

For the international firm, customer locations and sourcing opportunities are widely dispersed. The firm can attain a strategically advantageous position only if it is able to successfully manage complex international networks consisting of its vendors, suppliers, other third parties, and its customers. Neglect of links within and outside of the firm brings not only higher costs but also the risk of eventual noncompetitiveness, due to diminished market share, more expensive supplies, or lower profits. As discussed in the opening vignette, effective international logistics and supply-chain management can produce higher earnings and greater corporate efficiency, which are the cornerstones of corporate competitiveness.

This chapter will focus on international logistics and supply-chain management. Primary areas of concentration will be the links between the firm, its suppliers, and its customers, as well as transportation, inventory, packaging, and storage issues. The logistics management problems and opportunities that are peculiar to international business will also be highlighted.



## INTERNATIONAL LOGISTICS DEFINED

*1. To understand the escalating importance of logistics and supply-chain management as crucial tools for competitiveness*

International logistics is the design and management of a system that controls the forward and reverse flow of materials, services, and information into, through, and out of the international corporation. It encompasses the total movement concept by covering the entire range of operations concerned with movement, including therefore both exports and imports. By taking a systems approach, the firm explicitly recognizes the links among the traditionally separate logistics components within and outside a corporation. By incorporating the interaction with outside organizations and individuals such as suppliers and customers, the firm is able to build on jointness of purpose by all partners in the areas of performance, quality, and timing.

As a result of implementing these systems considerations successfully, the firm can develop just-in-time (JIT) delivery for lower inventory cost, electronic data interchange (EDI) for more efficient order processing, and early supplier involvement (ESI) for better planning of goods development and movement. In addition, the use of such a systems approach allows a firm to concentrate on its core competencies and to form outsourcing alliances with other companies. For example, a firm can choose to focus on manufacturing and leave all aspects of order filling and delivery to an outside provider. By working closely with customers such as retailers, firms can also develop efficient customer response (ECR) systems, which can track sales activity on the retail level. As a result, manufacturers can precisely coordinate production in response to actual shelf replenishment needs, rather than based on forecasts.

Two major phases in the movement of materials are of logistical importance. The first phase is **materials management**, or the timely movement of raw materials, parts, and supplies into and through the firm. The second phase is **physical distribution**, which involves the movement of the firm's finished product to its customers. In both phases, movement is seen within the context of the entire process. Stationary periods (storage and inventory) are therefore included. The basic goal of logistics management is the effective coordination of both phases and their various components to result in maximum cost effectiveness while maintaining service goals and requirements.

Key to business logistics are three major concepts: (1) the systems concept, (2) the total cost concept, and (3) the trade-off concept. The **systems concept** is based on the notion that materials-flow activities within and outside of the firm are so extensive and complex that they can be considered only in the context of their interaction. Instead of each corporate function, supplier, and customer operating with the goal of individual

**materials management** The timely movement of raw materials, parts, and supplies into and through the firm.

**physical distribution** The movement of finished products from suppliers to customers.

**systems concept** A view of logistics based on the notion that materials-flow activities are so complex that they can be considered only in the context of their interaction.

optimization, the systems concept stipulates that some components may have to work suboptimally to maximize the benefits of the system as a whole. The systems concept intends to provide the firm, its suppliers, and its customers, both domestic and foreign, with the benefits of synergism expected from the coordinated application of size.

In order for the systems concept to work, information flows and partnership trust are instrumental. Logistics capability is highly information dependent, because information availability is key to planning and to process implementation. Long-term partnership and trust are required in order to forge closer links between firms and managers.

A logical outgrowth of the systems concept is the development of the **total cost concept**. To evaluate and optimize logistical activities, cost is used as a basis for measurement. The purpose of the total cost concept is to minimize the firm's overall logistics cost by implementing the systems concept appropriately.

Implementation of the total cost concept requires that the members of the system understand the sources of costs. To develop such understanding, a system of activity-based costing has been developed, which is a technique designed to more accurately assign the indirect and direct resources of an organization to the activities performed based on consumption.<sup>1</sup> In the international arena, the total cost concept must also incorporate the consideration of total after-tax profit, by taking the impact of national tax policies on the logistics function into account. The objective is to maximize after-tax profits rather than minimizing total cost.

The **trade-off concept**, finally, recognizes the links within logistics systems that result from the interaction of their components. For example, locating a warehouse near the customer may reduce the cost of transportation. However, additional costs are associated with new warehouses. Similarly, a reduction of inventories will save money but may increase the need for costly emergency shipments. Managers can maximize performance of logistics systems only by formulating decisions based on the recognition and analysis of such trade-offs.

A trade-off of costs may go against one's immediate interests. Consider a manufacturer building several different goods. The goods all use one or both of two parts, A and B, which the manufacturer buys in roughly equal amounts. Most of the goods produced use both parts. The unit cost of part A is \$7, of part B, \$10. Part B has more capabilities than part A; in fact, B can replace A. If the manufacturer doubles its purchases of part B, it qualifies for a discounted \$8 unit price. For products that incorporate both parts, substituting B for A makes sense to qualify for the discount, since the total parts cost is \$17 using A and B, but only \$16 using Bs only. Part B should therefore become a standard part for the manufacturer. But departments building products that only use part A may be reluctant to accept the substitute part B because, even discounted, the cost of B exceeds that of A. Use of the trade-off concept will solve the problem.<sup>2</sup>

**total cost concept** A decision framework that uses cost as a basis for measurement in order to evaluate and optimize logistical activities.

**trade-off concept** A decision paradigm that recognizes linkages within the decision system.



## SUPPLY-CHAIN MANAGEMENT

The integration of these three concepts has resulted in the new paradigm of **supply-chain management**, where a series of value-adding activities connects a company's supply side with its demand side. It has been defined by the Ohio State University Global SMC forum as "the integration of business processes from end user through original suppliers, that provide products, services, and information that add value for customers."<sup>3</sup> This approach views the supply chain of the entire extended enterprise, beginning with the supplier's suppliers and ending with consumers or end users. The perspective encompasses the entire flow of funds, products and information that form

**2.** To learn about materials management and physical distribution

### supply-chain management

Results where a series of value-adding activities connect a company's supply side with its demand side.

one cohesive link to acquire, purchase, convert/manufacture, assemble, and distribute goods and services to the ultimate consumers. The implementation effects of such supply-chain management systems can be major.

Export supply-chain management skills facilitate the identification of attractive sources of supply and help firms develop a low-cost competitive supply position in export markets. They also help develop good relationships with suppliers and ensure increased quality and efficiency. The automobile industry was the first to adopt a comprehensive view of supply-chain management with an emphasis on supplier relations. BMW began to incorporate its suppliers' ideas into its own designs in order to capture their specialized knowledge. Ford Motor Company, which had previously been the most vertically integrated American automotive company, stopped making its own glass and purchased a share in a glass producer. This allowed Ford to use the glass producer's design and technology expertise, while still dictating specifications. This is an example of the so-called **extended enterprise**, where companies consider the entire supply chain to be a single organization that needs to be managed for purposes of both efficiency and effectiveness.<sup>4</sup>

**extended enterprise** When companies consider the entire supply chain to be a single organization that needs to be managed for purposes of both efficiency and effectiveness.

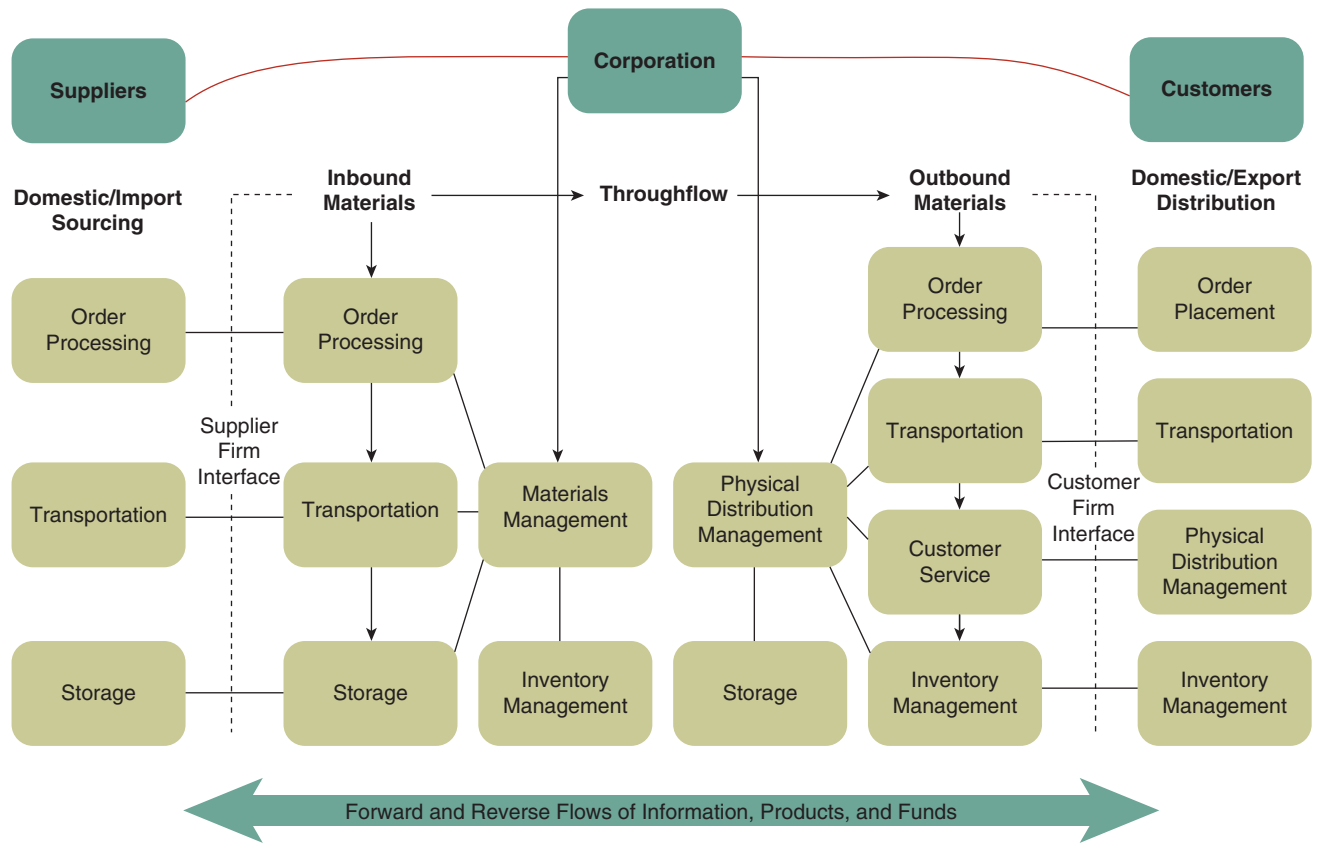
Advances in information technology (IT) have been crucial to progress in supply-chain management and supplier coordination. For example, TaylorMade—Adidas' golfing branch—uses supply-chain planning and execution software in order to optimize performance. In the demand planning phase, sales representatives capture data from retail customers using bar code technology at the point of sale, which is then transmitted in real time to the warehouse. The warehouse is able to compare orders with existing stock and alert vendors of future demand trends. This allows suppliers to plan ahead and improve their delivery schedules, which in turn leads to less inventory and higher levels of customer satisfaction. TaylorMade's successful use of data management software has led to improved performance across the supply chain, including higher inventory turnover rates (33 percent) and a 25 percent reduction in the overall cost of goods sold. On-time delivery of products has gone from 70 percent to more than 95 percent. There are many companies that have followed the TaylorMade model and have benefited from the introduction of IT to their supply-chain management systems.<sup>5</sup> In most cases, the positive impact has become manifest rather quickly. Three years after communications giant Motorola implemented an integrated system of IT supply-chain management, it was able to achieve customer on-time deliveries of 85 to 92 percent (from a previous 30 to 40 percent), and an 18 percent improvement in inventory turnover.<sup>6</sup> In the future, the strategic use of information technology will become increasingly crucial for international managers seeking to develop and maintain key competitive advantages. An overview of the international supply chain is shown in Figure 16.1.

