areas, but few had heard of Wal-Mart, whose stores were in rural settings. Considering the similarity of the stores and their mission, analysts attribute the fates of the two chains primarily to differing management philosophies.

In 1987, Kmart was far ahead, with twice as many stores and sales of \$26 billion, compared to \$16 billion for Wal-Mart. With its urban presence and a focus on advertising, Kmart had more visibility. In contrast, Wal-Mart began in stand-alone stores outside small towns, luring customers away from the mom-and-pop stores in aging downtowns. But so rapidly did Wal-Mart multiply over the rural landscape that an invasion of urban America—and a confrontation with Kmart—was inevitable.

Kmart executives focused on marketing and merchandising, even using Hollywood star Jaclyn Smith to promote her clothing line. By contrast, Sam Walton, Wal-Mart's founder, was obsessed with operations. He invested millions of dollars in a company-wide computer system linking cash registers to headquarters, enabling him to quickly restock goods. He also invested heavily in trucks and modern distribution centers. Besides enhancing his control of the supply chain, these moves sharply reduced costs. While Kmart tried to improve its image and cultivate store loyalty,

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<sup>17</sup>Joseph Bonney, "Toyota's Global Conveyor Belts," *American Shipper* (September 1994), pp. 50-58.

Walton kept lowering costs, betting that price would prove more important than any other factor in attracting customers. Wal-Mart's incredibly sophisticated distribution, inventory, and scanner systems meant that customers almost never encountered depleted shelves or price-check delays.

Meanwhile, Kmart's woes mounted, as distribution horror stories abounded. Employees lacked the training and skill to plan and control inventory properly, and Kmart's cash registers often did not have up-to-date information and would scan items and enter incorrect prices. This led to a lawsuit in California, and Kmart settled for \$985,000 for overcharging its customers.

Over the years, it has been Wal-Mart's focus on logistical matters that enables it to keep its prices low and its customers happy and returning often. Today, Wal-Mart is nearly six times the size of Kmart!<sup>18</sup>

Kmart continued its focus on ad circulars and promotional pricing into the twenty-first century, whereas Wal-Mart continued to focus more on supply chain efficiencies and less on advertising, with the results that selling, administrative, and overhead costs were 17.3 percent for Wal-Mart and Kmart's were 22.7 percent. Wal-Mart was able to achieve prices that average 3.8 percent below Kmart's and even 3.2 percent below Target's. In 2002, Kmart went into bankruptcy and reorganization.<sup>19</sup>

### Logistics/SC Adds Significant Customer Value

A product, or service, is of little value if it is not available to customers at the time and place that they wish to consume it. When a firm incurs the cost of moving the product toward the customer or making an inventory available in a timely manner, for the customer value has been created that was not there previously. It is value as surely as that created through the production of a quality product or through a low price.

It is generally recognized that business creates four types of value in products or services. These are: form, time, place, and possession. Logistics creates two out of these four values. Manufacturing creates *form* value as inputs are converted to outputs, that is raw materials are transformed into finished goods. Logistics controls the *time* and *place* values in products, mainly through transportation, information flows, and inventories. *Possession* value is often considered the responsibility of marketing, engineering, and finance, where the value is created by helping customers acquire the product through such mechanisms as advertising (information), technical support, and terms of sale (pricing and credit availability). To the extent that SCM includes production, three out of the four values may be the responsibility of the logistics/supply chain manager.

<sup>18</sup>"Loss Leader: How Wal-Mart Outdid a Once-Touted Kmart in Discount Store Race," *Wall Street Journal*, March 24, 1995, and revenue data for 2000 from Wal-Mart and Kmart financial reports found online at <http://finance.yahoo.com>

<sup>19</sup>Amy Merrick, "Expensive Ad Circulars Help Precipitate Kmart President's Departure," *Wall Street Journal*, January 18, 2002, B1ff.

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## Example

When discount houses selling computer software through Web sites, catalogs, and magazine advertisements wished to compete with local retailers, they had a price advantage due to the economies of scale that they could achieve. Operations were centralized at one location where lower-cost warehouse space rather than higher-cost retail space could be used. Their staff was predominately telephone order takers and warehouse order-fillers and packagers. Inventories were minimized relative to sales through centralization, but these discount operations also offered substantial variety and high levels of product availability. Conversely, retailers had the advantage of immediate availability for the anxious customer that would offset any price disadvantage of the local retailer. To counter this possible delivery advantage of retailers in their local markets, the discount houses made sure that customer orders could be placed using toll-free telephone numbers or through a Web site, that these orders were filled the *same day*, and that they were shipped overnight using priority air delivery. Many customers find this nearly as fast and, in many cases, a lot more convenient than traditional shopping! Value has been created for the busy customer through logistics.

