

Global Logistics and Risk Management



Wal-Mart Changes Tactics to Meet International Tastes

São Bernardo, Brazil. Wal-Mart Stores Inc. is finding out that what plays in Peoria isn't necessarily a hit in suburban São Paulo.

Tanks of live trout are out; sushi is in. American footballs have been replaced by soccer balls. The fixings for *feijoada*, a medley of beef and pork in black bean stew, are now displayed on the deli counter. American-style jeans priced at \$19.99 have been dropped in favor of \$9.99 knock-offs.

But adapting to local tastes may have been the easy part. Three years after embarking on a blitz to bring "everyday low prices" to the emerging markets of Brazil and Argentina, Wal-Mart is finding the going tougher than expected.

Brutal competition, markets that don't play to Wal-Mart's ability to achieve efficiency through economies of scale, and some of its own mistakes have produced red ink. Moreover, the company's insistence on doing things "the Wal-Mart way" has apparently alienated some local suppliers and employees.

DEEP POCKETS

No one is counting Wal-Mart out, of course. With sales of nearly \$105 billion last year and profits of \$3.1 billion, the Bentonville, Arkansas, behemoth

has deep pockets. And it has revised its merchandising in Brazil and Argentina and made other changes. Its four newest stores are smaller than the initial outlets in São Paulo and Buenos Aires and are in mid-size cities where competition isn't so fierce.

Bob L. Martin, Wal-Mart's head of international operations, is confident that the company will eventually become the dominant retailer in South America. "There is low-hanging fruit all over the place," he says. "The market is ripe and wide open for us." He adds that Wal-Mart plans to add eight stores in both Argentina and Brazil next year, doubling the number now in each country.

A lot is riding on Wal-Mart's global expansion drive, which is targeting not only South America but also China and Indonesia, two other markets full of promise and pitfalls. With opportunities for growth dwindling at home, the company is opening fewer than 100 domestic stores a year, down from as many as 150 in the early 1990s. The current rate of openings can't generate the profit gains that Wal-Mart wants, and its main hopes lie overseas.

"If we're good enough in international, we can duplicate Wal-Mart," chief executive David D. Glass said in an interview in June. "We have very high expectations."

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A SMALL OPERATION SO FAR

So far, though, the six-year-old international operation is relatively tiny; it accounted for only 4.8 percent of Wal-Mart's 1996 sales. Most of the company's international revenue comes from Canada, where Wal-Mart purchased 120 stores from Woolworth Corp. in 1994, and from Mexico, where earlier this year it bought a controlling stake in Cifra, SA, its partner, and now has about 390 stores. Last year, the international unit had an operating profit of \$24 million, its first, compared with a \$16 million loss in 1995. Mr. Martin says he expects further improvement this year. Mr. Glass said he expects international growth to account for a third of Wal-Mart's annual increase in sales and profits within three to five years.

The performance of Wal-Mart's 16 South American stores may well indicate the future outlook. In Canada and Mexico, many customers were familiar with the company from cross-border shopping trips, and by acquiring local retailers, Wal-Mart quickly reached the size necessary to hold down costs. In South America and Asia, by contrast, Wal-Mart is building from scratch in markets already dominated by savvy local and foreign competitors such as Grupo Pão de Acucar SA of Brazil and Carrefour SA of France.

LOSSES FORECAST

Wal-Mart doesn't break out financial data on its South American Operations. However, retail analysts, citing the accounts of Wal-Mart's Brazilian partner, Lojas Americanas SA, expect Wal-Mart to lose \$20 million to \$30 million in Brazil this year, on top of an estimated \$48 million in losses since starting up in South America in 1995. In Argentina, where the company doesn't have a partner, Wal-Mart executives concede that it is losing money but say its performance meets expectations. The company expects operations in both countries to be profitable by early 1999.

"What counts is that we are finding great customer acceptance," Mr. Martin says. Wal-Mart says its supercenter in Osasco, Brazil, was the top-grossing store in the entire company last year. And at a recent supercenter opening in the mid-size Brazilian city of Ribeirão Preto, shoppers practically beat down the doors to scoop up bargain-priced microwave ovens and television sets.

But such enthusiasm is hard to sustain. At an older supercenter in Avellaneda, a suburb of Buenos Aires, a few shoppers are in the store during peak hours one

Sunday. Hugo and Mariana Faojo help explain why. Browsing in the shoe section, the young couple say they see little difference between the goods at Wal-Mart and those at nearby Carrefour. For groceries, they prefer Supermercados Jumbo SA, a Chilean-owned chain, where they say they find high-quality products and fresh meats. Clothes and household goods, Wal-Mart's mainstays, are similar in quality and price to those at Carrefour, says Mr. Faojo, a government surveyor.

Not only did Carrefour arrive first—it now has a total of about 60 stores in Argentina and Brazil—but it is maneuvering with prices and promotions to keep Wal-Mart off balance. When Thomas Gallegos, who manages Wal-Mart's new store here, prints up fliers advertising bargains, the nearby Carrefour responds in just a few hours by offering the same product for a few cents less—and its fliers are handed out at the entrance to the Wal-Mart parking lot. "Geez, the competition is aggressive," says Mr. Gallegos, who previously ran a Wal-Mart in Harlingen, Texas.

Carrefour, which, like Wal-Mart in the United States, drives hard bargains with its suppliers, can afford to play low-ball because it has the critical mass that Wal-Mart lacks here. And it holds down its overhead by stocking a far-narrower selection of merchandise; for example, the Carrefour in La Plata, Argentina, stocks 22,000 items, while the Wal-Mart next door carries 58,000.

Mr. Martin contends that Carrefour's advantage is ephemeral and that customers value Wal-Mart's broader choice. "It's costing them something to fight us," he adds. Carrefour didn't respond to requests for an interview.

DISTRIBUTION PROBLEMS

Right now, however, Wal-Mart's effort to stock such a wide variety of merchandise is hurting it. Squeezing out costs in the supply chain is crucial to its "everyday low pricing" formula. In the United States, the company runs like a well-oiled machine, maintaining a highly sophisticated inventory-management system and its own network of distribution centers.

But timely delivery of merchandise is a relative concept in the bumper-to-bumper traffic of São Paulo, where Wal-Mart depends on suppliers or contract truckers to deliver most of its goods directly to stores. Because it doesn't own its distribution system, it can't control deliveries nearly as well as it

does in the United States, vendors say. Stores here sometimes process 300 deliveries daily, compared with seven a day at U.S. locations, and some shipments have mysteriously disappeared somewhere between the port and the store.

“The biggest issue Wal-Mart has is shipping product on time and getting it on the shelf,” says Jim Russel, a national account manager for Colgate-Palmolive Co. in Bentonville. Wal-Mart recently built a warehouse in Argentina and one in Brazil that it says will eventually reduce its distribution problems.

But logistics aren’t the only issue. Some local suppliers have difficulty meeting Wal-Mart’s specifications for easy-to-handle packaging and quality control, forcing the retailer to rely so heavily on imported goods that it could have problems if Brazil’s economic stabilization policies falter. Eleven South American suppliers have taken umbrage at Wal-Mart’s aggressive pricing policies and for a time refused to sell goods to the chain.

Wal-Mart also has sought to drive hard bargains with divisions of its major suppliers back in the United States. The pitch hasn’t been altogether successful. Wal-Mart doesn’t get special deals just because it’s a big U.S. customer, some large domestic suppliers say.