## THE IMPACT OF INTERNATIONAL LOGISTICS

Logistics costs comprise between 10 and 30 percent of the total landed cost of an international order.<sup>7</sup> International firms already have achieved many of the cost reductions that are possible in financing and production, and are now using international logistics as a competitive tool. The environment facing logistics managers in the next ten years will be dynamic and explosive. Technological advances and progress in communication systems and information-processing capabilities are particularly significant in the design and management of logistics systems.

For example, close collaboration with suppliers is required to develop a just-in-time inventory system, which in turn may be crucial to maintaining manufacturing costs at globally competitive levels. Yet, without electronic data interchange, such collaborations or alliances are severely handicapped. While most industrialized countries can offer the technological infrastructure for such computer-to-computer exchange

Figure 16.1 The International Supply Chain



of business information, the application of such a system in the global environment may be severely restricted. It may not be just the lack of technology that forms the key obstacle to modern logistics management, but rather the entire business infrastructure, ranging from ways of doing business in fields such as accounting and inventory tracking, to the willingness of businesses to collaborate with each other.

Inventory carrying costs and transportation costs are also a function of the general health of the global economy. For example, a record spike in fuel prices and drops in consumer demand in 2008 drove logistics costs for American businesses to a record \$1.4 trillion, or 10.1 percent of GDP, a percentage unseen since 2000. Up to that point, the U.S. economy had enjoyed a gradual rise in logistics efficiency and productivity, due to increased supply-chain synergies. For example, in 1985, logistics cost 12.3 percent of GDP. Two decades later that figure had dropped to 8.6 percent.<sup>8</sup>

The fundamentals of a country's logistics system remain the best predictor of cost and efficiency. For example, Russia's distribution costs have hovered around 30 percent of GNP, irrespective of the global economic climate, due to a combination of space constraints, poor lines of supply, and inadequate transportation. This makes transactions slow and expensive.<sup>9</sup> Even in countries that have a similar departure point in terms of logistics costs, government policies, infrastructure investment, and accumulation of managerial know-how can make a big difference. For example, since the ratification of NAFTA, Mexico's logistics efficiencies as a percentage of GNP have improved considerably, following the American example, while Brazil's have remained relatively stagnant at an average of 13 percent.<sup>10</sup> Logistics and supply-chain management increasingly are the key dimensions by which firms gain competitiveness in the international marketplace.



## THE NEW DIMENSIONS OF INTERNATIONAL LOGISTICS

3. To learn why international logistics is more complex than domestic logistics

In domestic operations, logistics decisions are guided by the experience of the manager, possible industry comparisons, an intimate knowledge of trends, and discovered heuristics—or rules of thumb. The logistics manager in the international firm, on the other hand, frequently has to depend on educated guesses to determine the steps required to obtain a desired service level. Variations in locale mean variations in environment. Lack of familiarity with such variations leads to uncertainty in the decision-making process. By applying decision rules based only on the environment encountered at home, the firm will be unable to adapt well to new circumstances, and the result will be inadequate profit performance. The long-term survival of international activities depends on an understanding of the differences inherent in the international logistics field.

### INTERNATIONAL TRANSPORTATION ISSUES

Transportation determines how and when goods will be received. Focus on Entrepreneurship details some of the problems that can be encountered in the transportation process. The transportation issue can be divided into three components: infrastructure, the availability of modes, and the choice of modes among the given alternatives.

#### FOCUS ON ENTREPRENEURSHIP

#### Late, Lost, and Damaged Goods

No shipper would want to win Roberts Express “Shipments from Hell” contest. “Winners” have nightmare tales of late, lost, broken, or even burned shipments, demonstrating just about everything that could possibly go wrong in transit. Judges from *Industry Week* and *Transportation and Distribution* magazines gave the top award to a shipment of auto parts that needed to be at an assembly plant in a few hours, since the factory operated on a just-in-time basis. But a misunderstanding over the chartered plane’s arrival time and the time the parts needed to arrive kept the freight on the ground for hours. The entire production line was forced to shut down, costing thousands of dollars a minute. Then a thunderstorm delayed the plane’s take-off by another half-hour, adding more dollars to the cost of the late shipment.

In another ‘Shipment from Hell,’ attention to detail could have averted a sticky disaster. A Danish company arranged to send a shipment by rail from New York to Washington State, but forgot to mention that the cargo needed refrigeration. After a week’s journey in a railcar, the shipment of imported margarine was a gooey yellow mess. At the opposite end of the spectrum, there is the delivery driver who ignored the warning that his cargo should be protected from sub-zero temperatures, resulting in a truckload of frozen solid adhesive.

Instances of damaged or destroyed goods abound in the contest. One “winner” found its custom-made products at the bottom of Houston Harbor. Another company’s million-dollar computer system was smashed as it rolled off the delivery truck. In an ironic twist on the damaged goods problem, one shipment was found burned and melted inside a forty-foot ocean container. It turned out the goods were firefighting equipment, sprinklers, and valves.

Some of the stories involve old-fashioned brazen theft, such as \$30,000 in missing beer that the delivery driver had been selling to a convenience store, blocks away from the customer’s warehouse.

The stories behind the “Shipments from Hell” illustrate that a host of bizarre circumstances can turn an ordinary shipment into a comedy of errors. If a merchant finds itself on the receiving end of a damaged shipment and decides to pursue legal action, the laws governing international transportation are many and complex. In one classic case (*Raymond Burke v. Mersey Docks and Harbour Board*), a container of motorcycles was waiting to be loaded when a harbor truck ran it over. The judge determined that the carrier’s contractual responsibility would not begin until loading of the goods in question had actually begun, and the company could not recoup its losses.

Sources: Gregory S. Johnson, “Damaged Goods: Hard-Luck Tales of ‘97,” *The Journal of Commerce*, January 9, 1998, IA, accessed October 21, 2009; Simon Baughen, *Shipping Law*, 4th ed. (New York: Routledge-Cavendish, 2009), 61.

## Transportation Infrastructure

In industrialized countries, firms can count on an established transportation network. Around the globe, however, major infrastructural variations will be encountered. Some countries may have excellent inbound and outbound transportation systems but weak internal transportation links. This is particularly true in former colonies, where the original transportation systems were designed to maximize the extractive potential of the countries. In such instances, shipping to the market may be easy, but distribution within the market may represent a very difficult and time-consuming task. Infrastructure problems can also be found in countries where most transportation networks were established between major ports and cities in past centuries. The areas lying outside the major transportation networks will encounter problems in bringing their goods to market.

New routes of commerce have also opened up, particularly between the former East and West political blocs. Yet, without the proper infrastructure, the opening of markets is mainly accompanied by major new bottlenecks. On the part of the firm, it is crucial to have wide market access to be able to appeal to sufficient customers. The firm's **logistics platform**, which is determined by a location's ease and convenience of market reach under favorable cost circumstances, is a key component of a firm's competitive position. Because different countries and regions may offer alternative logistics platforms, the firm must recognize that such alternatives can be the difference between success and failure. Policymakers in turn must recognize the impact they have on the quality of infrastructure. It is governmental planning that enables supply-chain capabilities and substantially affects logistics performance on the corporate level. In an era of foreign direct investment flexibility, the public sector's investment priorities, safety regulations, tax incentives, and transport policies can have major effects on the logistics decisions of firms.<sup>11</sup> In the first nine months of 2009, 114 vessels were boarded, 34 vessels hijacked, and 88 vessels fired upon. A total of 661 crewmembers were taken hostage, 12 kidnapped, 6 killed, and 8 reported missing.<sup>12</sup> For example, whether or not a country has a strong navy can become very meaningful for the logistician in light of the fact that piracy against the world's shipping keeps rising rapidly.

The logistics manager must therefore learn about existing and planned infrastructures abroad and at home and factor them into the firm's strategy. In some countries, for example, railroads may be an excellent transportation mode, far surpassing the performance of trucking, while in others the use of railroads for freight distribution may be a gamble at best. The future routing of pipelines must be determined before any major commitments are made to a particular location if the product is amenable to pipeline transportation. The transportation methods used to carry cargo to seaports or airports must be investigated. Mistakes in the evaluation of transportation options can prove to be very costly. One researcher reported the case of a food processing firm that built a pineapple cannery at the delta of a river in Mexico. Because the pineapple plantation was located upstream, the company planned to float the ripe fruit down to the cannery on barges. To its dismay, however, the firm soon discovered that at harvest time the river current was far too strong for barge traffic. Because no other feasible alternative method of transportation existed, the plant was closed and the new equipment was sold for a fraction of its original cost.<sup>13</sup>

Extreme variations also exist in the frequency of transportation services. For example, a particular port may not be visited by a ship for weeks or even months. Sometimes only carriers with particular characteristics, such as small size, will serve a given location.

All of these infrastructural concerns must be taken into account in the planning of the firm's location and transportation framework. The opportunity of a highly competitive logistics platform may be decisive for the firm's investment decision,

**logistics platform** Vital to a firm's competitive position, it is determined by a location's ease and convenience of market reach under favorable cost circumstances.

**land bridge** Transfer of ocean freight on land among various modes of transportation.

**sea bridge** The transfer of freight among various modes of transportation at sea.

**intermodal movements** The transfer of freight from one mode or type of transportation to another.

**ocean shipping** The forwarding of freight by ocean carrier.

**liner service** Ocean shipping characterized by regularly scheduled passage on established routes.

**bulk service** Ocean shipping provided on contract either for individual voyages or for prolonged periods of time.

**tramp service** Ocean shipping via irregular routes, scheduled only on demand.

**container ships** Ships designed to carry standardized containers, which greatly facilitate loading and unloading as well as intermodal transfers.

**roll-on-roll-off (RORO)** Transportation vessels built to accommodate trucks, which can drive on in one port and drive off at their destinations.

because it forms a key component of the cost advantages sought by multinational corporations. If a location loses its logistics benefits, due to, for example, a deterioration of the railroad system, a firm may well decide to move on to another, more favorable locale. Business strategist Michael Porter addressed the importance of infrastructure as a determinant of national competitive advantage and highlighted the capability of governmental efforts to influence this critical issue.<sup>14</sup> Governments must keep the transportation dimension in mind when attempting to attract new industries or trying to retain existing firms.

### Availability of Modes

International transportation frequently requires ocean or airfreight modes, which many corporations only rarely use domestically. In addition, combinations such as **land bridges** or **sea bridges** may permit the transfer of freight among various modes of transportation, resulting in **intermodal movements**. The international logistics manager must understand the specific properties of the different modes to be able to use them intelligently.

**Ocean Shipping** Water transportation is a key mode for international freight movement. Three types of vessels operating in **ocean shipping** can be distinguished by their service: liner service, bulk service, and tramp or charter service. **Liner service** offers regularly scheduled passage on established routes. **Bulk service** mainly provides contractual services for individual voyages or for prolonged periods of time. **Tramp service** is available for irregular routes and scheduled only on demand.

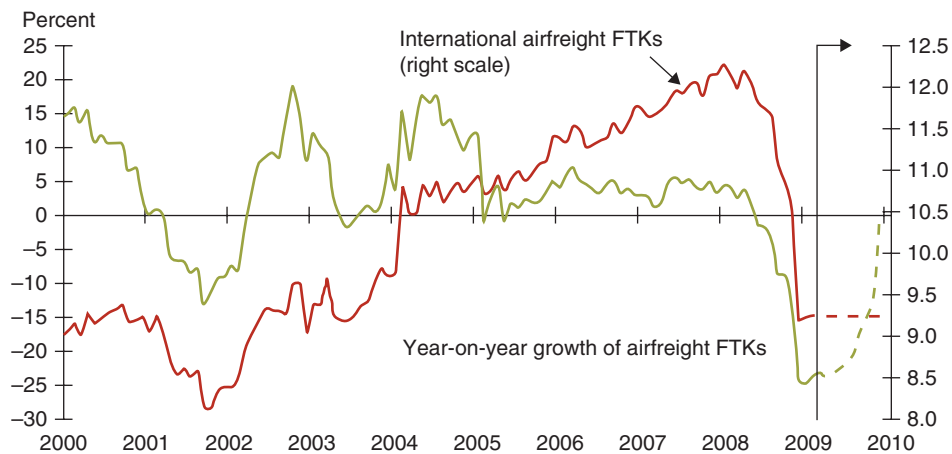
In addition to the services offered by ocean carriers, the type of cargo a vessel can carry is also important. Most common are conventional (break bulk) cargo vessels, container ships, and roll-on-roll-off vessels. Conventional cargo vessels are useful for oversized and unusual cargoes but may be less efficient in their port operations. **Container ships** carry standardized containers that greatly facilitate the loading and unloading of cargo and intermodal transfers. As a result, the time the ship has to spend in port is reduced as are the port charges. **Roll-on-roll-off (RORO)** vessels are essentially oceangoing ferries. Trucks can drive onto built-in ramps and roll off at the destination. Another vessel similar to the RORO vessel is the LASH (lighter aboard ship) vessel. LASH vessels consist of barges stored on the ship and lowered at the point of destination. The individual barge can then operate on inland waterways, a feature that is particularly useful in shallow water.

