Like home consumers, industries are charged a certain rate per kilowatt hour of electricity consumed, although large industrial users usually pay a lower rate than do home consumers. Each utility company sets its own rate schedule, subject to approval by its state’s regulatory agency. Industries with a particularly high demand for energy may select a location with lower electrical rates.

The aluminum industry, for example, requires a large amount of electricity to separate pure aluminum from bauxite ore. Aluminum producers locate near dams to take advantage of the large amount of cheap hydroelectric power generated there. The oldest continuously operating aluminum production and fabricating plant in the United States at Massena, New York, was established in 1902 by the Pittsburgh Reduction Co. (now Alcoa, Inc.) near a dam constructed by the St. Lawrence River Power Co. as part of a three-mile canal linking the St. Lawrence and Grasse rivers.

Alcoa, the world’s largest aluminum producer, also makes aluminum near other sources of inexpensive hydroelectric power. The company established facilities in the 1910s at Alcoa, Tennessee, along the Little River near the Tennessee River in the Great Smoky Mountains, and at Badin, North Carolina, along the Yadkin River. Aluminum smelting and fabricating plants were added during the mid-twentieth century at Wenatchee, Washington, near the Rocky Reach Dam on the Columbia River; near the Newburgh, Indiana, dam on the Ohio River; and at Goose Creek, South Carolina, along the Cooper River. A reflection of the importance of inexpensive electricity for aluminum production, a subsidiary of Alcoa even owns dams that generate power along the Cheoah, Little Tennessee, and Yadkin rivers in eastern Tennessee and western North Carolina.

**Capital**

Manufacturers typically borrow funds to establish new factories or expand existing ones. The U.S. motor vehicle industry concentrated in Michigan early in the twentieth century largely because this region’s financial institutions were more willing than eastern banks to lend money to the industry’s pioneers.

The most important factor in the clustering of high-tech industries in California’s Silicon Valley—even more important than proximity to skilled labor—was the availability of capital. Banks in Silicon Valley have long been willing to provide money for new software and communications firms even though lenders elsewhere have hesitated. High-tech industries have been risky propositions—roughly two-thirds of them fail—but Silicon Valley financial institutions have continued to lend money to engineers with good ideas so that they can buy the software, communications, and networks they need to get started. One-fourth of all capital in the United States is spent on new industries in the Silicon Valley.

The ability to borrow money has become a critical factor in the distribution of industry in LDCs. Financial institutions in many LDCs are short of funds, so new industries must seek loans from banks in MDCs. But enterprises may not get loans if they are located in a country that is perceived to have an unstable political system, a high debt level, or ill-advised economic policies.

**KEY ISSUE 3**

**Where is Industry Expanding?**

- Changing distribution within MDCs
- New industrial regions

Economic restructuring since the 1970s has resulted in major changes in the location of manufacturing facilities. Internationally, manufacturing has declined in MDCs and increased in LDCs. Within MDCs, changes have occurred at the intraregional scale and at the interregional scale.

**Changing Distribution Within MDCs**

At the intraregional scale, factories in MDCs have relocated from the center of cities to peripheral locations. At the interregional scale, factories have relocated from traditional clusters to regions not traditionally associated with manufacturing.

**Interraregional Shifts in Manufacturing**

Historically, most factories located inside cities for a combination of situation and site factors. A city offered an attractive situation—proximity to a large local market and convenience in shipping to a national market by rail. A city also offered an attractive site—proximity to a large supply of labor as well as to sources of capital.

The site factor that cities found increasingly difficult to provide was land suitable for manufacturing. Factories require space to accommodate large machinery and maneuver bulky inputs and products. To get enough space, early factories in cities were typically multiistory buildings. Raw materials were hoisted to the upper floors to make smaller parts, which were...
then sent downstairs on chutes and pulleys for final assembly and shipment. Water was stored in tanks on the roof.

Modern factories are more likely to be suburban or rural than near the center of a city. Contemporary factories generally require large tracts of land, because they usually operate more efficiently when laid out in one-story buildings. Raw materials are typically delivered at one end and moved through the factory on conveyors or forklift trucks. Products are assembled in logical order and shipped out at the other end. The land needed to build one-story factories is more likely to be available in suburban or rural locations. Also, land is much cheaper in suburban or rural locations than near the center of a city. A hectare (or an acre) of land in the United States may cost only a few thousand dollars in a rural area, tens of thousands in a suburban location, and hundreds of thousands near the center of a city.