VARIOUS MISTAKES

Wal-Mart’s troubles in South America stem partly from its own mistakes. Analysts say it failed to do its homework before plunging in. In addition to the live trout and American footballs, the company initially imported items such as cordless tools, which few South Americans use, and leaf blowers, which are useless in a concrete jungle such as São Paulo.

And merchandise flubs weren’t the only mistakes. In Brazil, Wal-Mart brought in stock-handling equipment that didn’t work with standardized local pallets. It also installed a computerized bookkeeping system that failed to take into account Brazil’s wildly complicated tax system. Vincente Trius, who heads Wal-Mart’s Brazilian operations, says, however, that the company hasn’t lost money as a result of tax miscalculations.

Wal-Mart has also been slow to adapt to Brazil’s fast-changing credit culture. Not until last February did the company start accepting postdated checks, which have become the most common form of credit since Brazil stabilized its currency in 1995. Pão de Açúcar, whose Extra supermarkets compete with Wal-Mart, has been taking postdated checks since

they first became popular and has installed a sophisticated credit-checking system at its registers. Wal-Mart is hurrying to do so, too.

The six South American Sam’s Club locations, the members-only warehouse stores that sell merchandise in bulk, got off to a slow start largely because shoppers weren’t used to paying a membership fee and don’t have enough room at home to store bulk purchases. In Argentina the clubs have faced another barrier: Small-business customers are reluctant to sign up for fear Wal-Mart could provide tax information to the authorities on their purchases.

Wal-Mart won’t disclose Sam’s Club membership data in South America. But it now offers shoppers free one-day memberships tied to specific purchases. Mr. Martin says that Wal-Mart is “disappointed” in the club’s performance in Argentina but that it is improving in Brazil. The company says it plans more Sam’s outlets in South America but hasn’t disclosed details.

PROBLEMS CALLED TEMPORARY

Wal-Mart’s Mr. Glass characterized the missteps as temporary problems and inevitable in entering a new market. “It’s a lengthy process to go to South America, recruit good managers, bring them to Wal-Mart, and train them and indoctrinate them and teach them what you want to teach them,” he said in June. “It’s slow going early on, and you spend a lot of money. You pay a lot of tuition to learn what you need to learn.”

Wal-Mart says that it is developing a strong group of young executives and hasn’t suffered high turnover. But Francisco de Narvaez, the owner of Argentine supermarket chain Casa Tia SA, says some managers have left because Wal-Mart “didn’t listen to their senior-level local employees.” In the past six months, Wal-Mart has hired two managers who had worked at its Mexican operations to take over two São Paulo locations.

Mr. Trius, a Spanish-born executive who earlier turned around Dairy Farm Ltd.’s Spanish supermarket chain, says he believes the criticisms of Wal-Mart’s South American operations go too far. “If Joe Blow was to open in Brazil with the same concept and within two years had everything in place, people would say, ‘What an incredible job,’” he says. “People expected us to snap our fingers and be Wal-Mart in the United States overnight. To me, the criticisms are more related to expectations than to reality.”

312 DESIGNING AND MANAGING THE SUPPLY CHAIN

By the end of this chapter, you should be able to answer the following questions:

- Other than a need to expand, what other reasons would Wal-Mart have for opening stores globally?
- Why would it be beneficial for Wal-Mart to have suppliers in different countries?
- Why would Wal-Mart want strong centralized control of its stores? Why would Wal-Mart want strong local control of stores?
- What pitfalls and opportunities other than those mentioned in *The Wall Street Journal* article would Wal-Mart face over the next few years?
- What are the sources of risks faced by the global supply chain and how can the firm mitigate the various risks?

10.1 INTRODUCTION

It is readily apparent that global operations and supply chains are becoming increasingly significant. Dornier et al. [59] collected the following statistics, which help to indicate the magnitude of this trend:

- About one-fifth of the output of U.S. firms is produced overseas.
- One-quarter of U.S. imports are between foreign affiliates and U.S. parent companies.
- Since the late 1980s, over half of U.S. companies increased the number of countries in which they operate.

In many ways, international supply chain management is the same as domestic supply chain management spread over a larger geographic area. However, as we will discuss in the remainder of this chapter, international supply chain networks can provide a wealth of additional opportunities if they are managed effectively. At the same time, there are many additional potential problems and pitfalls to be aware of.

International supply chains can run the gamut from a primarily domestic business with some international suppliers to a truly integrated global supply chain. Some of the advantages and disadvantages that we will discuss apply equally to all of the systems in the following list, while others apply only to the most complex integrated systems.

International distribution systems. In this type of system, manufacturing still occurs domestically, but distribution and typically some marketing take place overseas.

International suppliers. In this system, raw materials and components are furnished by foreign suppliers, but final assembly is performed domestically. In some cases, the final product is then shipped to foreign markets.

Offshore manufacturing. In this type of system, the product is typically sourced and manufactured in a single foreign location, and then shipped back to domestic warehouses for sale and distribution.

Fully integrated global supply chain. Here products are supplied, manufactured, and distributed from various facilities located throughout the world. In a truly global supply chain, it may appear that the supply chain was designed without regard to national boundaries. Of course, this is far from the truth! As we shall see, the true value of a global supply chain is realized by taking advantage of these national boundaries.

Clearly, a supply chain can fit more than one of these categories. Throughout the following discussion, consider how each of the issues discussed applies differently to firms, depending on their position in this global supply chain spectrum.

In any event, many firms cannot help but become involved in global supply chain issues. Dornier et al. [59] identified the following forces that collectively drive the trend toward globalization:

- Global market forces.
- Technological forces.
- Global cost forces.
- Political and economic forces.

10.1.1 Global Market Forces

Global market forces involve the pressures created by foreign competitors, as well as the opportunities created by foreign customers. Even if companies don't do business overseas, the presence of foreign competitors in home markets can affect their business significantly. To defend domestic markets successfully, companies may find it necessary to move into foreign markets. Sometimes the threat of a presence is sufficient, as in the dry breakfast cereal business, dominated by Kellogg Co. in the United States and Nestlé in Europe. Apparently, failed attempts in the past to penetrate each other's home markets, combined with the threat of retaliation, are enough to maintain the status quo.

In addition, much of the demand growth available to companies is in foreign and emerging markets. Recently, companies have made great sacrifices (particularly in terms of proprietary technology) and taken on considerable business risk to become involved in ventures in mainland China. Indeed, the United States is accounting for less and less of the total consumption of goods in the world.

One cause of this increasing demand for products throughout the world is the global proliferation of information. Television introduces products to Europeans. Japanese vacation abroad. Businesses send overnight mail between continents. The Internet provides instant international exposure, as well as the ability to purchase goods in one country that will be delivered in another without leaving home or office.

EXAMPLE 10-1

In Brazil thousands of people move from preindustrial villages to rapidly growing cities. Once there, their first goal is to install television sets, even as they continue to "make sacrificial offerings of fruit and fresh-killed chickens to Macumban spirits by the candlelight" [124].

As Kenichi Ohmae, head of management consulting firm McKinsey's Japanese office, points out, people have "all become global citizens, and so must the companies that want to sell us things" [154]. Products are universally desired, and many companies are willing to sell them globally. This is clearly a self-amplifying trend for an industry, because, as companies become global, their competitors also must become global in order to compete. Thus, many companies are becoming global citizens with universal products and the opportunity to hire talented employees worldwide.