The availability of a certain type of vessel, however, does not automatically mean that it can be used. The greatest constraints in international ocean shipping are the lack of ports and port services. For example, modern container ships cannot serve some ports because the local equipment cannot handle the resulting traffic. The problem is often found in developing countries, where local authorities lack the funds to develop facilities. In some instances, governments may purposely limit the development of **ports** to impede the inflow of imports. Increasingly, however, governments have begun to recognize the importance of an appropriate port facility structure and are developing such facilities in spite of the large investments necessary.

**Air Shipping** **Airfreight** is available to and from most countries. This includes the developing world,



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**Figure 16.2** International Airfreight, 2000–2010

Note: FTK = Freight tonne-kilometers

Sources: Based on data supplied by member states of the International Air Transport Association (IATA); IATA Economic Briefing, April 2009, [www.iata.org/economics](http://www.iata.org/economics), accessed October 21, 2009.

where it is often a matter of national prestige to operate a national airline. The growth and occasional declines in international airfreight are shown in Figure 16.2. The total volume of airfreight in relation to total shipping volume in international business remains quite small. Approximately 20 percent of the world's manufactured exports by weight travel by air. The figure is higher for advanced economies, which export more high-value items. Those are likelier to be shipped by air, particularly if they have a high density, that is, a high weight-to-volume ratio. However, when the global economy experiences a downturn, airfreight tends to lose customers to cheaper modes of transport. For example, amid the global recession in 2008, cargo air traffic declined by more than 20 percent. Airlines, particularly in the United States, responded with aggressive capacity adjustments, but many were not able to keep pace with the precipitous fall in demand, or were caught with fuel hedges higher than spot prices, and were forced to either consolidate or shut down.<sup>15</sup>

Airlines continue to make major efforts to increase the volume of airfreight. Many of these activities have concentrated on developing better, more efficient ground facilities, automating air waybills, introducing airfreight containers, and providing and marketing a wide variety of special services to shippers. In addition, some airfreight companies and ports have specialized and become partners in the international logistics effort.

Changes have also taken place within the aircraft. As an example, 40 years ago, the holds of large propeller aircraft could take only about 10 tons of cargo. Today's jumbo jets can load up to 148 metric tons of cargo, and can therefore transport bulky products,<sup>16</sup> such as locomotives, as shown in Figure 16.3. In addition, aircraft manufacturers have responded to industry demands by developing both jumbo cargo planes and combination passenger and cargo aircraft. The latter carry passengers in one section of the main deck and freight in another. These hybrids can be used by carriers on routes that would be uneconomical for passengers or freight alone.

From the shipper's perspective, the products involved must be appropriate for air shipment in terms of their size. In addition, the market situation for any given product must be evaluated. Airfreight may be needed if a product is perishable or if, for other reasons, it requires a short transit time. The level of customer service needs and expectations can also play a decisive role. For example, the shipment of an industrial product that is vital to the ongoing operations of a customer may be much more urgent than the shipment of packaged consumer products.

**ports** Harbor towns or cities where ships may take on or discharge cargo; the lack of ports and port services is the greatest constraint in ocean shipping.

**airfreight** Transport of goods by air; accounts for less than one percent of the total volume of international shipments, but more than 20 percent of value.

Employees of Lufthansa Cargo load freight onto a Boeing 747 at Frankfurt Airport. The 747 fleet has flown 3.5 billion people, equivalent to half the world's population.

**Figure 16.3** Large Planes Offer Unprecedented Loading Capacity



© AFP/Getty Images, Inc.

Source: *The Guardian*, February 11, 2009, <http://www.guardian.co.uk/artanddesign/gallery/2009/feb/11/40th-anniversary-jumbo-jet?picture=343114913>, accessed October 19, 2009.

## SELECTING A MODE OF TRANSPORT

The international logistics manager must make the appropriate selection from the available modes of transportation. The decision will be heavily influenced by the needs of the firm and its customers. The manager must consider the performance of each mode on four dimensions: transit time, predictability, cost, and noneconomic factors.

### Transit Time

The period between departure and arrival of the carrier varies significantly between ocean freight and airfreight. For example, the 45-day **transit time** of an ocean shipment can be reduced to 24 hours if the firm chooses airfreight. The length of transit time can have a major impact on the overall operations of the firm. As an example, a short transit time may reduce or even eliminate the need for an overseas depot. Also, inventories can be significantly reduced if they are replenished frequently. As a result, capital can be freed up and used to finance other corporate opportunities. Transit time can also play a major role in emergency situations. For example, if the shipper is about to miss an important delivery date because of production delays, a shipment normally made by ocean freight can be made by air. Overall, it has been estimated that each day that goods are in transit adds about 0.8 percent to the cost of the goods. Therefore, an extra twenty-day period spent at sea adds the equivalent of a 16 percent tariff on those goods, drastically reducing their competitiveness.<sup>17</sup>

**transit time** The period between departure and arrival of a carrier.

Perishable products require shorter transit times. Transporting them rapidly prolongs the shelf life in the foreign market. Air delivery may be the only way to enter foreign markets successfully with products that have a short life span. International sales of cut flowers have reached their current volume only as a result of airfreight.

The interaction among selling price, market distance, and form of transportation is not new. Centuries ago, Johann von Thünen, a noted German economist, developed models for the market reach of agricultural products that incorporated these factors. These models informed farmers as to what product could be raised profitably at different distances from its market. Yet, given the forms of transportation available today, the factors no longer pose the rigid constraints experienced by von Thünen; capability of transport creates new opportunities in international business.

At all times, the logistics manager must understand the interactions between different components of the logistics process and their effect on transit times. Unless a smooth flow throughout the supply chain can be assured, bottlenecks will deny any timing benefits from specific improvements. For example, Levi Strauss, the blue jeans manufacturer, offers customers in some of its stores the chance to be measured by a body scanner. Less than an hour after such measurement, a Levi factory has begun to cut the jeans of their choice. Unfortunately, it then takes ten days to get the finished jean to the customer.<sup>18</sup>

### Predictability

Providers of both ocean freight and airfreight service wrestle with the issue of reliability. Both modes are subject to the vagaries of nature, which may impose delays. Yet, because **reliability** is a relative measure, the delay of one day for airfreight tends to be seen as much more severe and ‘unreliable’ than the same delay for ocean freight. However, delays tend to be shorter in absolute time for air shipments. As a result, arrival time via air is more predictable. This attribute has a major influence on corporate strategy. For example, because of the higher predictability of airfreight, inventory safety stock can be kept at lower levels. Greater predictability also can serve as a useful sales tool, since it permits more precise delivery promises to customers. If inadequate port facilities exist, airfreight may again be the better alternative. Unloading operations for oceangoing vessels are more cumbersome and time-consuming than for planes. Merchandise shipped via air is likely to suffer less loss and damage from exposure of the cargo to movement. Therefore, once the merchandise arrives, it is more likely to be ready for immediate delivery—a fact that also enhances predictability.

An important aspect of predictability is also the capability of a shipper to track goods at any point during the shipment. **Tracking** becomes particularly important as corporations increasingly obtain products from and send them to multiple locations around the world. Being able to coordinate the smooth flow of a multitude of interdependent shipments can make a vast difference in a corporation’s performance.<sup>19</sup> Tracking allows the shipper to check on the functioning of the supply chain and to take remedial action if problems occur. Cargo also can be redirected if sudden demand surges so require. However, such enhanced corporate response to the predictability issue is only possible if an appropriate information system is developed by the shipper and the carrier, and is easily accessible to the user. Due to rapid advances in information technology, the ability to know where a shipment is has increased dramatically, while the cost of this critical knowledge has declined. Focus on e-Business explains this further.

Studies of customs data have demonstrated that transportation costs (both explicit and in terms of transit time) pose a barrier to trade at least as large as, and frequently larger than, tariffs. Global trade negotiations have steadily reduced tariff rates. As tariffs become a less important barrier to trade, the impact of transportation expenses on total

**reliability** Dependability; the predictability of the outcome of an action. For example, the reliability of arrival time for ocean freight or airfreight.

**tracking** The capability of a shipper to obtain information about the location of the shipment at any time.

**FOCUS  
ON  
E-BUSINESS**

## Product Tracking

Whenever Dawn Pabst of Las Vegas, Nevada, orders a pizza from Domino's, she does not wait for it to arrive at her doorstep. She tracks. She monitors the second-by-second status of her pizza at Dominos.com. Dawn is one of millions of customers who electronically track everything from order accuracy to the moment their pizza is prepared and sent for delivery. This is an example of a powerful new trend. Advances in information technology are transforming America into a nation of "track-a-holics." It would appear that everyone, from logistics managers at large multinational companies to customers like Dawn Pabst, want the ability to electronically track the whereabouts of the products they order or ship. Marketers are keenly aware of this growing consumer demand. When online package tracking was implemented in December 1995, UPS had about 100,000 track requests for the entire month. In December 2009, that number was 27.3 million requests per day.

According to one marketing analyst, "Data is money. The more information you have, the more interesting you are." This realization could explain why Domino's started Pizza Tracker; UPS and FedEx send constant location updates to consumers; cities like Chicago and Washington, DC, have introduced real-time tracking for their transit systems; and a growing number of Web services are offering to monitor everything from flights, to a sleeping baby, to government spending. The growing importance of tracking could reflect consumers' desire for a greater sense of control. Barry Glassner, sociology professor at the University of Southern California, endorses this theory: "I'd much rather know if I'm secure in my job," he says. "But if I can't know that, at least I can know the status of my pizza."

Beyond the marketing psychology of individual consumers, transportation service providers realize that for their corporate clients, a "greater sense of control" translates into calculations of predictability, reliability, and, ultimately, competitiveness and cost. For example, Texas Industries Inc. (TXI)—a large Dallas-based building supply company recently introduced a product tracking

system called ReadyTrac. It allows TXI's customers to increase productivity by accessing real-time truck locations from any computer with Internet access. GPS tracking provides information regarding delivery status, including whether trucks have been loaded or are in route to any jobsite. However, ReadyTrac goes a step beyond simple location tracking. Planned program enhancements include the ability to monitor jobsite crew productivity and profitability. The majority of TXI's customers are large construction companies that count labor costs among their biggest expenditures. If ReadyTrac is successful in allowing them to increase crew oversight, this would translate into cost savings for the customer and a strong competitive edge for TXI.

In a case of business innovation spilling over into the policy world, governments and regulatory agencies have started to take notice of developments in product tracking technology. One area, where product tracking could be especially beneficial, is in the incorporation of data into drug packaging in order to protect patients from dangerous counterfeits. Countries have begun to implement laws that require pharmaceutical companies to use tracking technologies. For example, since January 2009, all drugs sold in Turkey have to be packaged with track-and-trace barcode identifiers. Governments are also supporting research in tracking technology. The European Union has sponsored several studies aimed at developing end-to-end traceability for medication, such as the one carried out at the National Centre for Hereditary Coagulation Disorders in Ireland. China and India, which are often identified as the biggest culprits, but whose citizens are also the biggest victims of counterfeit pharmaceuticals, have launched exploratory studies on tracking. Whether contributing to a company's bottom line, appeasing impatient customers, or protecting patients, it looks like product tracking is here to stay.