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## Customers Increasingly Want Quick, Customized Response

Fast food retailers, automatic teller machines, overnight package delivery, and electronic mail on the Internet have led us as consumers to expect that products and services can be made available in increasingly shorter times. In addition, improved information systems and flexible manufacturing processes have led the marketplace toward mass customization. Rather than consumers having to accept the "one size fits all" philosophy in their purchases, suppliers are increasingly offering products that meet individual customer needs.

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## Observations

- Dell, a desktop computer company, will configure a PC to a customer's exact hardware requirements, and even install requested software.
- L. L. Bean sells clothes and other items through its catalog and Web site. In addition, some of the clothes may be altered to a customer's exact measurements. Moreover, L. L. Bean will ensure fast delivery by shipping via Federal Express at no additional charge (if the customer charges the order to an L. L. Bean Visa charge card).
- National Bicycle Industrial Co., a subsidiary of the Japanese electronics giant Matsushita, builds bicycles using *flexible* manufacturing techniques, those that allow switching from the production of one product to another with minimal setup cost. Rather than mass-producing in standard sizes and building inventories for retail sales, National Bicycle builds the bicycles to precise customer

specifications in over 11 million variations on 18 models of road, racing, and mountain bikes. Although it takes three hours to produce a bicycle using flexible manufacturing as compared to 90 minutes for mass production, the company is able to charge more than twice the price by pleasing customers with unique bikes built to their individual specifications.

Companies too have been applying the concept of quick response to their internal operations in order to meet the service requirements of their own marketing efforts. The quick response philosophy has been used to create a marketing advantage. Saks Fifth Avenue applied it, even though big profits are made through big margins and not on cost reductions that might be achieved from good logistics management. Supply chain costs may even rise, although the advantage is to more than cover these costs through increased profits.

### **Application**

Retailers go out of business at an alarming rate. To Saks Fifth Avenue, this fear alone may have been adequate motivation for management to integrate merchandising and logistics. The benefits are obvious when merchandising relies on manufacturers that might cut cloth in Bangladesh and finish garments in Italy before shipping them to a ritzy selling floor in the United States. The difference between profit and loss on hot-selling items may be as little as seven to ten days, so good logistics performance requires that such items be on the selling floor *precisely* when needed most. How does Saks do it?

The company's 69 stores are served by just two distribution centers. One is in Yonkers, New York, close by Saks' flagship store on New York City's 5th Avenue. The second is in Ontario, California, well situated to serve the trendy southern California market. Rapid movement through the supply channel is key to profitability. Items are processed by the centers in a 24-hour turnaround. About 80 percent of Saks' imported items arrive by airfreight—those from Europe are handled by Yonkers and those from the Far East by Ontario. Items are exchanged between the centers by airfreight, with a dedicated flight between New York and Los Angeles every business day. Distribution centers then serve their local stores with a combination of airfreight and trucking.<sup>20</sup>

### **Logistics/SC in Nonmanufacturing Areas**

It is perhaps easiest to think of logistics/SC in terms of moving and storing a physical product in a manufacturing setting. This is too narrow a view and can lead to many missed business opportunities. The logistics/SC principles and concepts

<sup>20</sup>Bruce Vail, "Logistics, Fifth Avenue Style," *American Shipper* (August 1994), pp. 49-51.

learned over the years can be applied to such areas as service industries, the military, and even environment management.

## Service Industry

The service sector of industrialized countries is large and growing. In the United States, over 70 percent of all jobs are in what the federal government classifies as the service sector. The size of this sector alone forces us to ask if logistics concepts are not equally applicable here as they are to the manufacturing sector. If they are, there is a tremendous untapped opportunity yet to be fulfilled.

Many companies designated as service firms in fact produce a product. Examples include: McDonald's Corporation (fast foods); Dow Jones & Co., Inc. (newspaper publishing); and Sears, Roebuck and Co. (merchandise retailing). These companies carry out all the typical supply chain activities of any manufacturing firm. However, for service companies such as Bank One (retail banking), Marriott Corporation (lodging), and Consolidated Edison (electric power), supply chain activities, especially those associated with physical distribution, are not as obvious.