Along similar lines, particular markets often serve to drive technological advances in some areas. By participating in these competitive markets, companies are forced to develop and enhance leading-edge technologies and products. These products can then be used to increase or maintain market position in other areas or regions where the markets are not as competitive. To be a leader in software, for example, you have

314 DESIGNING AND MANAGING THE SUPPLY CHAIN

to compete in the U.S. market. Similarly, the German machine tools market and the Japanese consumer electronics market are hotly contested.

10.1.2 Technological Forces

Technological forces are related to the products themselves. Various subcomponents and technologies are available in different regions and locations around the world, and many successful firms need to have the ability to use these resources quickly and effectively. To achieve this, it may be necessary for firms to locate research, design, and production facilities close to these regions. This is often particularly useful if suppliers are involved in the design process, as discussed in Chapter 11. The same logic applies to collaborations and interfirm development projects. To gain access to markets or technology, companies in different regions frequently collaborate, resulting in the location of joint facilities close to one of the partners.

Along similar lines, global location of research-and-development facilities is becoming more common, primarily for two reasons. First, as product cycles become shorter and time more important, companies have discovered how useful it is to locate research facilities close to manufacturing facilities. This helps transfer technology from research facilities to manufacturing facilities, and speeds up the resolution of problems that inevitably arise during this transfer. In addition, specific technical expertise may be available in certain areas or regions. For example, a few years ago, Microsoft opened a research lab in Cambridge, England, to take advantage of the expertise available in Europe.

10.1.3 Global Cost Forces

Cost forces often dictate global location decisions. In the past, the low cost of unskilled labor was a decisive factor in determining factory location. Recently, studies have found that in many cases, the costs of cheaper unskilled labor were more than offset by the increase in other costs associated with operating facilities in remote locations. In some cases, of course, cheaper labor is sufficient justification for overseas manufacturing. More recently, however, other global cost forces have become more significant. For example, cheaper *skilled labor* is drawing an increasing number of companies overseas. Many of the analyses and programs that U.S. consulting firms undertook to address the Year 2000 problem (in which computer programs might fail when the year changed from 1999 to 2000) were done in India, where programming skills are much cheaper.

We have discussed how a supplier and the manufacturer supply chain must often be tightly integrated to deliver certain products effectively. Often this can be accomplished most cost-effectively if the various participants are located close together. This may necessitate establishing integrated supply chains in different markets. Finally, the capital costs of building a new facility often dominate labor costs. Many governments are willing to provide tax breaks or cost-sharing arrangements to lower the cost of the new facility. In addition, supplier price breaks and cost-sharing joint ventures may dictate these types of decisions.

10.1.4 Political and Economic Forces

Political and economic forces may greatly affect the drive toward globalization. In Section 10.2.1, we will discuss exchange rate fluctuation and the operational approaches to dealing with this issue. There are also several other political and economic factors. For example, regional trade agreements may drive companies to expand into one of the countries in the regional group. It may be to a company's

advantage to obtain raw materials from or to manufacture within European, Pacific Rim, or North American trading blocs. In some cases, production processes may even be redesigned to avoid tariffs; for example, almost-finished goods may be shipped into a trading bloc to avoid tariffs on “finished goods.”

Similarly, various trade protection mechanisms can affect international supply chain decisions. Tariffs and quotas affect what can be imported, and may lead a company to decide to manufacture within the market country or region. More subtle regulations, including local content requirements, affect supply chains. To address local content requirements, for example, TI and Intel, both U.S. firms, make microprocessors in Europe, and various Japanese automakers produce cars in Europe. Even voluntary export restrictions can affect the supply chain: Japanese manufacturers began to manufacture more expensive cars after agreeing voluntarily to limit exports to the United States. Recall that this is why brands such as Infiniti and Lexus came into existence. Government procurement policies can affect the ability of international companies to be successful in various markets. In the United States, for example, the Department of Defense gives as much as a 50 percent advantage to U.S. companies in the bidding on contracts.

10.2 RISK MANAGEMENT

We have looked at the various forces that drive companies to develop global supply chains. Of course, many of the advantages of sourcing, manufacturing, and selling globally are immediately obvious. The world is converging in many instances toward standardized products.

This implies that more and more, vast markets have opened up for products—far greater than anything managers in the past could have imagined. By taking advantage of this trend, companies can realize vast economies of scale in terms of production, management, distribution, marketing, and so forth [124].

Indeed, as we discussed in the previous section, costs can be lowered with a larger number of options for sourcing raw material, labor, and outsourcing opportunities and a greater number of potential manufacturing sites. At the same time, the increase in potential markets allows for an increase in sales and profits. These advantages are due to the increase in the size and scope of the supply chain—they are independent of the specific characteristics of the global supply chain.

Unfortunately, all these advantages and opportunities associated with global supply chains come with significant increase in the level of risks faced by today’s global companies. Indeed, outsourcing and offshoring imply that the supply chain is geographically more diverse and hence more exposed to various risks. Similarly, recent trends toward cost reduction, lean manufacturing, and just-in-time imply that in a progressive supply chain, low inventory levels are maintained. However, in the event of an unforeseen disaster, adherence to this type of strategy could result in a shutdown of production lines because of lack of raw material or parts inventory.

Thus, in this section, we examine the various risks inherent in global supply chains and techniques to mitigate these risks.

10.2.1 Many Sources of Risks

Global supply chains are exposed to similar risks to those faced by domestic supply chains, as well as other risks that are more global in nature. Figure 10-1 provides a

316 DESIGNING AND MANAGING THE SUPPLY CHAIN

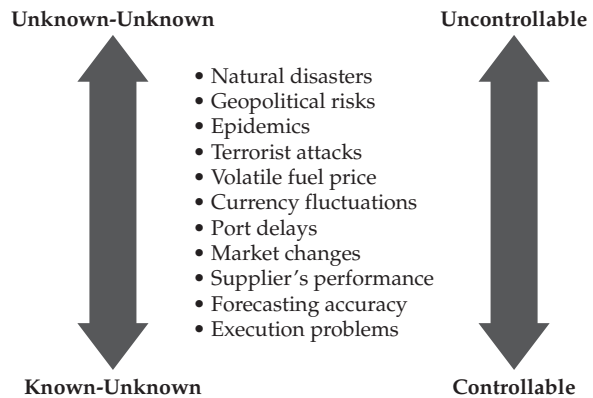


FIGURE 10-1 Risk sources and their characteristics.

nonexhaustive list of the various types of risks faced by global companies.¹ Natural disasters, geopolitical risks, epidemics, or terrorist attacks can shut down production lines because of lack of parts inventory. Indeed, this actually happened to some auto manufacturers in the wake of the September 11, 2001, terrorist attack.

Unfortunately, it is very difficult to prepare for mega-disasters such as hurricanes Katrina (2005) or Andrew (1992) because there is little experience to draw on [52]. Similarly, a SARS epidemic like the one in 2003 could shut down the flow of components and products from the Far East to the rest of the world but again is difficult to prepare for because of lack of data. Following former Secretary of Defense Donald Rumsfeld, we refer to these types of risks as the *unknown-unknown* since these are risks associated with scenarios where one cannot identify likelihood of occurrence.

At the other spectrum in Figure 10-1, we find sources of risks such as supplier performance, forecast accuracy, and operational problems. These are risks that can be quantified and hence we refer to those as the *known-unknown*. For example, using historical data the firm can characterize forecast error, mean time between machine failure, and supplier lead-time performance.