*Sources:* Bruce Horovitz, "Tracking Deliveries of all Kinds is on Everyone's Radar," *USA Today*, July 26, 2009; "TXI Ready-Mix Introduces Delivery Tracking System," *The Wall Street Journal*, August 26, 2009; "Tracking the Drug Trail," *PharmaceuticalTechnology.com*, May 12, 2008, <http://www.pharmaceutical-technology.com/features/feature1906/>, accessed November 6, 2009.

trade costs is on the rise. Nowadays, for the average import shipment to the United States, shippers pay \$9 in transportation costs for every \$1 paid in tariffs. Even at this level, the United States is actually an outlier, because it pays considerably less for transportation than other countries. For example, aggregate transportation spending for Latin America is 1.5 to 2.5 times higher than for the United States.<sup>20</sup> Transportation costs for a product depend on the distance it is shipped, the type of transport service selected, and the weight-to-value ratio of the good. Because these three factors vary considerably across shipments, transportation costs have a significant influence on prices and patterns of trade.<sup>21</sup>

**Cost of Transportation** International transportation services are usually priced on the basis of both the cost of the service provided and the value of the service to the shipper. Due to the high value of the products shipped by air, airfreight is often priced according to the value of the service. In this instance, of course, price becomes a function of market demand and the monopolistic power of the carrier.

The manager must decide whether the clearly higher cost of airfreight can be justified. In part, this will depend on the cargo's properties. The physical density and the value of the cargo will affect the decision. Bulky products may be too expensive to ship by air, whereas very compact products may be more appropriate for airfreight transportation. High-priced items can absorb transportation costs more easily than low-priced goods because the cost of transportation as a percentage of total product cost will be lower. As a result, sending diamonds by airfreight is easier to justify than sending coal. Alternatively, a shipper can decide to mix modes of transportation in order to reduce overall cost and time delays. For example, part of the shipment route can be covered by air, while another portion can be covered by truck or ship.

Most important, however, are the supply-chain considerations of the firm. The manager must determine how important it is for merchandise to arrive on time, which, for example, will be different for standard garments versus high fashion dresses. The effect of transportation cost on price and the need for product availability abroad must also be considered. Simply comparing transportation modes on the basis of price alone is insufficient. The manager must factor in all corporate, supplier, and customer activities that are affected by the modal choice and explore the full implications of each alternative. For example, some firms may want to use airfreight as a new tool for aggressive market expansion. Airfreight may also be considered a good way to begin operations in new markets without making sizable investments for warehouses and distribution centers. The final selection of a mode will be the result of the importance of different modal dimensions to the markets under consideration. A useful overall comparison of different modes of transportation is provided in Table 16.1.

**Noneconomic Factors** The transportation sector, nationally and internationally, both benefits and suffers from government involvement. Even though transportation carriers are one prime target in the sweep of privatization around the globe, many carriers are still owned or heavily subsidized by governments. As a result, governmental pressure is exerted on shippers to use national carriers, even if more economical alternatives exist. Such **preferential policies** are most often enforced when government cargo is being transported. Restrictions are not limited to developing countries. For example, in the United States, the federal government requires that all travelers on government business use national flag carriers when available.

For balance of payment reasons, international quota systems of transportation have been proposed. The United Nations Convention on the Code of Conduct for Liner Conferences, which was enacted in 1983, established the "40/40/20" rule in maritime transport. The main provision was that cargo shipments between two

**preferential policies** Government policies that favor certain (usually domestic) firms; for example, the use of national carriers for the transport of government freight even when more economical alternatives exist.

**Table 16.1** Evaluating Transportation Choices

Characteristics of Mode	Mode of Transportation				
	Air	Pipeline	Highway	Rail	Water
Speed (1=fastest)	1	4	2	3	5
Cost (1=highest)	1	4	2	3	5
Loss and Damage (1=least)	3	1	4	5	2
Frequency <sup>1</sup> (1=best)	3	1	2	4	5
Dependability (1=best)	5	1	2	3	4
Capacity <sup>2</sup> (1=best)	4	5	3	2	1
Availability (1=best)	3	5	1	2	4

<sup>1</sup>Frequency: number of times mode is available during a given time period.

<sup>2</sup>Capacity: ability of mode to handle large or heavy goods.

Source: Ronald H. Ballou, *Business Logistics Management*, 5th ed. (Upper Saddle River, NJ: Prentice-Hall, 2004).

countries had to be shared in the following way: 40 percent for ship owners in the country of origin, 40 percent for ship owners in the destination country, and 20 percent for ship owners from third countries (cross-traders). The Liner Code attempted to stimulate local shipping industries, but proved to be counterproductive. It generated market distortions that led to an increase in maritime transport prices. Additionally, the rule created national shipping companies that had no ships and would sell their country's share of cargo to foreign lines, without any responsibility for the subsequent quality or cost of service. In 1992, the European Court ruled that the liner conferences were illegal monopolies and the '40/40/20' rule was lifted.<sup>22</sup>

## EXPORT DOCUMENTATION

A firm must deal with numerous forms and documents when exporting to ensure that all goods meet local and foreign laws and regulations. In the simplest form of exporting, the only documents needed are a bill of lading and an export declaration. In most countries, these documents are available either from the government or from transportation firms. For example, an export declaration can be obtained in the United States from the Census Bureau (<http://www.census.gov/foreign-trade/regulations/forms>). A bill of lading can be obtained in Canada from a shipper, for example, Manitoulin Transport (<http://www.manitoulintransport.com>).

The shipper's **export declaration** provides proper authorization for export and serves as a means for governmental data collection efforts. A **bill of lading** is a contract between the exporter and the carrier indicating that the carrier has accepted responsibility for the goods and will provide transportation in return for payment. The bill of lading can also be used as a receipt and to prove ownership of the merchandise. There are two types of bills, negotiable and nonnegotiable. **Straight bills of lading** are nonnegotiable and are typically used in prepaid transactions. The goods are delivered to a specific individual or company. **Shipper's order** bills of lading are negotiable; they can be bought, sold, or traded while the goods are still in transit and are used for letter of credit transactions. The customer usually needs the original or a copy of the bill of lading as proof of ownership to take possession of the goods.

A **commercial invoice** is a bill for the goods stating basic information about the transaction, including a description of the merchandise, total cost of the goods sold, addresses of the shipper and seller, and delivery and payment terms. The buyer needs the invoice to prove ownership and to arrange payment. Some governments use the commercial invoice to assess customs duties.

Other export documents that may be required include export licenses, consular invoices (used to control and identify goods, they are obtained from the country to which the goods are being shipped), certificates of origin, inspection certification, dock and/or warehouse receipts, destination control statements (serve to notify the carrier and all foreign parties that the item may only be exported to certain destinations), insurance certificates, shipper's export declarations (used to control exports and compile trade statistics), and export packaging lists.<sup>23</sup>

The documentation required depends on the merchandise in the shipment and its destination. The number of documents required can be quite cumbersome and costly, creating a deterrent to trade. For example, businesses in Germany spend more than €47 billion annually on administrative costs, in order to comply with close to 10,000 legal obligations under national, European, and international law. The German government was so concerned about this bureaucratic burden that it established the National Regulatory Control Council, which checks all new legislative projects for necessity and administrative costs. Since its establishment in 2006, the Council has checked 900 draft laws and prevented an estimated €3.3 billion in additional costs to businesses.<sup>24</sup> The documentation burden is even more critical for developing

**export declaration** A shipping document detailing the type, destination, shipping, timing, and value of an export shipment.

**bill of lading** A contract between an exporter and a carrier indicating that the carrier has accepted responsibility for the goods and will provide transportation in return for payment.

**straight bill of lading** A nonnegotiable bill of lading usually used in prepaid transactions in which the transported goods involved are delivered to a specific individual or company.

**shipper's order** A negotiable bill of lading that can be bought, sold, or traded while the subject goods are still in transit and that is used for letter of credit transactions.

**commercial invoice** A bill for transported goods that describes the merchandise and its total cost and lists the addresses of the shipper and seller and delivery and payment terms.

economies. In a 2008 survey of informal firms, 67 percent in Côte d'Ivoire and 57 percent in Madagascar pointed to registration fees as a major or very severe obstacle to formally registering their businesses. Consequently, 80 percent of reforms in low- and lower-middle income economies over the past decade were aimed at reducing the administrative burden for firms, mostly by easing business start-up and trade costs.<sup>25</sup>

To ensure that all documentation required is accurately completed and to minimize potential problems, firms just entering the international market should consider using **freight forwarders**, who specialize in handling export documentation. Freight forwarders increasingly choose to differentiate themselves through the development of sophisticated information management systems, particularly with electronic data interchange (EDI).

## TERMS OF SHIPMENT AND SALE

The responsibilities of the buyer and the seller should be spelled out as they relate to what is and what is not included in the price quotation and when ownership of goods passes from seller to buyer. **Incoterms** are the internationally accepted standard definitions for terms of sale set by the International Chamber of Commerce (ICC) since 1936.<sup>26</sup> The Incoterms 2000 went into effect on January 1, 2000, with significant revisions to reflect international traders' growing reliance on intermodal transport and the increased use of electronic communications. The new Incoterms also clarify the loading and unloading requirements of both buyers and sellers.<sup>27</sup> Although the same terms may be used in domestic transactions, they gain new meaning in the international arena. The terms are grouped into four categories, starting with the term whereby the seller makes the goods available to the buyer only at the seller's own premises (the "E"-terms), followed by the group whereby the seller is called upon to deliver the goods to a carrier appointed by the buyer (the "F"-terms). Next are the "C"-terms, whereby the seller has to contract for carriage but without assuming the risk of loss or damage to the goods or additional costs after the dispatch, and finally the "D"-terms, whereby the seller has to bear all costs and risks to bring the goods to the destination determined by the buyer. The most common of the Incoterms used in international marketing are summarized in Figure 16.4.

Prices quoted **ex-works (EXW)** apply only at the point of origin, and the seller agrees to place the goods at the disposal of the buyer at the specified place on the date or within the fixed period. All other charges are for the account of the buyer.

One of the new Incoterms is **free carrier (FCA)**, which replaced a variety of FOB terms for all modes of transportation except vessel. FCA (named inland point) applies only at a designated inland shipping point. The seller is responsible for loading goods into the means of transportation; the buyer is responsible for all subsequent expenses. If a port of exportation is named, the costs of transporting the goods to the named port are included in the price.

**Free alongside ship (FAS)** at a named U.S. port of export means that the exporter quotes a price for the goods, including charges for delivery of the goods alongside a vessel at the port. The seller handles the cost of unloading and wharfage; loading, ocean transportation, and insurance are left to the buyer.

**Free on board (FOB)** applies only to vessel shipments. The seller quotes a price covering all expenses up to, and including, delivery of goods on an overseas vessel provided by or for the buyer.

Under **cost and freight (CFR)** to a named overseas port of import, the seller quotes a price for the goods, including the cost of transportation to the named port of debarkation. The cost of insurance and the choice of insurer are left to the buyer.

With **cost, insurance, and freight (CIF)** to a named overseas port of import, the seller quotes a price including insurance, all transportation, and miscellaneous charges

**freight forwarders** Specialists in handling international transportation by contracting with carriers on behalf of shippers.

**incoterms** International Commerce Terms. Widely accepted terms used in quoting export prices.

**ex-works (EXW)** Price quotes that apply only at the point of origin; the seller agrees to place the goods at the disposal of the buyer at the specified place on a date or within a fixed period.

**free carrier (FCA)** Applies only at a designated inland shipping point. Seller is responsible for loading goods into the means of transportation; buyer is responsible for all subsequent expenses.