In addition to providing enough space for one-story buildings, locations on the urban periphery are also attractive for factories to facilitate delivery of inputs and shipment of products. In the past, when most material moved in and out of a factory by rail, a central location was attractive because rail lines converged there. With trucks now responsible for transporting most inputs and products, proximity to major highways is more important for a factory. Especially attractive is the proximity to the junction of a long-distance route and the beltway or ring road that encircles most cities. Factories cluster in industrial parks located near suburban highway junctions.

### Interregional Shifts in Manufacturing

Manufacturing has shifted toward the south and west in the United States. In Western European countries, government policies have encouraged relocation toward economically distressed peripheral areas. As a result, the distribution of manufacturing has become less clustered in both regions.

#### SOUTHERN AND WESTERN UNITED STATES.

The northeastern United States has lost one million jobs in manufacturing during the past three decades, or one-third of the total jobs immediately before the energy crisis of the early 1970s. Especially large declines have been recorded by New York State and Pennsylvania, states that once served as centers for clothing, textile, steel, and fabricated metal manufacturing (Figure 11-17).

Meanwhile, manufacturing jobs have grown by one-sixth in the South and West since the early 1970s. California and Texas each added a quarter-million manufacturing jobs during the period.

Industrialization during the late nineteenth and early twentieth centuries largely bypassed the South, which had not recovered from losing the Civil War. The South lacked infrastructure needed for industrial development: road and rail networks were less intensively developed in the South, and electricity was less common. As a result, the South was the poorest region of the United States.

Industrial growth in the South since the 1930s has been stimulated in part by government policies to reduce historical disparities. The Tennessee Valley Authority brought electricity to much of the rural South, and roads were constructed in previously inaccessible sections of the Appalachians, Piedmont, and Ozarks. Air conditioning made living and working in the South more tolerable during the summer.

The principal lure for many manufacturers was enactment by Southern states of right-to-work laws. A right-to-work law requires a factory to maintain a so-called “open shop” and prohibits a “closed shop.” In a “closed shop,” a company and a union agree that everyone must join the union to work in the factory. In an “open shop,” a union and a company may not negotiate a contract that requires workers to join a union as a condition of employment.

By enacting right-to-work laws, Southern states made it much more difficult for unions to organize factory workers, collect dues, and bargain with employers from a position of strength. More importantly, the region was especially attractive for companies working hard to keep out a union altogether. The right-to-work laws sent a powerful signal that antilabor attitudes would be tolerated, even actively supported. As a result, the percentage of workers who were members of union is much lower in the South than elsewhere in the United States.

![Figure 11-17](image-url) Changing U.S. manufacturing. States traditionally associated with manufacturing, in the Northeast and Southern Great Lakes, as shown in Figure 11–6, accounted for two-thirds of the country’s manufacturing in 1950, compared to only two-fifths in 2005.
Steel, textiles, tobacco products, and furniture industries have become dispersed through smaller communities in the South, many in search of a labor force willing to work for less pay than in the North and forgo joining a union. The Gulf Coast has become an important industrial area because of access to oil and natural gas. Along the Gulf Coast are oil refining, petrochemical manufacturing, food processing, and aerospace product manufacturing. Completion of construction of Los Angeles harbor in 1910 and the Panama Canal in 1914 opened the West Coast for processing commodities that could be grown in the region's favorable climate and could then be safely shipped long distance. Manufacturing in Los Angeles, acting as a branch plant town, grew rapidly during the first half of the twentieth century.

Aircraft manufacturing began in Southern California when Donald Douglas formed Davis-Douglas Company in 1920. Clear skies, light winds, and mild winters attracted the industry; when the United States entered World War II in 1941, more than one-third of Los Angeles' manufacturing employment was in the aircraft industry.

Los Angeles has become the country's largest area of clothing and textile production, the second-largest furniture producer, and a major food-processing center. A large pool of low-wage unorganized workers has been assembled in the Los Angeles area through immigration, especially from Mexico and several Asian countries.

**INTERREGIONAL SHIFTS IN WESTERN EUROPE.** Manufacturing has also diffused from traditional industrial centers in northwestern Europe toward southern and eastern Europe. The distribution of manufacturing has also changed within countries.

The key difference with the United States is that European government policies have explicitly encouraged the industrial relocation. A number of Western European countries use incentives to lure industry into poorer regions and discourage growth in the richer regions. The European Union, through its Structural Funds, assists regions lagging in industrial investment (Figure 11-18).