Of course, due to their nature, the unknown-unknown are difficult to control while the known-unknown are more controllable. Between the two extremes are various types of risks that can be controlled to a certain extent. For example, risk associated with volatile fuel price can be managed through long-term contracts while fluctuating exchange rates can be managed through a variety of hedging strategies as we discuss below.

Indeed, currency fluctuations pose a significant risk in today's global operations. They change the relative value of production and the relative profit of selling a product in a particular country. Relative costs change so that manufacturing, storing, distributing, or selling in a particular region at a particular price can change from being extremely profitable to a total loss. The same is true domestically. In many cases, certain regions within the same country may be less expensive for storage or manufacturing than others. However, the cost differences between domestic regions are not typically as dramatic as those across countries and, more importantly, they don't change as frequently.

¹The figure is inspired by [32].

It should be stressed that although managers typically think of exchange rates as affecting the dollar value of assets and liabilities denominated in foreign currencies, it is the *operating exposure* described in the previous paragraphs that can have the most dramatic effect on annual operating profit. This operating exposure reflects the fact that, in the short run, changes in currency exchange rates do not necessarily reflect changes in relative inflation rates between countries. Thus, over the short term, regional operations can become relatively more or less expensive in terms of dollars. Note that this operating exposure is not only a function of a firm's global supply chain, but also its competition's global supply chain. If a competitor's relative costs decrease more, a firm can be underpriced in the market [123].

Indeed, Dornier et al. [59] identified several factors that affect the impact of operating exposure on a firm. *Customer reactions* influence how a firm adjusts prices in various markets in response to changes in operating expenses. As discussed above, *competitor reactions* also influence how a firm can react to changes in the relative cost of doing business. Competitors can react to price increases by raising their own prices to increase profitability or gain market share. As we discuss in the next section, *supplier reactions*—the ability of suppliers to respond with flexibility to varying demands—is a strong factor in the effectiveness of certain strategies that help firms address the risk of operating exposure. Finally, *government reactions* play a large role on the global stage. Governments can intervene to stabilize currencies or even directly support endangered firms by providing subsidies or tariffs. In addition, other political instabilities also can affect multinational companies. Tax situations can change rapidly because political factors dictate different treatment of corporations, particularly foreign corporations, in various regions.

Likewise, foreign companies can enter domestic markets. These companies may even use domestic profits to subsidize low-priced goods in foreign markets. This could even affect companies that have decided not to compete on the global stage.

So what are the methods that the global firm can use to mitigate many of the risks described in this subsection? In the next two subsections, we consider strategies for dealing with both the unknown-unknown, and the classes of risk further towards the known-unknown end of the risk spectrum.

10.2.2 Managing the Unknown-Unknown

Are there strategies that the firm can use to deal with the unknown-unknown? Unfortunately, these are the sources of risks that may create a mega-disaster that not only can wipe out years of profit but also can force a company to exit a certain region or a specific market.

We discuss in this section the following methods for managing supply chain risks and in particular strategies for managing the unknown-unknown.

- Invest in redundancy.
- Increase velocity in sensing and responding.
- Create an adaptive supply chain community.

As we will illustrate below, an effective use of these methods allows the supply chain to recover from a misfortune, thus creating the so-called *resilient supply chain*. Each of these methods focuses on a different supply chain dimension. Redundancy is built at the design stage; sensing and responding require accurate information in a timely fashion; finally, an adaptive supply chain is a supply chain in which all its elements share similar culture, work toward the same objectives, and benefit from financial gains.

Redundancy A key challenge in risk management is to design the supply chain so that it can effectively respond to unforeseen events, the unknown-unknown, without significantly increasing costs. This can be done through careful analysis of supply chain cost trade-offs so that the appropriate level of redundancy is built into the supply chain.

EXAMPLE 10-2

In 2001, a U.S.-based consumer packaged goods (CPG) company had a global supply chain with about 40 manufacturing facilities all over the world. Demand for its products, household goods, was spread over many countries. The company grew organically and through acquisition. Management realized that it was time to rationalize its network and close nonproductive manufacturing facilities. Initial analysis indicated that the firm can reduce cost by about \$40M a year by shutting down 17 of its existing manufacturing facilities, and leaving 23 plants operating, while still satisfying market demand all over the world.

Unfortunately, this new lean supply chain design suffered from two important weaknesses. First, the new design left no plant in North America or Europe, thus creating long and variable supply lead times. Such lead times require a significant increase in inventory levels. More importantly, the remaining manufacturing facilities in Asia and Latin America were fully utilized and, hence, any disruption of supply from these countries, due to epidemics or geopolitical problems, would make it impossible to satisfy many market areas. So how can one design the supply chain taking into account epidemics or geopolitical problems that are difficult to quantify?

The approach the firm took was to analyze the cost trade-offs. These trade-offs are illustrated in Figure 10-2 where the x-coordinate represents the number of plants that remain open and the y-coordinate, the various cost components, including variable production cost, fixed cost, transportation, duties, and inventory costs. The top line is the total cost, that is, the sum of various cost components. As you can see, closing 17 plants and leaving 23 open will minimize supply chain costs. However, observe that the total cost function is quite flat around the optimal strategy. Indeed, increasing the number of open plants from 23 to 30 facilities will increase total cost by less than \$2.5M while at the same time increasing redundancy significantly. Thus, even though we cannot quantify the risks associated with epidemics or geopolitical problems, we can prepare the supply chain for supply disruption by investing in redundancy without significantly increasing supply chain costs.

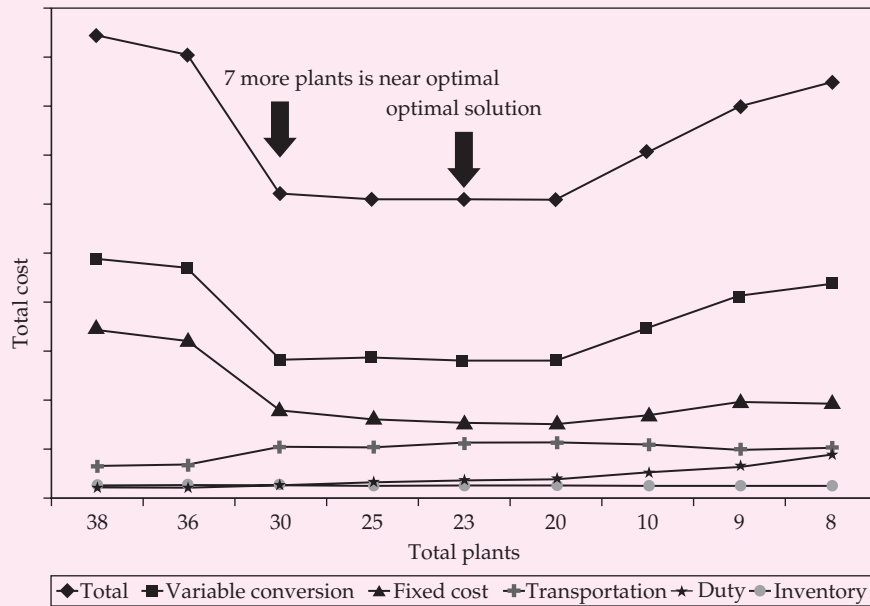


FIGURE 10-2 Cost trade-offs in supply chain design.