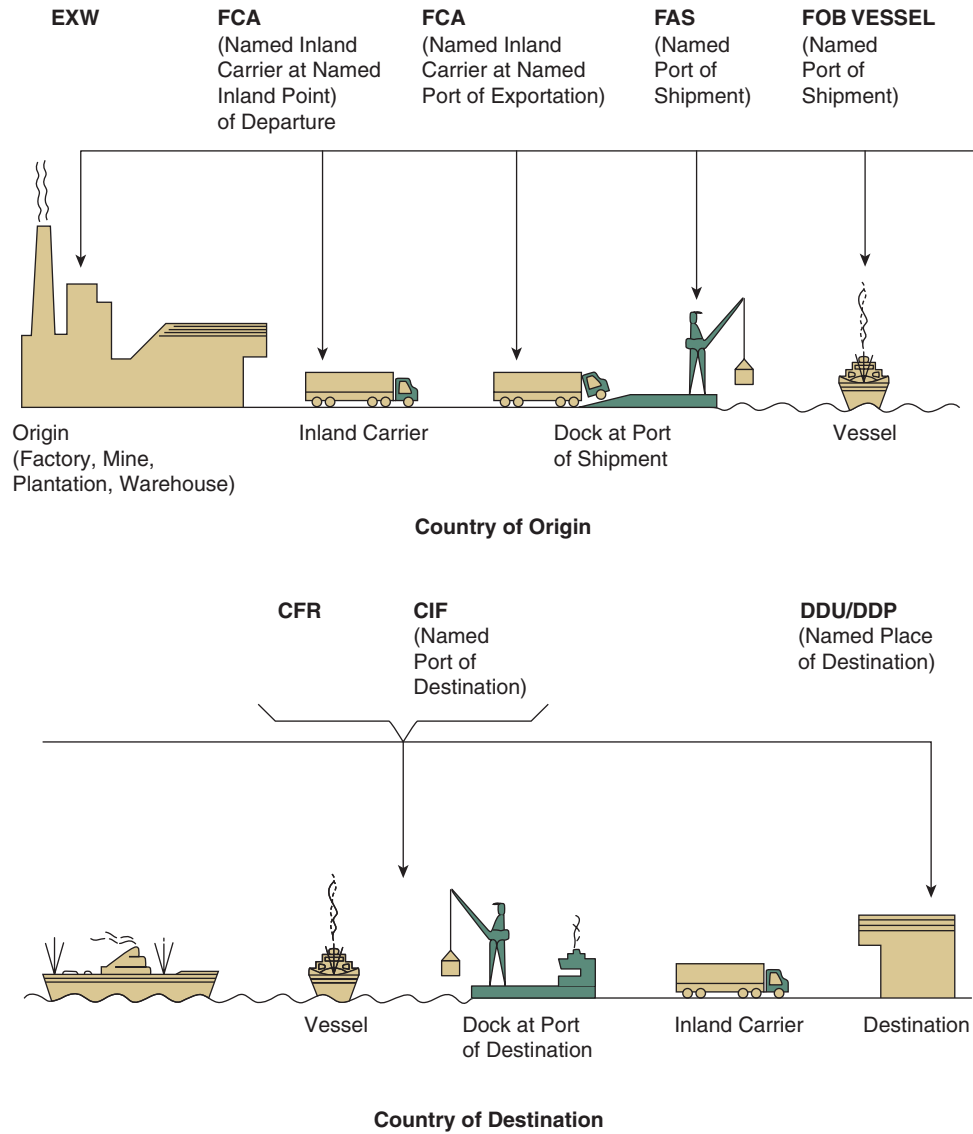
**free alongside ship (FAS)** Exporter quotes a price for the goods, including charges for delivery of the goods alongside a vessel at a port. Seller handles cost of unloading and wharfage; loading, ocean transportation, and insurance are left to the buyer.

**free on board (FOB)** Applies only to vessel shipments. Seller quotes a price covering all expenses up to and including delivery of goods on an overseas vessel provided by or for the buyer.

**cost and freight (CFR)** Seller quotes a price for the goods, including the cost of transportation to the named port of debarkation. Cost and choice of insurance are left to the buyer.

**cost, insurance, and freight (CIF)** Seller quotes a price including insurance, all transportation, and miscellaneous charges to the point of debarkation from the vessel or aircraft.

Figure 16.4 Selected Trade Terms

**carriage paid to (CPT)**

The price quoted by an exporter for shipments not involving waterway transport, not including insurance.

**delivered duty paid (DDP)**

Seller delivers the goods, with import duties paid, including inland transportation from import point to the buyer's premises.

**delivered duty unpaid**

(DDU) Only the destination customs duty and taxes are paid by the consignee.

to the point of debarkation from the vessel. If other than waterway transport is used, the terms are **CPT (carriage paid to)** or CIP (carriage and insurance paid to).

With **delivered duty paid (DDP)**, the seller delivers the goods, with import duties paid, including inland transportation from import point to the buyer's premises. With **delivered duty unpaid (DDU)**, only the destination customs duty and taxes are paid by the consignee. Ex-works signifies the maximum obligation for the buyer; delivered duty paid puts the maximum burden on the seller.

Careful determination and clear understanding of terms used, and their acceptance by the parties involved, are vital to avoid misunderstandings and disputes. These terms are also powerful competitive tools. The exporter should therefore learn what importers usually prefer in the particular market and what the specific transaction may require. An inexperienced importer may be discouraged by a quote such as "ex-plant Jessup, Maryland," whereas "CIF Helsinki" will assure the Finnish importer that many additional costs will only be in the familiar home environment.

Increasingly, exporters are quoting more inclusive terms. The benefits of taking charge of the transportation on either a CIF or DDP basis include the following: (1) exporters can offer foreign buyers an easy-to-understand “delivered cost” for the deal; (2) by getting discounts on volume purchases for transportation services, exporters cut shipping costs and can offer lower overall prices to prospective buyers; (3) control of product quality and service is extended to transport, enabling the exporter to ensure that goods arrive to the buyer in good condition; and (4) administrative procedures are cut for both the exporter and the buyer.<sup>28</sup>

When taking control of transportation costs, however, the exporter must know well in advance what impact the additional costs will have on the bottom line. If the approach is implemented incorrectly, exporters can be faced with volatile shipping rates, unexpected import duties, and restive customers. Most exporters do not want to go beyond the CIF quotation because of uncontrollables and unknowns in the destination country. Whatever terms are chosen, the program should be agreed to by the exporter and the buyer(s) rather than imposed solely by the exporter.



## INTERNATIONAL INVENTORY ISSUES

Inventories tie up a major portion of corporate funds. Capital used for inventory is not available for other corporate opportunities. Annual **inventory carrying costs** (the expense of maintaining inventories) are heavily influenced by the cost of capital and industry-specific conditions. A company with a 36 percent inventory carrying cost will pay for its inventory twice in two years: once to purchase it, and a second time to carry it for about 25 months. Therefore, inventory management is critical for make/buy, make-to-order/make-to-stock, and other top-level decisions.<sup>29</sup>

In addition, **just-in-time inventory** policies, which minimize the volume of inventory by making it available only when it is needed, are increasingly required by multinational manufacturers and distributors engaging in supply-chain management. They choose suppliers on the basis of their delivery and inventory performance and their ability to integrate themselves into the supply chain. Proper inventory management may therefore become a determining variable in obtaining a sale.

The purpose of establishing **inventory** systems—to maintain product movement in the delivery pipeline and to have a cushion to absorb demand fluctuations—is the same for domestic and international operations. The international environment, however, includes unique factors such as currency exchange rates, greater distances, and duties. At the same time, international operations provide the corporation with an opportunity to explore alternatives not available in a domestic setting, such as new sourcing or location alternatives. In international operations, the firm can make use of currency fluctuation by placing varying degrees of emphasis on inventory operations, depending on the stability of the currency of a specific country. Entire operations can be shifted to different nations to take advantage of new opportunities. International inventory management can therefore be much more flexible in its response to environmental changes.

In deciding the level of inventory to be maintained, the international manager must consider three factors: the order cycle time, desired customer service levels, and use of inventories as a strategic tool.

### ORDER CYCLE TIME

The total time that passes between the placement of an order and the receipt of the merchandise is referred to as **order cycle time**. Two dimensions are of major

4. To see how the transportation infrastructure in host countries often dictates the options open to the manager

**inventory carrying costs**  
The expense of maintaining inventories.

**just-in-time inventory**  
Materials scheduled to arrive precisely when they are needed on a production line.

**inventory** Materials on hand for use in the production process; also finished goods on hand.

**order cycle time** The total time that passes between the placement of an order and the receipt of the product.

importance to inventory management: the length of the total order cycle and its consistency. In international business, the order cycle is frequently longer than in domestic business. It comprises the time involved in order transmission, order filling, packing and preparation for shipment, and transportation. Order transmission time varies greatly internationally depending on the method of communication. Supply-chain driven firms use electronic data interchange (EDI) rather than facsimile, telex, telephone, or mail.

EDI is the direct transfer of information technology between computers of trading partners.<sup>30</sup> The usual paperwork the partners send each other, such as purchase orders and confirmations, bills of lading, invoices, and shipment notices, are formatted into standard messages and transmitted via a direct link network or a third-party network. EDI can streamline processing and administration and reduce the costs of exchanging information.

The order-filling time may also increase because lack of familiarity with a foreign market makes the anticipation of new orders more difficult. Packing and shipment preparation require more detailed attention. Finally, of course, transportation time increases with the distances involved. Larger inventories may have to be maintained both domestically and internationally to bridge the time gaps.

Consistency, the second dimension of order cycle time, is also more difficult to maintain in international business. Depending on the choice of transportation mode, delivery times may vary considerably from shipment to shipment. The variation may require the maintenance of larger safety stocks to be able to fill demand in periods when delays occur.

## CUSTOMER SERVICE LEVELS

**customer service** A corporate effort aimed at customer satisfaction; customer service levels measure the responsiveness that inventory policies permit for a given situation.

The level of **customer service** denotes the responsiveness that inventory policies permit for any given situation. A customer service level of 100 percent would be defined as the ability to fill all orders within a set time—for example, three days. If, within the same three days, only 70 percent of the orders can be filled, the customer service level is 70 percent. The choice of customer service level for the firm has a major impact on the inventories needed. In highly industrialized nations, firms frequently are expected to adhere to very high levels of customer service. Corporations are often tempted to design international customer service standards to similar levels.

Yet, service levels should not be oriented primarily around cost or customary home-country standards. Rather, the international service level should be based on expectations encountered in each market. These expectations are dependent on past performance, product desirability, customer sophistication, and the competitive status of the firm.

Because high customer service levels are costly, the goal should not be the highest customer service level possible, but rather an acceptable level. Different customers have different priorities. Some will be prepared to pay a premium for speed, some may put a higher value on flexibility, and another group may see low cost as the most important issue. Flexibility and speed are expensive, so it is wasteful to supply them to customers who do not value them highly.<sup>31</sup> If, for example, foreign customers expect to receive their merchandise within 30 days, it does not make sense for the international corporation to promise delivery within 10 or 15 days. Indeed, such delivery may result in storage problems. In addition, the higher prices associated with higher customer service levels may reduce the competitiveness of a firm's product. By contrast, in a business-to-business setting, sometimes even a few-hour delay in the delivery of a crucial component may be unacceptable, since the result may be a shutdown of the production process.

In such instances, strategically placed depots in a region must ensure that near instantaneous response becomes possible. For example, Amazon.com rents

11.9 million square feet worldwide, mostly warehouse and fulfillment operation facilities. This allows for speedier deliveries and increased customer satisfaction. Amazon’s location decisions are symptomatic of larger trends in the digital economy. While global and regional management headquarters are located in first-tier business cities, fulfillment facilities, call centers, and warehouses are often located in third-tier cities. This distribution is motivated by the search for lower costs (salaries, taxes, and real estate) and better airfreight accessibility.<sup>32</sup>

### INVENTORY AS A STRATEGIC TOOL

Inventories can be used by the international corporation as a strategic tool in dealing with currency valuation changes or to hedge against inflation. By increasing inventories before an imminent devaluation of a currency instead of holding cash, the corporation may reduce its exposure to devaluation losses. Similarly, in the case of high inflation, large inventories can provide an important inflation hedge. In such circumstances, the international inventory manager must balance the cost of maintaining high levels of inventories with the benefits accruing from hedging against inflation or devaluation. Many countries, for example, charge a property tax on stored goods. If the increase in tax payments outweighs the hedging benefits to the corporation, it would be unwise to increase inventories before a devaluation.