The Western European country with the most rapid manufacturing growth since the late twentieth century has been Spain, especially since its admission to the European Union in 1986. Spain's manufacturing growth had been retarded by physical and political isolation.

Spain's motor-vehicle industry has grown into the second largest in Europe, behind only Germany, although it is entirely foreign owned. Spain's leading industrial area is Catalonia, in the northeast, centered on the city of Barcelona. The region is the center of Spain's textile industry and the country's largest motor-vehicle plant.

### New Industrial Regions

Manufacturing has grown rapidly in selected locations outside the traditional industrial concentrations of North America and Europe. China is by far the leading new industrial center.

The shift to new industrial regions can be seen clearly in production of steel. In 1980, 80 percent of world steel was produced in MDCs and 20 percent in LDCs (Figure 11-19, top). Between 1980 and 2005, the share of world steel production declined to 45 percent in MDCs and increased to 55 percent in LDCs (Figure 11-19, bottom). The share of world steel production declined during the quarter-century from 30 percent to 10 percent in Eastern Europe, from 20 to 15 percent in Western Europe, and from 20 to 10 percent in North America; Japan

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**FIGURE 11-18** European Union Structural Funds. The European Union provides subsidies in regions with economic difficulties because of declining industries.
remained at 10 percent of world production. China, now the world's largest steel producer, accounted for 30 percent of world steel output in 2005, and other LDCs 25 percent (Figure 11-20).

Asia
China is the largest manufacturer of textiles and apparel, steel, and many household products. As the world's most populous country, China has two principal assets in attracting manufacturing—the world's largest supply of low-cost labor and the world's largest market for many consumer products.

Policy changes beginning in the 1990s opened both of China's assets to transnational corporations. Foreign-owned firms seeking low-cost labor were permitted to open factories in China to manufacture labor-intensive products such as apparel for export. Rapid economic expansion put money in the pockets of enough of China's 1.3 billion people to encourage more manufacturing for domestic consumption.
China's manufacturers have clustered in three areas along the east coast—near Guangdong and Hong Kong, the Yangtze River valley between Shanghai and Wuhan, and along the Gulf of Bo Hai from Tianjin and Beijing to Shenyang. These three areas contain only one-fourth of China's population, but one-half of its wealth, three-fourths of its foreign investment, and five-sixths of its foreign trade. The clustering of investment has produced large and increasing gaps in wealth within China.

Other Asian countries encouraged the dismantling of barriers to manufacturing investment by multinational corporations during the 1990s. For example, Thailand set a 120 percent tariff on imported vehicles in 1974 to encourage a larger domestic automotive industry, but lowered it to 20 percent during the 1990s. Similarly, India's economic liberalization program in 1991 eliminated many of the country's restrictions on foreign investment.

**Latin America**

Mexico and Brazil are the two leading industrial centers in Latin America. In both countries, manufacturing clustered in the largest city—Mexico City and São Paulo—for proximity to the major market.

To nurse domestic manufacturers during the 1960s, Latin American countries choked off imports from the United States and Europe through strict domestic content rules. Foreign companies were permitted to own factories and produce goods in Latin America only if most of the parts and raw materials had originated in Latin America. This policy encouraged foreign firms to operate inefficient factories and sell outdated products. For example, Ford was producing and selling in Brazil into the 1990s a version of its Falcon car that it had stopped making in the United States back in the 1960s.

Latin America's manufacturers were hit hard when domestic demand declined sharply during the 1980s in the wake of the two 1970s oil shortages. The region suffered from triple-digit hyper-inflation and an inability to repay massive foreign debts that had funded industrial expansion. These setbacks further discouraged investment in efficient facilities and up-to-date products.

In Mexico, manufacturing expanded during the 1980s in the far north rather than in the traditional center near the capital. With domestic demand stagnating, manufacturers looked north to the massive U.S. market. Several thousand maquiladora plants were established along the U.S. border, especially during the 1980s.

The largest Latin American markets replaced protectionism with open markets through a series of reforms during the 1980s and 1990s. Swept away were high tariffs, restrictions on foreign ownership, and government ownership of production. Mexico's maquiladora laws were superseded by the North American Free Trade Agreement (NAFTA), which eliminated even the modest restrictions on flow of materials and products between the United States and Mexico.

Mexico's manufacturers retain an economic geography advantage over those in other LDCs because of their proximity to the U.S. market. However, maquiladora plants are a bit too far from most U.S. manufacturing facilities for just-in-time delivery. Although the average wage rate at maquiladoras of around $400 per month is considerably cheaper than in the United States, it is much higher than the $100 per month being paid in China and other Asian countries.