Even though many service-oriented companies may be distributing an intangible, nonphysical product, they do engage in many physical distribution activities and decisions. A hospital may want to extend emergency medical care throughout the community and must make decisions as to the locations of the centers. United Parcel Service and Federal Express must locate terminals and route pickup and delivery trucks. The East Ohio Gas Company inventories natural gas in underground wells during the off-season in the region where demand will occur. Bank One must locate and have cash inventory on hand for its ATMs. The Federal Reserve Bank must select the methods of transportation to move canceled checks among member banks. The Catholic Church must decide the number, location, and size of the churches needed to meet shifts in size and location of congregations, as well as to plan the inventory of its pastoral staff. Xerox's repair service for copying equipment is also a good example of the logistics decisions encountered in a service operation.

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## Examples

- Promise Keepers is a Christian men's ministry that conducts 23 major events around the United States—with attendance ranging from 50 to 80,000. Promise Keepers must rely on good logistics management to assure that their crusades can be conducted on time. The operation is large enough to involve a major motor carrier that handles the event logistics. Using the concept of *time definite delivery*, the carrier coordinates the receipt of supplies such as Bibles from Chicago, hats from Kansas City, in addition to trailer loads of stage equipment. The materials must be assembled and delivered to an event site and delivered precisely on time. Since events are held at stadiums, speedways, and the like, there are other events (ball games, races, etc.) also scheduled on the same weekend. There may be as many as 30 truckloads that must be coordinated to arrive precisely on time and leave just as precisely to avoid congestion with the

logistics of the other events. Computer technology is used to track trailer movements and ensure that the extremely close coordination can be achieved.<sup>21</sup>

- During the time span of one week, there were three major stories that drew the largest TV audience in history: England's Princess Diana was killed in an automobile crash in Paris, India's Mother Teresa died of heart failure in Calcutta, and there was a major bombing incident in Jerusalem. Suddenly, the media had major logistical problems with covering three major news stories in three corners of the world. For example, CNN diverted a reporter from Paris to the Middle East, while other networks sent their Hong Kong correspondents to Calcutta. Then, there were the logistical problems of allocating airtime to the three stories.<sup>22</sup>

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The techniques, concepts, and methods discussed throughout this text should be as applicable to the service sector as they are to the manufacturing sector. The key, according to Theodore Levitt, may be in transforming an intangible service into a tangible product.<sup>23</sup> Problems will remain in carefully identifying the costs associated with the distribution of an intangible product. Perhaps because of this, few service firms or organizations have a physical distribution manager on their staff, although they frequently do have a materials manager to handle supply matters. However, managing logistics in service industries does represent a new direction for the future development of logistics practice.

## Military

Before businesses showed much interest in coordinating supply chain processes, the military was well organized to carry out logistics activities. More than a decade before business logistics' developmental period, the military carried out what was called the most complex, best-planned logistics operation of that time—the invasion of Europe during World War II.

Although the problems of the military, with its extremely high customer service requirements, were not identical with those of business, the similarities were great enough to provide a valuable experience base during the developmental years of logistics. For example, the military alone maintained inventories valued at about one-third of those held by all U.S. manufacturers. In addition to the management experience that such large-scale operations provide, the military sponsored, and continues to sponsor, research in the logistics area through such organizations as the RAND Corporation and the Office of Naval Research. With this background, the field of business logistics began to grow. Even the term *logistics* seems to have had its origins in the military.

<sup>21</sup>Roger Morton, "Direct Response Shipping," *Transportation & Distribution* (April 1996), pp. 32–36.

<sup>22</sup>Kyle Pope, "For the Media, Diana's Funeral Prompts Debate," *Wall Street Journal* September 8, 1997, B1.

<sup>23</sup>Theodore Levitt, *The Marketing Imagination* (New York: The Free Press, 1983), pp. 108–110.

The most recent example of military logistics on a large scale was the conflict between the United States and Iraq over Iraq's invasion of the small country of Kuwait. This invasion has been described as the largest military logistics operation in history.<sup>24</sup> The logistics support in that war is yet another illustration of what world-class companies have always known: Good logistics can be a source of competitive advantage. Lieutenant General William Pagonis, who was in charge of logistics support for Desert Storm, observed:

When the Middle East started heating up, it seemed like a good time to pull out some history books on desert warfare in this region. . . . But there was nothing on logistics. Logistics is not a best seller. In a couple of his diaries, Rommel talked about logistics. He thought the Germans lost the battle not because they didn't have great soldiers or equipment—in fact, the German tanks outfought ours almost throughout World War II—but because the British had better logistics.<sup>25</sup>