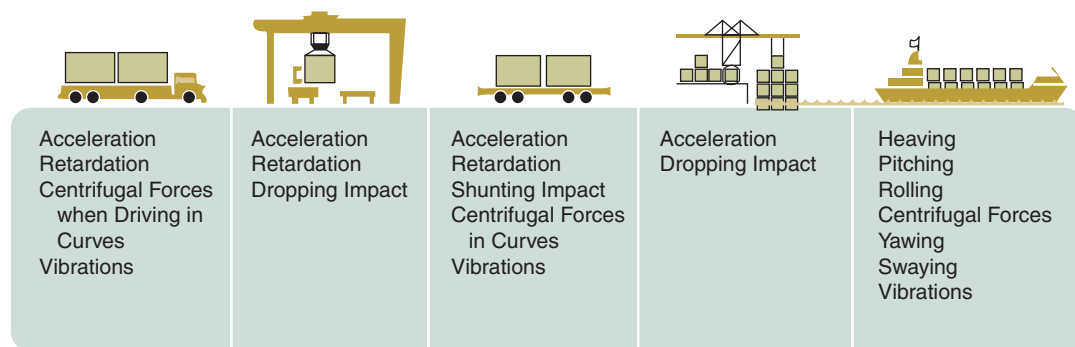
### INTERNATIONAL PACKAGING ISSUES

Packaging is instrumental in getting the merchandise to the ultimate destination in a safe, maintainable, and presentable condition. Packaging that is adequate for domestic shipping may be inadequate for international transportation because the shipment will be subject to the motions of the vessel on which it is carried. Added stress in international shipping also arises from the transfer of goods among different modes of transportation. Figure 16.5 provides examples of some sources of stress in intermodal movement that are most frequently found in international transportation.

5. To learn why international inventory management is crucial for success

The responsibility for appropriate packaging rests with the shipper of goods. The U.S. Carriage of Goods by Sea Act of 1936 states: “Neither the carrier nor the ship shall be responsible for loss or damage arising or resulting from insufficiency of

**Figure 16.5** Stresses in Intermodal Movement



Note: Each transportation mode exerts a different set of stresses and strains on containerized cargoes. The most commonly overlooked are those associated with ocean transport.

Source: James L. Bossert, ed., *Supplier Management Handbook*, 6th ed, (Milwaukee, WI: American Society for Quality, 2004).

packing.” The shipper must therefore ensure that the goods are prepared appropriately for international shipping. This is important because it has been found that “the losses that occur as a result of breakage, pilferage, and theft exceed the losses caused by major maritime casualties, which include fires, sinkings, and collision of vessels. Thus the largest of these losses is a preventable loss.”<sup>33</sup>

Packaging decisions must also take into account differences in environmental conditions—for example, climate. When the ultimate destination is very humid or particularly cold, special provisions must be made to prevent damage to the product. The task becomes even more challenging when one considers that, in the course of long-distance transportation, dramatic changes in climate can take place. Still famous is the case of a firm in Taiwan that shipped drinking glasses to the Middle East. The company used wooden crates and padded the glasses with hay. Most of the glasses, however, were broken by the time they reached their destination. As the crates traveled into the dry Middle East, the moisture content of the hay dropped. By the time the crates were delivered, the thin straw offered almost no protection.<sup>34</sup>

The weight of packaging must also be considered, particularly when airfreight is used, as the cost of shipping is often based on weight. At the same time, packaging material must be sufficiently strong to permit stacking in international transportation. Another consideration is that, in some countries, duties are assessed according to the gross weight of shipments, which includes the weight of packaging. Obviously, the heavier the packaging, the higher the duty will be.

The shipper must pay sufficient attention to instructions provided by the customer for packaging. For example, requests by the customer that the weight of any one package should not exceed a certain limit or that specific package dimensions should be adhered to, usually are made for a reason. Often they reflect limitations in transportation or handling facilities at the point of destination.

Although the packaging of a product is often used as a form of display abroad, international packaging can rarely serve the dual purpose of protection and display. Therefore double packaging may be necessary. The display package is for future use at the point of destination; another package surrounds it for protective purposes.

One solution to the packaging problem in international logistics has been the development of intermodal containers—large metal boxes that fit on trucks, ships, railroad cars, and airplanes and ease the frequent transfer of goods in international shipments. Developed in different forms for both sea and air transportation, containers also offer better utilization of carrier space because of standardization

of size. The shipper therefore may benefit from lower transportation rates. In addition, containers can offer greater safety from pilferage and damage. Of course, at the same time, the use of containers allows thieves to abscond with an entire shipment, rather than just parts of it. The rise in cargo theft and pilferage has given birth to a whole new industry of “risk consultancies,” which are contracted by exasperated ship owners to safeguard their vessels. In addition to providing armed guards on ships and offering their own crafts as escorts, “consultancies” are responsible for parleying with pirates, paying ransoms, and outfitting ships with barbed or electric wires and water cannons to make it hard for pirates to clamber aboard.<sup>35</sup>



© Image Source/Bjoern Holland/Getty Images, Inc.

A single cargo ship can transport up to 11,000 containers.

Container traffic is heavily dependent on the existence of appropriate handling facilities, both domestically and internationally. In addition, the quality of inland transportation must be considered. If transportation for containers is not available and the merchandise must be unpacked and reloaded the expected cost reductions may not materialize.

In some countries, rules for the handling of containers may be designed to maintain employment. For example, U.S. union rules obligate shippers to withhold containers from firms that do not employ members of the International Longshoremen's Association for the loading or unloading of containers within a fifty-mile radius of Atlantic or Gulf ports. Such restrictions can result in an onerous cost burden.

Overall, cost attention must be paid to international packaging. The customer who ordered and paid for the merchandise expects it to arrive on time and in good condition. Even with replacements and insurance, the customer will not be satisfied if there are delays. Dissatisfaction will usually translate directly into lost sales.



## INTERNATIONAL STORAGE ISSUES

Although international logistics is discussed as a movement or flow of goods, a stationary period is involved when merchandise becomes inventory stored in warehouses. Heated arguments can arise within a firm over the need for and utility of warehousing internationally. On the one hand, customers expect quick responses to orders and rapid delivery. Accommodating the customer's expectations would require locating many distribution centers around the world. On the other hand, warehouse space is expensive. In addition, the larger volume of inventory increases the inventory carrying cost. Fewer warehouses allow for consolidation of transportation and therefore lower transportation rates to the warehouse. However, if the warehouses are located far from customers, the cost of outgoing transportation increases. The international logistician must consider the tradeoffs between service and cost to the supply chain in order to determine the appropriate levels of warehousing.

## STORAGE FACILITIES

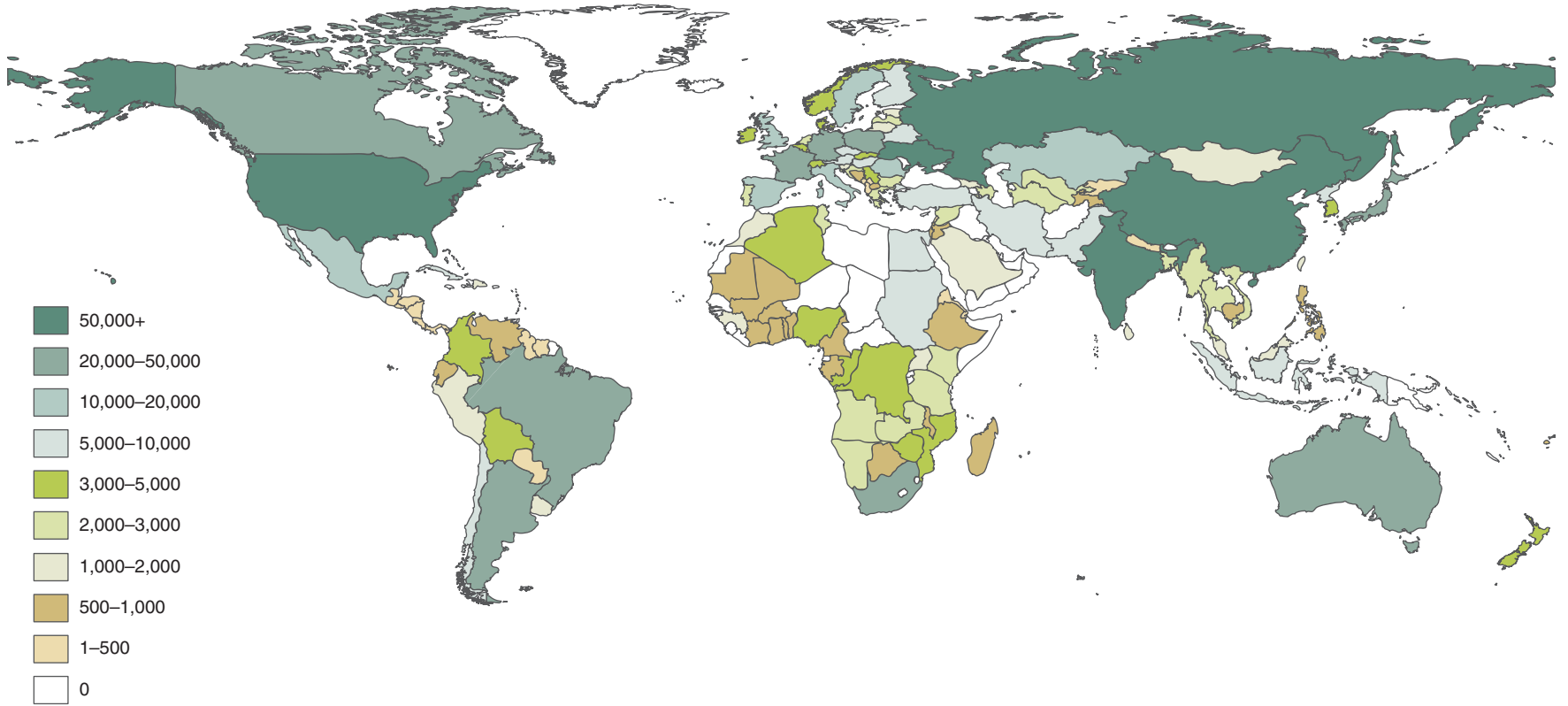
The **location decision** addresses how many distribution centers to have and where to locate them. The availability of facilities abroad will differ from the domestic situation. For example, while public storage is widely available in some countries, such facilities may be scarce or entirely lacking in others. Also, the standards and quality of facilities can vary widely. As a result, the storage decision of the firm is often accompanied by the need for large-scale, long-term investments. Despite the high cost, international storage facilities should be established if they support the overall logistics effort. In many markets, adequate storage facilities are imperative to satisfy customer demands and to compete successfully. For example, since the establishment of a warehouse connotes a visible presence, in doing so a firm can convince local distributors and customers of its commitment to remain in the market for the long term.

Once the decision is made to use storage facilities abroad, the warehouse conditions must be carefully analyzed. As an example, in some countries warehouses have low ceilings. Packaging developed for the high stacking of products is therefore

*6. To learn about interactions between different logistics components*

**location decision** A decision concerning the number of facilities to establish and where they should be situated.

### RAILWAY DENSITY WORLD MAP (in km)



Source: CIA World Factbook.

unnecessary or even counterproductive. In other countries, automated warehousing is available. Proper bar coding of products and the use of package dimensions acceptable to the warehousing system are basic requirements. In contrast, in warehouses still stocked manually, weight limitations will be of major concern. And, if no forklift trucks are available, palletized delivery is of little use.

To optimize the logistics system, the logistician should analyze international product sales and then rank order products according to warehousing needs. Products that are most sensitive to delivery time might be classified as “A” products. “A” products would be stocked in all distribution centers, and safety stock levels would be kept high. Alternatively, the storage of products can be more selective, if quick delivery by air can be guaranteed. Products for which immediate delivery is not urgent could be classified as “B” products. They would be stored only at selected distribution centers around the world. Finally, products for which there is little demand would be stocked only at headquarters. Should an urgent need for delivery arise, airfreight could again assure rapid shipment. Classifying products enables the international logistician to substantially reduce total international warehousing requirements and still maintain acceptable service levels.

## SPECIAL TRADE ZONES

Areas where foreign goods may be held or processed and then reexported without incurring duties are called **foreign trade zones**. The zones can be found at major ports of entry and also at inland locations near major production facilities. For example, Kansas City, Missouri, has one of the largest foreign trade zones in the United States.