Sensing and Responding The following case illustrates how speed in sensing and responding can help the firm overcome unexpected supply problems. Indeed, it also illustrates how failure to sense, and therefore respond to, changes in the supply chain can force a company to exit a specific market.

EXAMPLE 10-3

In 2001, the Philips semiconductor factory in Albuquerque, New Mexico, provided several types of radio frequency chips used in mobile telephones. Major customers included OEMs such as Ericsson and Nokia. On Friday, March 17, 2000, at 8 p.m., Mother Nature, in the form of lightning, struck the Philips semiconductor plant. Fire, smoke, and water used during the fire exhaustion destroyed almost all the silicon stock in the factory. As a result, the plant was shut down for months.

Three days after the fire, Nokia detected delays in incoming orders from the Albuquerque plant. In the initial contacts, Philips reported they expected the plant to be shut for only one week. Fearing the worst, Nokia decided to send engineers to New Mexico to evaluate the damage. When the engineers did not get access to the plant, Nokia raised red flags and increased the frequency of monitoring incoming orders from the plant from weekly to daily. On March 31, two weeks after the fire, Philips confirmed to Nokia that months of orders will be disrupted.

Nokia's response to the news was decisive. The company changed product design so they could use chips from other suppliers. These suppliers committed a five-day lead time. Unfortunately, this was not enough; one of the five components provided by Philips was impossible to source from other suppliers. So Nokia convinced Philips to provide this component from two Philips factories in China and the Netherlands.

Ericsson's experience was quite different. It took the news to reach upper management about four weeks, even though Philips informed Ericsson of the fire three days after the incident. More importantly, only five weeks after the fire, Ericsson realized the severity of the situation. By that time, the alternative supply of chips was already taken by Nokia. The impact on Ericsson was devastating. \$400M in potential sales was lost; part of the loss was covered by insurance. This, together with other problems such as component shortages, the wrong product mix, and marketing problems, caused a \$1.68B loss to Ericsson Cell Phone Division in 2000 and forced the company to exit the cell phone market [40].

Source: Adapted with permission from F. Cela Diaz, "An Integrative Framework for Architecting Supply Chains." MS thesis, Massachusetts Institute of technology, 2005.

Adaptability This is, no doubt, the most difficult risk management method to implement effectively. It requires all supply chain elements to share the same culture, work towards the same objectives and benefit from financial gains. Indeed, it creates a community of supply chain partners that morph and reorganize to better react to sudden crisis. The next example illustrates the impact of the adaptive supply chain in a powerful way.

EXAMPLE 10-4

In 1997, Aisin Seiki was the sole supplier of 98 percent of the brake fluid proportioning valves (P-valves) used by Toyota Japan. P-valves are inexpensive (about \$7 each) but important in the assembly of any car. If supply is interrupted, the Toyota production line will have to shut down. On Saturday, February 1, 1997, a fire stopped Aisin's main factory in the industrial area of Kariya, where other Toyota providers are located. Initial evaluation of the damage estimated that it would take two weeks to restart the production again, and six months for complete recovery, see [175].

The situation was critical. Toyota was facing a season of great demand, and plants were operating at full capacity, producing close to 15,500 vehicles per day. Conforming to the just-in-time (JIT) principle of the Toyota Production System, only two to three days of inventory were available in

EXAMPLE 10-4 Continued

stock at Toyota, giving a margin of only a few days before the plants would have to come to a complete stop.

Immediately after the accident, Toyota initiated a recovery effort with the help of their suppliers to restructure the entire supply chain of P-valves. Blueprints of the valves were distributed among all Toyota's suppliers, and engineers from Aisin and Toyota were relocated to suppliers' facilities and other surrounding companies, such as Brother—a manufacturer of printers and sewing machines. Existing machinery was adapted to build the valves according to Aisin and Toyota's specifications, and new machinery was acquired in the spot market. As observed in [151], "Within days, firms with little experience with P-valves were manufacturing and delivering parts to Aisin, where they were assembled and inspected before shipment to Toyota." All in all, about 200 of Toyota's suppliers were collaborating in the effort to minimize the impact of Aisin's fire and recover the Toyota production line as soon as possible [151].

Figure 10-3 depicts the evolution of production and inventories during the crisis. Factories came to a complete stop for barely three days, and full production was restored in less than one week. The accident initially cost 7.8 billion yen (\$65 million) to Aisin and 160 billion yen (or \$1.3 billion) to Toyota; see [151]. However, it is estimated that the damage was reduced to 30 billion yen (\$250 million) with extra shifts and overtime [175]. In addition, Toyota issued a \$100 million token of appreciation to their providers as a gift for their collaboration.

Source: Adapted with permission from F. Cela Diaz, "An Integrative Framework for Architecting Supply Chains." MS thesis, Massachusetts Institute of Technology, 2005. Much of his analysis is based on data in [175], [151], and [13].

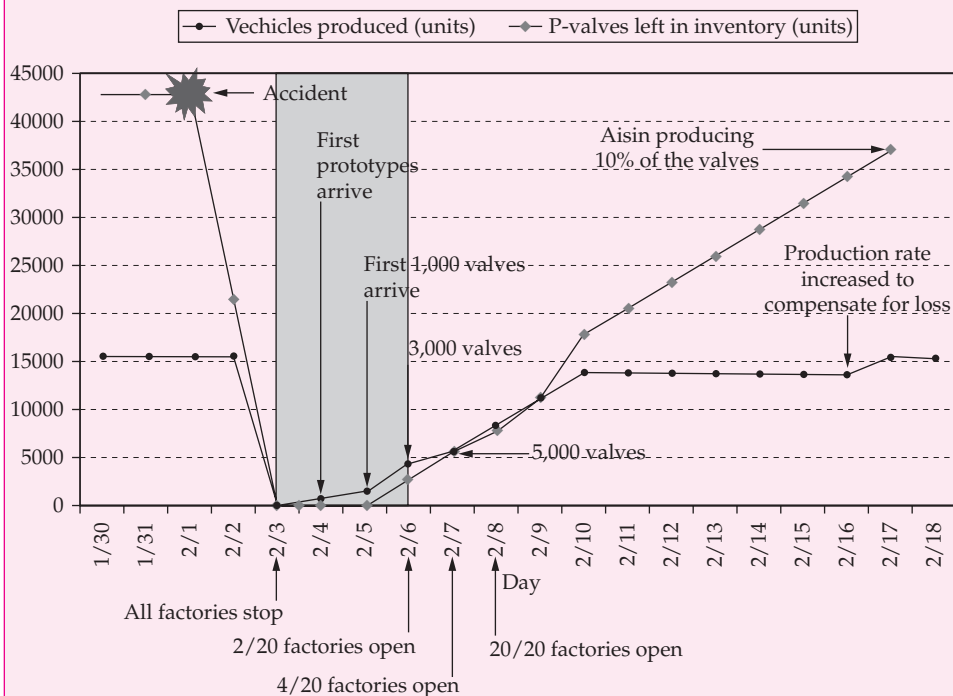


FIGURE 10-3 Vehicle production and P-valve inventory levels.

The example thus illustrates how Toyota's suppliers self-organized to address a sudden disruption in the supply of a key component. However, it raises three important questions. Does a single-sourcing strategy make sense for such a key component? Even if a single-sourcing strategy is appropriate, should not Toyota carry large amounts of inventory for such a low-cost but key component? And finally, what are

the underlying mechanisms that exist in Toyota's supply chain and help the firm quickly recover from the sudden supply disruption?