Good logistics performance was obvious. The first wave of 200,000 troops and their equipment was deployed in a month and a half, whereas troop deployment took nine months in the Vietnam conflict. In addition, the application of many good logistics concepts was evident. Take customer service, for example:

We believed that if we took care of our troops, the objectives would be accomplished no matter whatever else happened. The soldiers are our customers. It is no different than a determined, single focus on customers that many successful businesses have. Now, you take care of your soldiers not only by providing them cold sodas, and burgers, and good food: you make sure they have the ammunition on the front line, so that when they go fight the war they know they have what they need.<sup>26</sup>

This meant that when 120 mm guns rather than 105 mm guns were desired on tanks, they were changed. When brown vehicles were preferred over the traditional camouflage green, they were repainted at the rate of 7,000 per month.

## Environment

Population growth and resultant economic development have heightened our awareness of environmental issues. Whether it is recycling, packaging materials, transporting hazardous materials or refurbishing products for resale, logisticians are involved in a major way. After all, the United States alone produces more than 160 million tons of waste each year, enough for a convoy of 10-ton garbage trucks reaching halfway to the moon.<sup>27</sup> In many cases, planning for logistics in an environmental setting is no different from that in manufacturing or service sectors. However,

<sup>24</sup>*Business Week*, March 4, 1991, pp. 42–43.

<sup>25</sup>Graham Sharman, "Good Logistics Is Combat Power," *McKinsey Quarterly*, No. 3 (1991), pp. 3–21.

<sup>26</sup>*Ibid.*

<sup>27</sup>E. J. Muller, "The Greening of Logistics," *Distribution* (January 1991), p. 32.

in a few cases additional complications arise, such as governmental regulations that make the logistics for a product more costly by extending the distribution channel.

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### Example

In Germany, the government requires retail grocers to collect cereal boxes at the point of sale. Typically, consumers pay for the product, then open the box and empty the contents into containers they brought from home, and put the empty boxes into collection bins. The seller has the responsibility either for recovery of the spent materials and their repackaging and reuse, or for their disposal.<sup>28</sup>

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## BUSINESS LOGISTICS/SC IN THE FIRM

It has been the tradition in many firms to organize around marketing and production functions. Typically, marketing means selling something and production means making something. Although few business people would agree that their organization is so simple, the fact remains that many businesses emphasize these functions while treating other activities, such as traffic, purchasing, accounting, and engineering, as support areas. Such an attitude is justified to a degree, because if a firm's products cannot be produced and sold, little else matters. However, such a pattern is dangerously simple for many firms to follow in that it fails to recognize the importance of the activities that must take place between points and times of production or purchase and the points and times of demand. These are the logistics activities, and they affect the efficiency and effectiveness of both marketing and production.

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### Example

General Motors (GM) hopes improving customer service will boost sales of Cadillacs, which have been squeezed as buyers shift to other U.S. cars as well as to imports. Cadillac loses substantial sales when customers are put off by lengthy delivery times. Research shows that 10 percent to 11 percent of sales are lost simply because the cars are not available in a timely manner.

A production and distribution program was tested in Florida, a major market for Cadillacs. Under the program, about 1,500 Cadillacs were sent to a regional distribution center in Orlando, Florida, where they would be delivered to dealers state-wide within 24 hours. In some areas of Florida, many buyers wait two days for popularly equipped cars. Additionally, GM's Cadillac factory in Detroit increased production of specially ordered Cadillacs as well as reducing shipping time. Custom Cadillacs

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<sup>28</sup>"European Logistics Changes Sharply," *American Shipper* (May 1993), p. 66.



arrived at dealerships in about three weeks, compared with the usual 8 to 12 weeks. Under this program, GM expected dealership inventories to decline by about 50 percent.<sup>29</sup>

Scholars and practitioners of both marketing and production have not neglected the importance of logistics. In fact, each area considers logistics within its scope of action. For example, the following definition of marketing management includes physical distribution:

Marketing (management) is the process of planning and executing the conception, pricing, promotion, and distribution of ideas, goods, and services to create exchanges with target groups that satisfy individual and organizational objectives.<sup>30</sup>

Marketing's concern is to place its products or services in convenient distribution channels to facilitate the exchange process. The concept of production/operations management often includes logistics activities. For example, "operations management has the responsibility for the production and delivery of physical goods and services."<sup>31</sup> Production/operations, on the other hand, is likely to be most interested in those activities that directly affect manufacturing and its primary objective of producing at the lowest unit cost. Now, viewing product flow activities as a process to be coordinated, product flow aspects within marketing, production, and logistics are collectively managed to achieve customer service objectives.