The existence of trade zones can be quite useful to the international firm. For example, in some countries, the benefits derived from lower labor costs may be offset by high duties and tariffs. As a result, location of manufacturing and storage facilities in these countries may prove uneconomical. Foreign trade zones are designed to exclude the impact of duties from the location decision. This is done by exempting merchandise in the foreign trade zone from duty payment. The international firm can therefore import merchandise; store it in the foreign trade zone; and process, alter, test, or demonstrate it—all without paying duties. If the merchandise is subsequently shipped abroad (that is, reexported), no duty payments are ever due. Duty payments become due only if the merchandise is shipped into the country from the foreign trade zone. An interesting example of tax reductions and industrial development incentives is offered by the Shanghai Waigaoqiao Free Trade Zone in China. This facility was established in 1990 on a plot of 10,000 square kilometers. Companies located within the zone are given five years of preferential tax treatment. Instead of paying the corporate tax rate of 15 percent, the tax rate starts at 8 percent and increases over the five-year period to the full 15 percent. This policy has attracted a slew of companies, such as Intel, Hewlett-Packard, Phillip, IBM, and Emerson Electric, creating a technology hub in the heart of China.<sup>36</sup>

Trade zones can also be useful as transshipment points to reduce logistics cost and redesign marketing approaches. For example, Audiovox was shipping small quantities of car alarms from a Taiwanese contract manufacturer directly to distributors in Chile. The shipments were costly and the marketing strategy of requiring high minimum orders stopped distributors from buying. The firm resolved the dilemma by using a Miami trade zone to ship the alarms from Taiwan and consolidate the goods with other shipments to Chile. The savings in freight costs allowed the Chilean distributors to order whatever quantity they wanted and allowed the company to quote lower prices. As a result, sales improved markedly.<sup>37</sup>

**foreign trade zones** Special areas where foreign goods may be held or processed without incurring duties and taxes until they enter the country outside the zone.

All parties to the arrangement benefit from foreign trade zones. The government maintaining the trade zone achieves increased employment and investment. The firm using the trade zone obtains a spearhead in the foreign market without incurring all of the costs customarily associated with such an activity. As a result, goods can be reassembled, and large shipments can be broken down into smaller units. Also, goods can be repackaged when packaging weight becomes part of the duty assessment. Finally, goods can be given domestic “made-in” status if assembled in the foreign trade zone. Thus, duties may be payable only on the imported materials and component parts rather than on the labor that is used to finish the product.

In addition to foreign trade zones, governments also have established export processing zones and special economic areas. The common dimensions for all the zones are that special rules apply to them when compared with other regions of the country, and that the purpose of these special rules lies in the government’s desire to stimulate the economy, particularly the export side of international trade.

Export processing zones usually provide tax- and duty-free treatment for production facilities whose output is destined abroad. The maquiladoras of Mexico are one example of a program that permits firms to take advantage of sharp differentials in labor costs. Firms can carry out the labor-intensive part of their operations in Mexico, while sourcing raw materials or component parts from other nations.

One country that has used trade zones very successfully for its own economic development is China. Through the creation of **special economic zones**, in which there are substantial tax incentives, low prices for land and labor, and no tariffs, the government has attracted many foreign investors bringing in billions of dollars. The investors have brought new equipment, technology, and managerial know-how and have increased local economic prosperity substantially. The job generation effect has been so strong that the central Chinese government has expressed concern about the overheating of the economy and the inequities between regions with and without trade zones.<sup>38</sup>

For the logistician, the decision whether to use such zones mainly is framed by the overall benefit for the supply-chain system. Clearly, additional transport and retransport are required, warehousing facilities need to be constructed, and material handling frequency will increase. However, the costs may well be balanced by the preferential government treatment or by lower labor costs.

#### special economic zones

Areas in which there are substantial tax incentives, low prices for land and labor, and no tariffs, created by a country to attract foreign investors.



## MANAGEMENT OF INTERNATIONAL LOGISTICS

### 7. To decide who should be in charge of logistics

The very purpose of a multinational firm is to benefit from system synergism and a persuasive argument can be made for the coordination of international logistics at corporate headquarters. Without coordination, subsidiaries will tend to optimize their individual efficiency but jeopardize the efficiency of the overall performance of the supply chain.

### CENTRALIZED LOGISTICS MANAGEMENT

A significant characteristic of the centralized approach to international logistics is the existence of headquarters staff that retains decision-making power over logistics activities affecting international subsidiaries. If headquarters exerts control, it must

also take the primary responsibility for its decisions. Clearly, ill will may arise if local managers are appraised and rewarded on the basis of a performance they do not control. This may be particularly problematic if headquarters staff suffers from a lack of information or expertise.

To avoid internal problems, both headquarters staff and local management should report to one person. This person, whether the vice president for international logistics or the president of the firm, can then become the final arbiter to decide the firm's priorities. Of course, the individual should also be in charge of determining appropriate rewards for managers, both at headquarters and abroad, so that corporate decisions that alter a manager's performance level will not affect the manager's appraisal and evaluation. Further, the individual can contribute an objective view when inevitable conflicts arise in international logistics coordination. The internationally centralized decision-making process leads to an overall supply-chain management perspective that can dramatically improve profitability.

## **DECENTRALIZED LOGISTICS MANAGEMENT**

When a firm serves many international markets that are diverse in nature, total centralization might leave the firm unresponsive to local adaptation needs. If each subsidiary is made a profit center in itself, each one carries the full responsibility for its performance, which can lead to greater local management satisfaction and to better adaptation to local market conditions. Yet often such decentralization deprives the logistics function of the benefits of coordination. For example, while headquarters, referring to its large volume of overall international shipments, may be able to extract bottom rates from transportation firms, individual subsidiaries by themselves may not have similar bargaining power. The same argument applies also to the sourcing situation, where the coordination of shipments by the purchasing firm may be much more cost-effective than individual shipments from many small suppliers around the world.

Once products are within a specific market, however, increased input from local logistics operations should be expected and encouraged. At the very least, local managers should be able to provide input into the logistics decisions generated by headquarters. Ideally, within a frequent planning cycle, local managers can identify the logistics benefits and constraints existing in their particular market and communicate them to headquarters. Headquarters can then either adjust its international logistics strategy accordingly or explain to the manager why system optimization requires actions different from the ones recommended. Such a justification process will help greatly in reducing the potential for animosity between local and headquarters operations.

## **OUTSOURCING LOGISTICS SERVICES**

A third option, used by some corporations, is the systematic outsourcing of logistics capabilities. By collaborating with transportation firms, private warehouses, or other specialists, corporate resources can be concentrated on the firm's core product.

Many firms whose core competency does not include logistics find it more efficient to use the services of companies specializing in international shipping. This is usually true for smaller shipping volumes, for example in cases when smaller import-export firms or smaller shipments are involved. Such firms prefer to outsource at least some of the international logistics functions, rather than detracting from staff resources and time. Some logistical services providers carve specific niches in the transnational shipping market, specializing for example in consumer goods forwarding.

**one-stop logistics** Allows shippers to buy all the transportation modes and functional services from a single carrier.

The resulting lower costs and better service make such third parties the preferred choice for many firms. On the other hand, when hazardous or other strictly regulated materials are involved, some firms may choose to retain control over handling and storing activities, in view of possible liability issues.<sup>39</sup>

Going even further, **one-stop logistics** allows shippers to buy all the transportation modes and functional services from a single carrier, instead of going through the pain of choosing different third parties for each service. One-stop logistics ensures a more efficient global movement of goods via different transportation modes. Specialized companies provide EDI tracking services and take care of cumbersome customs procedures; they also offer distribution services, such as warehousing and inventory management. Finally, third parties may even take some of the international shipper's logistical functions. This rapidly growing trend provides benefits to both carriers and shippers.<sup>40</sup> The latter enjoy better service and simplified control procedures and claims settlement. On the other hand, one-stop logistics can help carriers achieve economies of scale and remain competitive in a very dynamic market. The proliferation of one-stop logistics practices is facilitated by the wider acceptance of EDI and the growing importance of quality criteria versus cost criteria in shipping decisions.

While the cost savings and specialization benefits of such a strategy seem clear, one must also consider the loss of control for the firm, its suppliers, and its customers that may result from such outsourcing. Yet, contract logistics does not and should not require the handing over of control. Rather, it offers concentration on one's specialization—a division of labor. The control and responsibility toward the supply chain remain with the firm, even though operations may move to a highly trained outside organization.



## THE SUPPLY CHAIN AND THE INTERNET

**8.** *To appreciate how information and data exchange are pivotal for supply-chain management*

The Internet has been instrumental in transforming supply-chain management. Firms are now able to conduct many more global comparisons among suppliers and select from a wide variety of choices. At the same time, firms can be much more informed in the structure of their supplier network. In consequence, the supply base of many firms has become much broader, but includes fewer participants.

Many firms use their web sites as a marketing and advertising tool and are expanding them to include order-taking capabilities. The development of new technologies and digital processes has led to a dramatic growth in net e-commerce revenue. In the United States, Internet sales have grown from \$995.0 billion in 1999 to \$3,333 billion in 2007 and are projected to increase by 9.0 percent annually through 2012.<sup>41</sup>

Companies wishing to enter e-commerce will not have to do so on their own. Hub sites (also known as virtual malls or digital intermediaries) bring together buyers, sellers, distributors, and transaction payment processors in a single marketplace, making convenience the key attraction. Business-to-business (B2B) activity, transactions by manufacturers and merchant wholesalers, account for most e-commerce (93 percent). However, the acceptance of e-commerce is not uniform.<sup>42</sup> The presence of cultural and social factors, which makes customers from some countries more reluctant to shop on-line than others.<sup>43</sup> The future is also growing brighter for hubs in the consumer-to-consumer market, where companies like eBay are setting high standards of profitability.

When customers have the ability to access a company through the Internet, the company has to be prepared for 24-hour order-taking and customer service, and to have the regulatory and customs-handling expertise for international delivery. The instantaneous interactivity that users experience will also be translated into an expectation of expedient delivery of answers and products ordered. Firms must remember that web sites should encourage business, not preclude it. If prospective customers cannot easily and rapidly find what they are looking for on a web site, they are likely to move on and find another site that makes its information and interactivity more apparent.<sup>44</sup>

Some companies elect to build their own international distribution networks. Both QVC, a televised shopping service, and Amazon.com, an online retailer of books, have distribution centers in Britain and Germany to take advantage of the European Internet audience and to fulfill more quickly and cheaply the orders generated by their web sites. Transactions and the information they provide about the buyers will also allow for more customization and service by region, market, or even individual customer.

For industries such as music and motion pictures, the Internet is both an opportunity and a threat. The Web provides a new, efficient method of distribution and customization of products. At the same time, it can be a channel for intellectual property violation through unauthorized posting on other web sites where these products can be downloaded. For example, the music industry is very concerned about a shift in the balance of economic power: If artists can deliver their works directly to customers via technologies such as MP3, what will be the role of labels and distributors?

A number of hurdles and uncertainties may keep companies out of global markets or from exploiting them to their full potential. Some argue that the World Wide Web does not yet live up to its name, because it is mostly a tool for the United States and Europe. For all countries, but particularly developing nations, the issue of universal access to the Internet is crucial. Such access depends on the speed with which governments end their monopolistic structures in telecommunications and open their markets to competition. The 1997 World Trade Organization agreement on telecommunications accelerated the process of liberalization through the establishment of new companies, foreign direct investment in existing companies, and cross-border transmission of services. The Doha Round of service negotiations, which commenced in 2000, has sought to identify additional market openings and areas of further liberalization in telecommunications. Meanwhile, access to the Internet is undergoing major expansion through new technologies such as NetTV and Web phone.<sup>45</sup> As Internet penetration levels increase due to technological advances, improvements in many countries' Web infrastructures, and customer acceptance, e-business will become truly global.



## LOGISTICS AND SECURITY

The entire field of supply-chain management and logistics has been thoroughly affected by newly emerging security concerns. After the terrorist attacks of 2001, companies have had to learn that the pace of international transactions has slowed down and that formerly routine steps will now take longer. While in decades past many governmental efforts were devoted to speeding up transactions across borders, national security reasons are now forcing governments to erect new barriers and

*9. To understand the vulnerability and support of logistics*

**FOCUS  
ON  
POLITICS**
**Logistics and National Security**

The Department of Homeland Security (DHS) is a cabinet-level agency designed to coordinate U.S. efforts in the war against terror. Twenty-two federal agencies are united in this new department. Some of these agencies affect international shippers, including the Customs Service, Coast Guard, Transportation Security Administration, and the import inspection services of the Food and Drug Administration. Additionally, DHS has implemented a number of antiterror regulations, in an effort to keep the country safe in the post-9/11 environment.