According to Kiyoshi Kinoshita, Toyota's general manager of production control, single sourcing and holding almost no inventory was a calculated risk [175]. Toyota's single sourcing allows Aisin to achieve economies of scale in P-valve production, and offer high quality at very low costs to Toyota [151].

The third question is discussed in detail in [151]. They observe that key to understanding the ability of the supply chain to adapt to the new environment is the just-in-time (JIT) philosophy followed by Toyota and its suppliers almost religiously. Indeed, the essence of JIT is to control the amount of work-in-process (WIP) inventory at a relatively low level. Such a low level of WIP inventory promotes high quality and a quick identification of problems in the production line. Indeed, in JIT, every worker has the authority to stop the line in order to correct any problem. This also implies that JIT with low inventory levels fosters problem-solving capability [151].

These are the qualities that were essential to the quick adaptability of Toyota's supply chain. Once Toyota identified the Aisin fire as a problem, it stopped not only its production line, but the entire supply chain. This stop of the line forced supply chain partners to deal with the challenge [151].

10.2.3 Managing Global Risks

We now turn our attention to the other risks faced by global supply chains, including those risks that can be, to a certain extent, quantified and controlled (that is, the intermediate risks identified in Figure 10-1). Bruce Kogut [111] identified three ways a global supply chain can be employed to address global risks: speculative, hedge, and flexible strategies.

Speculative Strategies Using *speculative strategies*, a company bets on a single scenario, with often spectacular results if the scenario is realized, and dismal ones if it is not. For example, in the late 1970s and early 1980s, Japanese automakers bet that if they did all of their manufacturing in Japan, rising labor costs would be more than offset by exchange rate benefits, rising productivity, and increased levels of investment and productivity. For a while these bets paid off, but then rising labor costs and unfavorable exchange rates began to hurt manufacturers, and it became necessary to build plants overseas. Of course, if it had remained favorable to do all the manufacturing in Japan, the Japanese manufacturers would have "won the bet" because building new facilities is time-consuming and expensive.

Hedge Strategies Using *hedge strategies*, a company designs the supply chain in such a way that any losses in part of the supply chain will be offset by gains in another part. For example, Volkswagen operates plants in the United States, Brazil, Mexico, and Germany, all of which are important markets for Volkswagen products. Depending on macroeconomic conditions, certain plants may be more profitable at various times than others. Hedge strategies, *by design*, are simultaneously successful in some locations and unsuccessful in others.

Flexible Strategies When properly employed, *flexible strategies* enable a company to take advantage of different scenarios. Typically, flexible supply chains are designed with multiple suppliers and excess manufacturing capacity in different countries. In addition, factories are designed to be flexible, so that products can be moved at minimal cost from region to region as economic conditions demand.

322 DESIGNING AND MANAGING THE SUPPLY CHAIN

When considering the implementation of a flexible strategy, managers have to answer several questions:

1. Is there enough variability in the system to justify the use of flexible strategies? Clearly, the more variability in international conditions, the more a company can benefit from utilizing flexible strategies.
2. Do the benefits of spreading production over various facilities justify the costs, which may include loss of economies of scale in terms of manufacturing and supply?
3. Does the company have the appropriate coordination and management mechanisms in place to take rapid advantage of flexible strategies?

If the supply chain is appropriately designed, several approaches can be utilized to implement flexible strategies effectively:

Production shifting. Flexible factories and excess capacity and suppliers can be used to shift production from region to region to take advantage of current circumstances. As exchange rates, labor cost, and so on, change, manufacturing can be relocated.

Information sharing. Having an increased presence in many regions and markets often will increase the availability of information, which can be used to anticipate market changes and find new opportunities.

Global coordination. Having multiple facilities worldwide provides a firm with a certain amount of market leverage that it might otherwise lack. If a foreign competitor attacks one of your main markets, you can attack back. Of course, various international laws and political pressures place limits on this type of retaliation.

Political leverage. The opportunity to move operations rapidly gives firms a measure of political leverage in overseas operations. For example, if governments are lax in enforcing contracts or international law, or present expensive tax alternatives, firms can move their operations. In many cases, the implicit threat of movement is sufficient to prevent local politicians from taking unfavorable actions.

EXAMPLE 10-5

When Michelin began to target North American markets aggressively, Goodyear was able to drop its tire prices in Europe. This forced Michelin to slow its overseas investment program.

10.2.4 Requirements for Global Strategy Implementation

Any company, even a huge global company, is not immediately ready for integrated global supply chain management on this scale. Michael McGrath and Richard Hoole [137] discuss important developments that are necessary to set the stage for this kind of massive global integration. These developments are outlined below for each of the **five basic functions of firms**: product development, purchasing, production, demand management, and order fulfillment.

1. **Product development.** It is important to design products that can be modified easily for major markets, and which can be manufactured in various facilities. As we discuss in the next section, this is not always possible, but it is certainly helpful in those cases where it is achievable. While it is dangerous to design a product to be the “average” of what several markets require, it may be possible to design a base product or products that can be more easily adapted to several different markets. An international design team may be helpful in this regard.

- 2. Purchasing.** A company will find it useful to have management teams responsible for the purchase of important materials from many vendors around the world. In this way, it is much easier to ensure that the quality and delivery options from various suppliers are compatible, and that a qualified team is present to compare the pricing of various suppliers. Also, these teams can work to guarantee that sufficient suppliers in different regions are at hand to ensure the flexibility necessary to take full advantage of the global supply chain.
- 3. Production.** As we discussed above, excess capacity and plants in several regions are essential if firms are to take full advantage of the global supply chain by shifting production as conditions warrant. To utilize this kind of strategy, however, effective communications systems must be in place so that this global supply chain can be managed effectively. Centralized management is thus essential to this system, which implies that centralized information must be available. Indeed, knowledge of the current status of factories, supplies, and inventory is essential when making the types of decisions described above. In addition, since factories are typically supplying each other in a complex supply chain, it is important that interfactory communication is solid and that centralized management makes each factory aware of the system status.
- 4. Demand management.** Often demand management, which involves setting marketing and sales plans based on projected demand and available product, is carried out on a regional basis. For the supply chain to be managed in an integrated way, demand management clearly has to have at least some centralized component. On the other hand, much of this sensitive, market-based information is best supplied by analysts located in each region. Thus, once again communication is a critical component of the success of global supply chain management.
- 5. Order fulfillment.** To successfully implement a truly flexible supply chain management system, a centralized system must be in place so that regional customers can receive deliveries from the global supply chain with the same efficiency as they do from local or regionally based supply chains. All the flexibility in the world is of little use if it makes the system so cumbersome and unpleasant that customers turn elsewhere. We discuss the kinds of advanced information systems that this centralized order fulfillment requires in Chapter 14.

Only when a company is sufficiently prepared to implement flexible strategies can it take advantage of all that the global supply chain has to offer.

10.3 ISSUES IN INTERNATIONAL SUPPLY CHAIN MANAGEMENT

In this section, we discuss other important issues of international supply chains that were not appropriate for the previous sections.

10.3.1 International versus Regional Products

The preceding discussion suggests that the ideal company builds “universal products” that can be sold in many markets. In many cases, however, this is not that simple. Ohmae [154] pointed out that there are several categories of products, each of which has different “international requirements.”