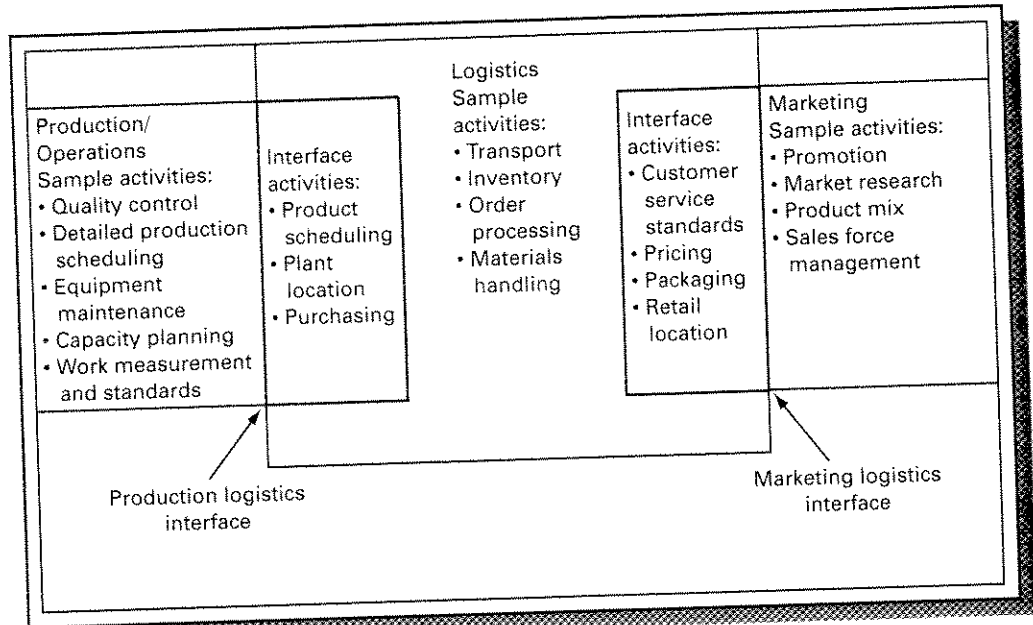
The difference in operating objectives (maximize revenue versus minimize cost) for marketing and production/operations may lead to a fragmentation of interest in, and responsibility for, logistics activities, as well as a lack of coordination among logistics activities as a whole. This, in turn, may lead to lower customer service levels or higher total logistics costs than are necessary. Business logistics represents a regrouping, either by formal organizational structure or conceptually in the minds of management, of the move-store activities that historically may have been partially under the control of marketing and production/operations.

If logistics activities are looked upon as a separate area of managerial action, the relationship of logistics activities to those of marketing and production/operations would be as shown in Figure 1-7. Marketing would be primarily responsible for market research, promotion, sales-force management, and the product mix, which create possession value in the product. Production/operations would be concerned with the creation of the product or service, which creates form value in the product. Key responsibilities would be quality control, production planning and scheduling, job

<sup>29</sup>Wall Street Journal, August 16, 1994, A5.

<sup>30</sup>Definition approved by the American Marketing Association as paraphrased in Philip Kotler, *Marketing Management: Planning, Analysis, Implementation, and Control*, 10th ed. (Upper Saddle River, NJ: Prentice-Hall, 2000), p. 13.

<sup>31</sup>John O. McClain and L. Joseph Thomas, *Operations Management: Production of Goods and Services*, 2nd ed. (Upper Saddle River, NJ: Prentice-Hall, 1985), p. 14.