Importers to the United States and the customs brokers who serve them are feeling the pressure to help secure U.S. borders. For example, a recent Homeland Security screening law, commonly referred to as 10+2, requires shippers and carriers to capture 12 additional data elements than previously required for shipments being imported into the United States. Few firms have systems in place that can capture and disseminate this information. The necessary capital investment is driving up trade costs. Beyond advanced data reporting, importers have also complained about bureaucratic inefficiencies, generated by conflicting agency mandates. For example, shippers have occasionally found themselves caught in a struggle between the Transportation Security Administration and Customs over which agency makes the final decisions regarding cargo security.

During the 2009 NAFTA summit, participants identified border security regulations as one of the most pressing areas of concern and called for harmonizing security requirements across the NAFTA bloc. Some supported customs preclearance throughout all the NAFTA countries, pointing out that a single secure entry/exit point creates a competitive disadvantage for

all members. Prior to the terrorist attacks on the World Trade Center, Canada and the United States had taken steps in that direction, issuing a Smart Border report that defined areas beyond the border, where shippers could preclear cargo. However, 9/11 ushered in a more stringent security regime, with some unintended consequences for trade. For example, Canadian transport providers have complained about situations where a cargo shipment is cleared, but the truck driver is not, or cases of critical or perishable cargo lingering in Custom's limbo for weeks, sometimes months, awaiting clearance. Some Canadian suppliers have begun sending two trucks with the same critical cargo across the border to make sure that at least one gets through in the required time period.

Border slowdowns cost North America billions of dollars. However, security liberalization is difficult, because of DHS's superseding mandate to ensure the safety of the United States. DHS operates from a law enforcement standpoint, with trade considerations taking a backseat to security. Despite all the new regulations and increased oversight, it is very difficult to completely secure cargo. Even if the truck, ship, or train is cleared at the point of origin, contamination could occur in transit. It is technologically impossible to monitor every transport shipment from beginning to end.

This has left some analysts wondering whether the cost is worth the price, and whether there can be such a thing as absolute security.

*Sources: Inbound Logistics NAFTA Summit Report, "Growing Together, Insider Perspectives on the NAFTA Nations' Economies." January 2009; C. John Langley Jr. and Capgemini U.S. LLC "The State of Logistics Outsourcing: 2008 Third-Party Results and Findings of the 13th Annual Study," 2008, <http://www.scl.gatech.edu/research/supply-chain/20083PLReport.pdf>.*

conduct new inspections. Logistics is one of the business activities most affected,<sup>46</sup> as Focus on Politics shows.

Modern transportation systems have proved to be critical to terrorist activities. They provide the means for the perpetrators to quickly arrive at, and depart from, the sites of attacks. On occasion, terrorists have even used transportation systems themselves to carry out their crimes.

Logistics systems are often the targets of attacks. Consider the vulnerability of pipelines used for carrying oil, natural gas, and other energy sources. Logistics systems also serve as the conduit for the weapons or people who are planning to carry out attacks. These systems are the true soft spots of vulnerability for both nations and firms. Take the issue of sea ports: there are 361 ports in the United States, 126 of which have waters deep enough to accommodate ocean going ships. With the exception of land trade with Mexico and Canada, 95 percent of all international trade shipments to the United States arrive by ship.<sup>47</sup> Thousands of additional shipments arrive by truck and rail. In most instances, the containers are secured by nothing more than a 10¢ seal that can easily be broken.

The need to institute new safeguards for international shipments will affect the ability of firms to efficiently plan their international shipments. There is now more

uncertainty and less control over the timing of arrivals and departures. There is also a much greater need for internal control and supervision of shipments. Cargo security will increasingly need not only to ensure that nothing goes missing, but also that nothing has been added to a shipment.

Firms with a just-in-time regimen are exploring alternative management strategies. Planning includes the shift of international shipments from air carriage to sea. Some U.S. firms are thinking about replacing international shipments with domestic ones, where transportation via truck would replace transborder movement altogether and eliminate the use of vulnerable ports. Further down the horizon are planning scenarios in which firms consider the effects of substantial and long-term interruptions of supplies or operations. Still, any actual move away from existing JIT systems is likely to be minor unless new large-scale interruptions occur.



## LOGISTICS AND THE ENVIRONMENT

The logistician plays an increasingly important role in allowing the firm to operate in an environmentally conscious way. Environmental laws, expectations, and self-imposed goals set by firms are difficult to adhere to without a logistics orientation that systematically takes such concerns into account. Because laws and regulations differ across the world, the firm's efforts need to be responsive to a wide variety of requirements. One logistics orientation that has grown in importance due to environmental concerns is the development of **reverse distribution** systems. Such systems are instrumental in ensuring that the firm not only delivers the product to the market, but also can retrieve it from the market for subsequent use, recycling, or disposal. To a growing degree the ability to develop such reverse logistics is a key determinant for market acceptance and profitability.

Society also recognizes that retrieval should not be restricted to short-term consumer goods, such as bottles. Rather, it may be even more important to devise systems that enable the retrieval and disposal of long-term capital goods, such as cars, refrigerators, air conditioners, and industrial goods, with the least possible burden on the environment. In Germany, for example, car manufacturers are required to take back their used vehicles for dismantling and recycling purposes. Focus on e-Business presents some of the major issues connected to the design of a reverse logistics system.

Managers are often faced with the trade-offs between environmental concerns and logistical efficiency. Companies increasingly need to learn how to simultaneously achieve environmental and economic goals. Esprit, the apparel maker, and The Body Shop, the well-known British cosmetics producer, screen their suppliers for environmental and social responsibility practices. The significance of this trend is reaffirmed in the rules issued by the International Organization of Standardization (ISO). The ISO 14000 standards target international environmental practices by evaluating companies both at the organization level (management systems, environmental performance, environmental auditing, and communication) and product level (life-cycle assessment, labeling, and product standards). The ISO is continuously introducing new recommendations, with the most recent being ISO 14064 and 14065 for supporting greenhouse gas reduction and emissions trading. Its standards are implemented in 138 countries and are thoroughly integrated with the global economy.<sup>48</sup>

**10.** To see and consider the linkages between logistics and sustainability

**reverse distribution** A system responding to the need for product returns that ensures a firm can retrieve a product from the market for subsequent use, recycling, or disposal.

From the perspective of materials management and physical distribution, environmental practices are those that bring about fewer shipments, less handling, and more direct movement. Such practices are to be weighted against optimal efficiency routines, including just-in-time inventory and quantity discount purchasing.

On the transportation side, logistics managers will need to expand their involvement in carrier and routing selection. For example, shippers of oil or other potentially hazardous materials increasingly will need to ensure that the carriers used have excellent safety records and use only double-hulled ships. Society may even expect corporate involvement in choosing the route that the shipment will travel, preferring

## FOCUS ON BUSINESS

### Reverse Logistics, or “Turning Trash into Cash”

Reverse logistics concerns the handling and disposition of returned products and use of related materials and information. U.S. companies pay more than an estimated \$35 billion annually for handling, transporting, and processing of returned products—and this figure does not include the costs of disposing or recycling of unwanted items. Nor does it factor in lost administrative time. With the gradual rise of oil and other commodity prices, companies are beginning to see used products less as trash and more as the sum of their raw materials, energy, and labor. This new attitude has intensified the search for innovative ways to extract maximum value from product returns.

More and more companies are entering the reverse logistics business. For example, Genco, a Pittsburgh-based consultancy, specializes in helping retailers, such as Best Buy, Sears, and Target, find buyers for products that were returned as defective and would otherwise be discarded.

One recent study suggests that this allows companies to recover up to 0.3 percent of annual sales (that translates into approximately \$100 million in the case of Best Buy). Business has been so brisk that Genco developed its own wholesale brokerage business (Genco Marketplace) that connects sellers and buyers with rejected goods and liquidates about \$5 million per day. The next step was the launching of NoBetterDeal.com—a direct-to-consumer Web store. According to Robert R. Auray Jr., Genco Marketplace CEO, “What makes this Web store different is that we source our products from the secondary market. Each year, billions of dollars worth of surplus inventory and returns are liquidated at a small fraction of their retail value, even though a majority of the goods are high-quality, fully functional items.”

Some companies choose to keep the reverse logistics effort in-house. For example, carpet makers Interface and Shaw Industries collect leftover materials and reenter them into production. This frugal approach should result in cost advantages over competitors that produce from scratch. There is also an environmental component to applying the reuse-reduce-recycle principle to reverse logistics that is appealing to eco-

conscious consumers. Outdoor gear maker Patagonia has a particularly ambitious reverse logistics program. The company uses recycled fibers from old fleeces and T-shirts to produce its line of Synchilla Vests. Customers can leave their old garments, irrespective of where they were purchased, in a Patagonia store or mail them to a distribution center. About 90 percent of the fabric is spun into new garments and any by-products are used to make a cement additive. The final product is more expensive than virgin polyester, but it fulfills an environmental mandate that is appealing to Patagonia’s consumer base.

Whatever the motivation behind the recycling of returned products, the real value of reverse logistics is in “turning trash into cash,” according to Curtis Greve, a senior vice president at Genco. A comprehensive strategy for extracting value from returns results in a competitive advantage and a larger bottom line—two of the fundamental requirements for any successful business. Additionally, remanufactured products cost 40 to 60 percent less to produce and deliver than new products. This is because most of the raw materials already exist in their final form and only a portion goes through added fabrication. Given the finite supply of valuable resources, such as steel, copper, aluminum, and petroleum that are extensively used in many manufacturing sectors, recycling makes not only environmental but also economic sense. Commercial recycling is already an established industry in many developing countries and could be a future source of economic growth for them. Brazil and India, for example, are the world’s leading recyclers of aluminum. As resources become ever more scarce, reverse logistics is likely to become not just a choice, but a necessity for global manufacturing.

Sources: Brian Hindo, “Reverse Logistics: From Trash to Cash,” *BusinessWeek*, July 24, 2008; “The Footprint Chronicles,” Patagonia, [http://www.patagonia.com/web/us/patagonia.go?slc=en\\_US&sct=US&assetid=23429&ln=66](http://www.patagonia.com/web/us/patagonia.go?slc=en_US&sct=US&assetid=23429&ln=66), accessed October 27, 2009; “GENCO Marketplace Launches Online Store for Bargain Shoppers—NoBetterDeal.com,” March 3, 2009, [http://www.genco.com/Press-Releases/2009/090303\\_GENCO-Marketplace-Launches-Online-Store.php](http://www.genco.com/Press-Releases/2009/090303_GENCO-Marketplace-Launches-Online-Store.php), accessed October 27, 2009; Sameer Kumar and Valora Putnam, “Cradle to Cradle: Reverse Logistics Strategies and Opportunities across Three Industry Sectors,” *International Journal of Production Economics* 115, no. 2 (October 2008): 305–315.

routes that are far from ecologically important and sensitive zones. Firms will need to assert leadership in such consideration of the environment to provide society with a better quality of life.

## S U M M A R Y

As competitiveness is becoming increasingly dependent on efficiency, international logistics and supply-chain management are becoming of major importance.

International logistics is concerned with the flow of materials into, through, and out of the international corporation and therefore includes materials management as well as physical distribution. The logistician must recognize the total systems demands on the firm, its suppliers, and customers to develop trade-offs between various logistics components. By taking a supply-chain perspective, the manager can develop logistics systems that are supplier- and customer-focused and highly efficient. Implementation of such a system requires close collaboration between all members of the supply chain.

International logistics differs from domestic activities in that it deals with greater distances, new variables, and greater complexity because of national differences. One major factor to consider is transportation. The international manager needs to understand transportation infrastructures in other countries and modes of transportation such as ocean shipping and airfreight. The choice among these modes will depend on the customer's demands and the firm's transit time, predictability, and cost requirements. In

addition, noneconomic factors such as government regulations weigh heavily in this decision.

Inventory management is another major consideration. Inventories abroad are expensive to maintain yet often crucial for international success. The logistician must evaluate requirements for order cycle times and customer service levels to develop an international inventory policy that can also serve as a strategic management tool.

International packaging is important because it ensures arrival of the merchandise at the ultimate destination in safe condition. In developing packaging, environmental conditions such as climate and handling conditions must be considered.

The logistics manager must also deal with international storage issues and determine where to locate inventories. International warehouse space will have to be leased or purchased and decisions will have to be made about utilizing foreign trade zones.

International logistics management is increasing in importance. Implementing the logistics function with an overall supply-chain perspective that is responsive to environmental demands will increasingly be a requirement for successful global competitiveness.

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