Region-specific products. Some products have to be designed and manufactured specifically for certain regions. For example, automobile designs are often region specific. The 1998 Honda Accord has two basic body styles: a smaller body style tailored to European and Japanese tastes and a larger body style catering to American tastes. Of course, even if regional designs are different, effective supply

324 DESIGNING AND MANAGING THE SUPPLY CHAIN

chain management can take advantage of common components or subassemblies within the different designs. We discuss this issue in detail in Chapter 11.

EXAMPLE 10-6

Nissan designates “lead-country” status to each of its car models. For example, the Maxima and Pathfinder are designed for American tastes, often by American design studios. Similar designs are developed primarily for Japanese and European markets. Once regional product managers ensure that vehicles meet lead-country requirements, other regional product managers suggest slight changes that might promote local sales. But the focus is on developing cars for regions. Otherwise, Nissan fears “the trap of pleasing no one well by pleasing everyone half way.” There is no effective way to average size, color, and other aesthetic and substantive differences in cars across regions without ending up with a model that no customers in that region particularly like. Of course, if models can be modified slightly to increase sales in other regions, it helps, but that isn’t the primary focus [154].

True global products. These products are truly global, in the sense that no modification is necessary for global sales. For example, Coca-Cola is essentially the same throughout the world, as are Levi’s jeans and McDonald’s burgers. Similarly, luxury brands such as Coach and Gucci are essentially the same worldwide. It should be noted, however, that some of these brands and products, such as Coke and McDonald’s, depend on very specific regional manufacturing and bottling facilities and distribution networks, while others are essentially distributed and sold in the same way throughout the world [124].

The difference between region-specific products and global products does not imply that one is inherently better than the other. However, it is important to consider carefully which of the two product types is more appropriate for a particular situation because employing strategies for regional products that are designed for global products, or vice versa, can lead to disastrous results.

10.3.2 Local Autonomy versus Central Control

Centralized control can be important in taking advantage of some of the strategies we have discussed, but in many cases it makes sense to allow local autonomy in the supply chain. Sometimes, after independent regional operations have proven to be successful, headquarters can’t resist the temptation to tamper with the system, and performance suffers.

In addition, it is important to temper expectations for regional business depending on the characteristics of the region involved. For example, companies typically experience, in the short term, relatively low returns in Japan, medium returns in Germany, and higher returns in the United States. Indeed, those companies that are successful in Japan had often settled initially for low returns [154].

However, managers may be tempted to follow local conventional wisdom, and thus miss some of the opportunities derived from the knowledge acquired in the operation of a global supply chain.

EXAMPLE 10-7

When it first introduced the decongestant Contac 600 to Japanese markets, SmithKline Corporation was advised to use the traditional approach, involving more than 1,000 distributors with which the firm would have little contact. Rather than accept this advice, SmithKline used 35 wholesalers, with whom it remained in close contact. SmithKline had used this approach successfully elsewhere. Despite the naysayers, the introduction was highly successful [124].

10.3.3 Miscellaneous Dangers

To be sure, there are many potential dangers that firms must face as they expand their supply chains globally. Exchange rate fluctuations, discussed earlier as an opportunity, can just as easily be a risk if not properly managed. It may be harder to administer offshore facilities, especially in less-developed countries. Similarly, the promise of cheap labor may mask the threat of reduced productivity [132]. Expensive training may be required, but even then productivity may not reach domestic levels.

Often local collaboration occurs in the global supply chain. In this case, collaborators can ultimately become competitors.

EXAMPLE 10-8

- Hitachi, which used to manufacture under license from Motorola, now makes its own microprocessors.
- Toshiba, which manufactured copiers for 3M, is now a major supplier of copiers under the Toshiba brand name.
- Sunrise Plywood and Furniture, of Taiwan, was for many years a partner of Mission Furniture in California. Now it is one of Mission's major competitors [132].

Similar dangers exist with foreign governments. To deal with China and gain access to that country's huge markets, many companies are handing over critical manufacturing and engineering expertise to the Chinese government or to Chinese partners. It is only a matter of time until these Chinese companies, or other companies selected by the government, begin to compete under favorable terms with their original partners. The only question is whether the overseas firms that gave away their technology will still be able to compete successfully in the Chinese market, or if they will lose this opportunity even as Chinese companies begin to compete on the world stage.

EXAMPLE 10-9

Royal Dutch Shell and its Japanese partners, Mitsui and Mitsubishi, have been investing for over a decade in the development of oil fields in Russia's far east. The oil exploration project has run into environmental problems and cost far exceeded the original projection. Surprisingly, now that development is almost over, oil prices are at an all-time high, and huge revenue is expected, the partners sold a majority stake in the project to Gazprom, Russia's state-owned gas company. The assumption in the West is that Russia flexed its muscles and forced the three partners to transfer ownership, threatening dire consequences for any environmental problems [15].

Indeed, this serves to highlight only one of the dangers that foreign governments pose to the international supply chain. Although world markets are becoming more open all the time, the world is far from becoming a giant free trade zone. At any time, the threat of *protectionism* might appear, and if the global supply chain is not set up with some kind of counter to this threat, companies will not be able to do much about it. Sometimes the threat comes not from the foreign government, but from the domestic government, dealing with the concerns of smaller local firms.

EXAMPLE 10-10

In 1986, Taiwan had a \$15.7 billion trade surplus with the United States, heightening domestic pressure on the U.S. government to impose trade restrictions on Taiwanese products. This occurred despite the fact that the vast majority of Taiwanese imports were parts to supply American companies such as GE, IBM, Hewlett-Packard, and Mattel, which had moved manufacturing offshore to take advantage of lower costs. In response, Taiwan was forced to increase the value of its currency relative to the U.S. dollar, thus effectively removing much of the cost advantage of manufacturing to Taiwan [132].

10.4 REGIONAL DIFFERENCES IN LOGISTICS

In the previous sections, we discussed the general advantages, disadvantages, and strategies for utilizing global supply chains effectively. Of course, it is important to be aware of the cultural, infrastructural, and economic differences between regions when decisions are made about particular foreign links in the global supply chain. Wood et al. [209] identified several categories of differences that managers must consider when designing international supply chains. In particular, major differences can be highlighted between the so-called *triad*, or First World, nations, Japan, the United States, and the nations of western Europe; *emerging nations* such as Thailand, Taiwan, China, Brazil, Argentina, and the countries of eastern Europe; and the *Third World* nations. These differences are summarized in Table 10-1 and analyzed below.

10.4.1 Cultural Differences

Cultural differences can critically affect the way international subsidiaries interpret the goals and pronouncements of management. Wood et al. [209] highlighted beliefs and values, customs, and language, all of which play a big role in global business and can strongly affect negotiation and communication.

Language consists not only of words but also of expressions, gestures, and context. Many times, the words appear to be translated correctly, but the meaning is not. We've all heard stories of American businesspeople using the wrong gestures in Asia, leading to disastrous consequences. It is important to utilize appropriate resources to make sure that communication is effective.

Beliefs, or specific values about something, can differ widely from culture to culture. The belief that effective communication is important, for instance, can vary from culture to culture. Similarly, values, or more general conceptions, can vary. For example, American manufacturers value "efficiency" in ways that some other cultures do not [209]. Also, some cultures may value time more than others, so that late delivery may be viewed in some places as a serious problem, while in others it is not particularly important.

Customs, of course, vary greatly from country to country. In many cases, it is important for the businessperson to adhere to local customs to avoid offending anyone. For example, the practice of gift giving varies greatly from country to country.