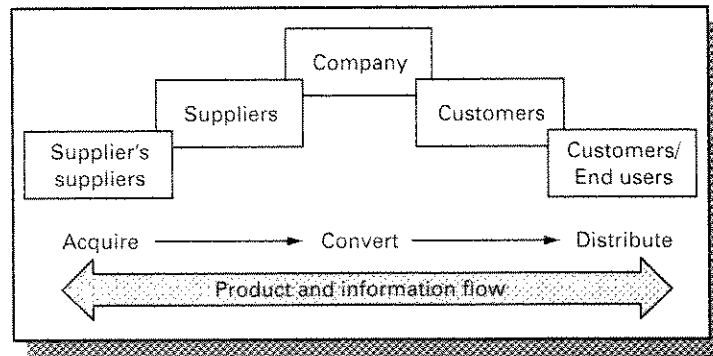


**Figure 1-7** Logistics/SC Interfaces with Marketing and Production

design, capacity planning, maintenance, and work measurement and standards. Logistics would be concerned with those activities (previously defined) that give a product or service time and place value. This separation of the activities of the firm into three groupings rather than two is not always necessary or advisable to achieve the coordination of logistics activities that is sought. Marketing and production/operations, when broadly conceived and coordinated, can do an effective job of managing logistics activities without creating an additional organizational entity. Even if a separate functional area is created for logistics within the firm so as to achieve effective control of the firm's immediate logistics activities, logisticians will need to view their responsibility as one of coordinating the entire supply chain process rather than being just a local logistics activity administrator. To do otherwise may miss substantial opportunities for cost reduction and logistics customer service improvement.

Figure 1-7 also shows activities that are at the interface of marketing and logistics and production/operations and logistics within the immediate firm. An interface activity is one that cannot be managed effectively within one functional area. The interface is created by the arbitrary separation of a firm's activities into a limited number of functional areas. Managing the interface activities by one function alone can lead to suboptimal performance for the firm by subordinating broader company goals to individual functional goals—a potential danger resulting from the departmental form of organizational structure so common in companies today. To achieve interfunctional coordination, some measurement system and incentives for cooperation among the

**Figure 1-8**  
Scope of the Modern  
Supply Chain



functions involved need to be established. This is equally true of the interorganizational coordination required to manage product flows across company boundaries.

It is important to note, however, that establishing a third functional group is not without its disadvantages. Two functional interfaces now exist where only one between marketing and production/operations previously existed. Some of the most difficult administrative problems arise from the interfunctional conflicts that occur when one is attempting to manage interface activities. Some of this potential conflict may be dissipated if a new organizational arrangement is created whereby production/operations and logistics are merged into one group called supply chain.

Just as managers are beginning to understand the benefits of interfunctional logistics management, interorganizational management is being encouraged. Supply chain management proponents who view the area more broadly than some logisticians have been strongly promoting the need for collaboration among supply channel members that are outside the immediate control of a company's logistician, that is members who are legally separate companies. Collaboration among the channel members that are linked through buyer-seller relationships is essential to achieving cost-service benefits unable to be realized by managers with strictly an internal view of their responsibilities. Supply chain managers consider themselves to have responsibility for the entire supply channel of the scope as illustrated in Figure 1-8. Managing in this broader environment is the new challenge for the contemporary logistician.

## **OBJECTIVES OF BUSINESS LOGISTICS/SC**

Within the broader objectives of the firm, the business logistician seeks to achieve supply channel process goals that will move the firm toward its overall objectives. Specifically, the desire is to develop a logistics activity mix that will result in the highest possible return on investment over time. There are two dimensions to this goal: (1) the impact of the logistics system design on the revenue contribution, and (2) the operating cost and capital requirements of the design.

Ideally, the logistician should know how much additional revenue would be generated through incremental improvements in the quality of customer service provided. However, such revenue is not generally known with great accuracy. Often, the customer service level is set at a target value, usually one that is acceptable to customers, the sales function, or other concerned parties. At this point, the logistics objective may become one of minimizing costs subject to meeting the desired service level rather than profit maximization or return on investment.

Unlike revenue, logistics costs usually can be determined as accurately as accounting practice will allow and are generally of two types: operating costs and capital costs. Operating costs are those that recur periodically or those that vary directly with variation in activity levels. Wages, public warehousing expenses, and administrative and certain other overhead expenses are examples of operating costs. Capital costs are the one-time expenses that do not change with normal variations in activity levels. Examples here are the investment in a private trucking fleet, the construction cost of a company warehouse, and the purchase of materials-handling equipment.

If it is assumed that there is knowledge of the effect of logistics activity levels on revenues of the firm, a workable financial objective for logistics can be expressed in the ratio known as *ROLA* (*return on logistics assets*). *ROLA* is defined as

$$\text{ROLA} = \frac{\text{Contribution to revenue} - \text{logistics operating costs}}{\text{Logistics assets}}$$

The contribution to revenue refers to the sales resulting from the logistics system design. Logistics operating costs are the expenses incurred to provide the level of logistics customer service needed to generate sales. Logistics assets are the capital investments made in the logistics system. *ROLA* is to be maximized over time.

If the value of money is high, maximizing the present value of cash flows or maximizing the internal rate of return is a more appropriate statement of the objective. Maximizing the cumulative return on investment over time is the single most important objective to ensure the long-run survival of the firm.

## APPROACH TO THE STUDY OF LOGISTICS/SC

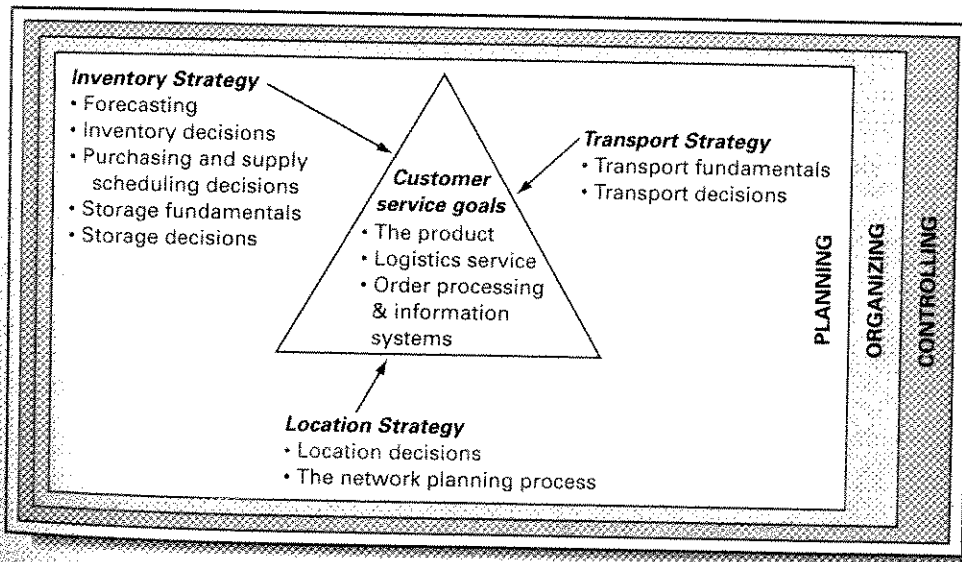
Now that a background of definition and significance has been provided, we can begin our study of the management of logistics in a systematic way. Two themes are used in this text; they follow what management does and the skills needed to perform in a technically complex world. First, the work of management can be looked upon as performing the tasks of planning, organizing, and controlling to achieve the objectives of the firm. *Planning* refers to deciding on the goals for the firm, *organizing* refers to collecting and positioning the resources of firm to accomplish the company goals, and *controlling* refers to measuring company performance and taking corrective action when performance is not in line with goals. Because these are central to

what management does, each will be discussed within the various chapters of this book.

Second, managers, whether at entry level or top level, spend a great deal of time in the planning activity. To do effective planning, it is useful to have a vision of the goals of the firm, to have concepts and principles for guidance on how to get there, and to have tools that help to sort among alternative courses of action. Specifically for logistics management, planning follows a primary decision triangle of location, inventory, and transportation, with customer service being the result of these decisions (see Figure 1-9). Although the logistics' planning triangle is the primary organizational theme for this book, additional topics that relate to it will also be discussed. We begin with, an overview of a strategy for logistics planning and the information systems and technology that support the strategy. A chapter follows on the customer, who drives all logistics decision making. Chapters covering transportation, location, and inventory, which form the cornerstones of the logistics' planning triangle, are all included. Finally, chapters on organization and control round out the planning, organizing, and control theme. Contemporary issues such as global logistics, service industry logistics, quality, collaborative logistics, and reverse logistics are important, but are recognized as extensions of the basic ideas presented in the text. Therefore, their discussion is integrated throughout the text. Numerous examples are given to illustrate how the concepts and tools for good logistics/supply chain management apply to the problems actually encountered in the real world.

From just about every standpoint—whether cost, value to customers, or strategic importance to a firm's mission—logistics/SC is vital. However, only in recent years have businesses on a broad scale begun to manage supply chain activities in an

**Figure 1-9** The Planning Triangle in Relation to the Principal Activities of Logistics/Supply Chain Management



integrated way—that is, to think about products and services flowing seamlessly from the sources of raw materials to the final consumers. Moreover, in recent times that flow must include backward movement in the supply channel, or reverse logistics. The economic forces—mainly increased worldwide deregulation of business, proliferation of free trade agreements, increased foreign competition, increased globalization of industries, and increased requirements for faster and more certain logistics performance—have all been instrumental in elevating logistics to a high level of importance in many firms. New opportunities for logistics management, brought about by growth in the service sector, environmental issues, and information technology, will continue to support the vital nature of logistics for many years to come.