10.4.2 Infrastructure

In First World countries, the manufacturing and logistics infrastructure is highly developed. Highway systems, ports, communication and information systems, and

TABLE 10-1

MAJOR DIFFERENCES BETWEEN DIFFERENT REGIONS

	First World	Emerging	Third World
Infrastructure	Highly developed	Under development	Insufficient to support advanced logistics
Supplier operating standards	High	Variable	Typically not considered
Information system availability	Generally available	Support system not available	Not available
Human resources	Available	Available with some searching	Often difficult to find

advanced manufacturing techniques allow the development of advanced supply chains. Regional differences do exist, primarily for geographical, political, or historical reasons. For example, road widths, bridge heights, and communications protocols may differ from region to region, but, in general, techniques have been developed to overcome these differences.

Regardless of the infrastructure, geography also affects supply chain decisions, even within First World countries. In the United States, for example, where large distances often exist between major cities, more inventory might be held than in countries such as Belgium, where the distance between cities is small.

Similarly, relative economic conditions have affected the mix of logistics and supply chain components in many First World countries. For example, countries with relatively cheap land and cheap labor, such as France, have built many large, “low-tech” warehouses, while the Scandinavian countries have developed warehouse automation because labor in those countries is so expensive [66].

In the emerging nations, the supply chain infrastructure is usually not fully in place. Most domestic companies in emerging nations see logistics as a necessary expense and not a strategic advantage, so they limit investments in logistics infrastructure. In many cases, gross national income in an emerging nation may not yet be sufficient to fully implement an advanced logistics infrastructure. In addition, the focus of infrastructure development may have been on exports instead of building a system appropriate for imports and exports. This is true in China [209]. Nonetheless, these nations are “emerging” because they have begun to address these issues. For example, many countries have national transportation policies in place, and are beginning or continuing to implement them.

In the Third World, the infrastructure is generally insufficient to support advanced logistics operations. Roads are often in poor shape. Warehousing facilities are frequently unavailable. Distribution systems may be nonexistent. In general, specific supply chain decisions have to be considered carefully, because many of the things taken for granted in the triad or emerging nations may not exist here.

10.4.3 Performance Expectation and Evaluation

Although regional differences remain among First World nations, operating standards are generally uniform and high. For example, overnight carriers are expected to make deliveries overnight. Contracts are legally binding documents. Environmental regulations and constraints typically are present, and companies are expected to obey them. However, the approaches to developing and enforcing relationships do differ from region to region. For example, European and American companies use formal partnership contracts more frequently than Japanese firms, which tend to favor informal partnership agreements built over time [33].

In emerging nations, operating standards typically vary greatly. Some firms may have—and meet—high expectations, and place great value on contracts and agreements. Others, however, might not be so scrupulous. Research and negotiation are essential to successful deal making in the emerging nations. In addition, the government typically plays a large role in business, so foreign partners and corporations often must be ready to respond to the government’s changing whims.

In the Third World, traditional performance measures have no meaning. Shortages are common and customer service measures that are used in the West (e.g., stock availability, speed of service, and service consistency) are irrelevant; given this situation, a firm has little control of the timing and availability of inventory [209].

10.4.4 Information System Availability

Within the triad nations, computer technology has increased at more or less the same rate across different nations. In most cases, POS data, automation tools, personal computers, and other information system tools are just as available in Spain as in California.

Of course, there may be incompatibilities in various systems. For example, European EDI standards may vary from country to country and industry to industry. In addition, legal standards relating to data protection and document authentication vary from country to country. Nevertheless, efforts are underway to overcome these hurdles, and technology exists to overcome the technical incompatibilities [143].

Support systems in the emerging nations may not be in place to implement efficient information systems. Communications networks may be incomplete and not reliable enough to support the traffic. Technical support expertise may not be available to utilize and maintain the equipment. However, governments in these nations typically have plans or programs in place to address these issues.

Advanced information technology is simply not available in Third World countries. Systems such as EDI and bar coding cannot be supported in this type of environment. Even the value of a personal computer is limited because of inefficient communications systems. In addition, data on the economy and population typically are unavailable.

10.4.5 Human Resources

Within most First World countries, technically and managerially competent workers are available. As Wood et al. [209] pointed out, "Cultural differences aside, a logistics manager from Japan would be functionally at home in a counterpart's position in America." Unskilled labor, however, is relatively expensive in these regions.

While it may be true that skilled managerial and technical personnel are frequently not available in emerging nations, sometimes this is not the case. It might take some searching, but employees with the appropriate skills often can be found. In particular, the eastern European countries have generally well-educated populations [87]. In addition, the wages of skilled workers in emerging nations are generally competitive on the world market. On the other hand, many Chinese managers used to be selected for political reasons, rather than technical or managerial expertise, so experience in this case may not be an appropriate indicator of ability [87].

Although it may be possible to find employees that are appropriate to the available technology level, it is often difficult to find trained logistics professionals and managers familiar with modern management techniques in Third World countries. Thus, training becomes especially important in this type of environment.

SUMMARY

In this chapter, we examined issues specific to *global* supply chain management. First, we discussed various types of international supply chains, covering the spectrum from primarily domestic supply chains with some international product distribution all the way to fully integrated global supply chains. We then examined the various forces compelling companies to develop international supply chains. Both advantages and risks are inherent in global supply chains. These risks run the gamut from unknown-unknown risks to known-unknown risks. We discussed a variety of approaches to dealing with unknown-unknown risks, and a set of strategies for addressing many of the other risks. In particular, we focused on the advantages of having a truly flexible global supply chain to address the inherent risks in operating a global company.

However, even with a flexible supply chain, the strategies and approaches used to address these risks will work only if the appropriate infrastructure is in place.

We next surveyed some of the many issues in global supply chain management, including the concepts of international and regional products, and the issue of centralized versus decentralized control in an international context. We concluded with a discussion of regional logistics differences that influence the design of effective supply chains in different parts of the world.

DISCUSSION QUESTIONS

1. Discuss situations in which each of these supply chains might be the appropriate choice for a firm:
 - a. International distribution systems.
 - b. International suppliers.
 - c. Offshore manufacturing.
 - d. Fully integrated global supply chain.
2. Discuss a recent example of an unknown-unknown risk that proved damaging to a supply chain. Explain specifically how each of the following strategies might have mitigated this risk:
 - a. Invest in redundancy.
 - b. Increase velocity in sensing and responding.
 - c. Create an adaptive supply chain community.
3. You are the CEO of a small electronics manufacturing firm that is about to develop a global strategy. Would you prefer a speculative strategy, a hedge strategy, or a flexible strategy? Would your answer to this question change if you were the CEO of a large electronics firm?
4. Discuss some examples of regional products and of true global products. What is it about the products that makes them better suited to being regional or global products?
5. You are the manager of a regional bakery. Contrast the issues you would face if your firm is located in each of the following countries:
 - a. Belgium
 - b. Russia
 - c. Singapore
 - d. Canada
 - e. Argentina
 - f. Nigeria
6. Answer these questions about the case at the beginning of this chapter:
 - a. Other than a need to expand, what other reasons would Wal-Mart have for opening stores globally?
 - b. Why would it be beneficial for Wal-Mart to have suppliers in different countries?
 - c. Why would Wal-Mart want strong centralized control of its stores? Why would Wal-Mart want strong local control of stores?
 - d. What pitfalls and opportunities, other than those mentioned in this case, will Wal-Mart face over the next few years?