The primary emphasis of this text is directed toward dealing effectively with the managerial problems associated with moving and storing goods throughout the supply chain by business firms. These firms may be producing either goods or services and will have profit-making objectives.

This text is organized around the three primary tasks of management: planning, organizing, and controlling. Usually, the most difficult of these is planning, that is, the identification of, and selection among, alternative courses of action. Therefore, major emphasis will be given to this phase of management. It is the approach of this text to describe logistics problems as simply as possible and to apply definitive methodology in solving them that has proven to be of practical value in real applications. It is a decision-making approach.

## QUESTIONS AND PROBLEMS

1. What is supply chain management? Contrast it with business logistics management.
2. Describe business logistics, as you would expect it to be practiced in the following countries or regions:
  - a. United States
  - b. Japan
  - c. European Union
  - d. Australia
  - e. South Africa
  - f. China
  - g. Brazil
3. Summarize the factors and forces that give logistics importance among other functional areas (marketing, finance, production) of a firm.
4. Discuss the similarities and differences between logistics management of a manufacturing firm and
  - a. a service firm (bank, hospital, etc.)
  - b. a nonprofit organization (symphony orchestra, art museum, etc.)
  - c. the military
  - d. a retailing firm (general merchandise, fast food, etc.)
5. Discuss the role that efficient and effective logistics systems play in encouraging a high level of foreign trade.

6. Why is it that both marketing and production may claim some or all of logistics activities as part of their area of responsibility?
7. What are the key activities of the business logistics function? Discuss their existence and importance to the management of
  - a. a TV manufacturer (Sony)
  - b. a touring musical group (Berlin Philharmonic)
  - c. a hospital (Massachusetts General)
  - d. a city government (New York City)
  - e. a fast-food chain (McDonald's)
8. How do you think international logistics differs from logistics for a firm with global operations?
9. Suggest some products that benefit significantly from increased time and place value.
10. Establishing logistics as a separate area for management within a business firm creates an additional set of interface activities. What are interface activities? Why would the creation of an additional set of interface activities cause concern in most companies?
11. The political and economic barriers are continuing to come down among the several countries of the European Union. If you are a manager of physical distribution for a multinational company that sells finished consumer goods (e.g., Procter & Gamble of Italy) within your own country, what distribution decisions are facing you in the future?
12. Suppose that a manufacturer of men's shirts can produce a dress shirt in its Houston, Texas plant for \$8 per shirt (including the cost of raw materials). Chicago is a major market for 100,000 shirts per year. The shirt is priced at \$15 at the Houston plant. Transportation and storage charges from Houston to Chicago amount to \$5 per hundredweight (cwt.). Each packaged shirt weighs 1 pound.

As an alternative, the company can have the shirts produced in Taiwan for \$4 per shirt (including the cost of raw materials). The raw materials, weighing about 1 pound per shirt, would be shipped from Houston to Taiwan at a cost of \$2 per cwt. When the shirts are completed, they are to be shipped directly to Chicago at a transportation and storage cost of \$6 per cwt. An import duty of \$0.50 per shirt is assessed.

  - a. From a logistics-production cost standpoint, should the shirts be produced in Taiwan?
  - b. What additional considerations, other than economic ones, might be considered before making a final decision?
13. Use the following form as part of an in-class exercise. Be prepared to discuss your choices and to contrast them with others in the class. Identify the common elements making some companies successful logistically and the elements that are missing among others leading to logistics/SC failures.

# Examples of Good Logistics/ Supply Chain Strategy, or Lack Thereof

Many firms use logistics/supply chain strategy as a central element in their corporate strategy. You are asked to identify those firms that have been successful because of their logistics/supply chain strategy execution and to note why you consider the execution outstanding (Hall of Famers). Conversely, identify those firms that suffer from poor execution of an important logistics/supply chain strategy (Hall of Shamers).

1. **Hall of Famers.** Identify three firms that use a logistics/supply chain strategy as an important element of their overall business strategy.

Hall of Famers	Logistics/Supply Chain Elements Well Executed

2. **Hall of Shamers.** Identify three firms that have failed in the execution of a logistics/supply chain strategy important to their overall strategy.

Hall of Shamers	Logistics/Supply Chain Elements That Failed

3. From a logistics/supply chain viewpoint, what distinguishes the Hall of Famers from the Hall of Shamers?

Distinguishing Features