Competition from Asia has forced some maquiladora plants to close. For example, in 2002 Royal Philips Electronics closed its computer monitor plant in Ciudad Juárez and transferred
production to Suzhou, China; Canon Inc. closed its ink-jet printer factory in Tijuana and transferred production to Thailand and Vietnam. Between 2001 and 2003, 325 of 1,122 maquiladoras that made apparel closed, primarily because of competition from Asia.

“Central” Europe

Several European countries situated east of Germany and west of Russia have become major centers of industrial investment since the fall of communism in the early 1990s. Poland, Czech Republic, and Hungary have had the most industrial development, though other countries in the region have shared in the growth. The region prefers to be called Central Europe, reverting to a common pre-Cold-War term, to signify its more central location in Europe's changing economy.

Central Europe offers manufacturers an attractive combination of two important site and situation factors—labor and market proximity. Central Europe’s workers offer manufacturers good value for money—less skilled but much cheaper labor than in Western Europe, more expensive but much more skilled labor than in Asia and Latin America. At the same time, the region offers closer proximity to the wealthy markets of Western Europe than other emerging industrial centers.

KEY ISSUE 4
Why Are Location Factors Changing?

- Attraction of new industrial regions
- Renewed attraction of traditional industrial regions

Manufacturing is on the move around the world because location factors are changing. Changes in situation and site costs are inducing some manufacturers to cluster in the newly emerging industrial regions, yet at the same time inducing others to invest in the traditional regions.

Attraction of New Industrial Regions

Labor is the site factor that is changing especially dramatically in the twenty-first century. To minimize labor costs, some manufacturers are locating in places where prevailing wage rates are lower than in traditional industrial regions.

Proximity to Low-Cost Labor

The textile and apparel industry has been especially prominent in opening production in lower wage locations while shutting production in higher wage locations. This trend can be seen in shifts in location of production both within countries and between countries.

Within the United States, the textile and apparel industry was heavily concentrated in the Northeast during the early twentieth century. The region’s major attraction was a large supply of European immigrants willing to weave and sew long hours in sweatshops for low pay. The center of the industry was New York City, where most of the immigrants disembarked at Ellis Island.

New York’s Garment District, near Pennsylvania Station at 7th Avenue and 33rd Street, once housed a large percentage of the nation’s textile and apparel manufacturers. Buyers from around the country arrived in New York, mostly by train, twice a year to select the clothing for sale in their stores during the next season and to place orders for making the clothes with Garment District manufacturers.

Most textile and apparel production in the United States moved from the Northeast to the Southeast during the mid-twentieth century. Favorable sites were small towns of the Appalachian, Piedmont, and Ozark mountains, especially western North and South Carolina and northern Georgia and Alabama. For example, the region is home to 99 percent of U.S. hosiery and sock producers, including one-half in North Carolina (Figure 11–21).

Prevailing wage rates were much lower in the Southeast than in the Northeast, although higher than those that Southeastern workers were receiving for other work. Even more important for manufacturers, Southeastern workers showed little interest in joining one of the unions established by Northeastern textile and apparel workers to bargain for higher wages and safer working conditions. Although located farther from Northeastern population centers, Southeastern mills were able to reach markets easily after the opening of the interstate highway system beginning in the 1950s.

FIGURE 11–21 Men’s and women’s socks and hosiery manufacturers. To support their labor-intensive industry, hosiery manufacturers locate where a low-cost workforce exists. In the United States, the lowest-cost labor is concentrated in the Southeast. The U.S. Bureau of the Census classifies these manufacturers as North American Industry Classification System (NAICS) 31511.
Labor cost per hour, clothing manufacturing. Wages are in the teens in more developed countries, compared to under a dollar in some less developed countries.

FIGURE 11-22

Though wages in Southeastern mills are low compared to the Northeastern United States, they are high by world standards in the twenty-first century. As apparel from other countries has become less expensive and less complicated to import into the United States, Southeastern mills paying $10 to $15 per hour wages are unable to compete with manufacturers in countries paying less than $1 per hour (Figure 11-22).

The number of apparel workers in the United States declined from 1.5 million in 1994 to 700,000 in 2003. Western Europe experienced similar job losses during the period. Meanwhile, imports of apparel to the United States increased from $9 million in 1980 and $26 million in 1990 to $60 million in 2000. Imports constituted more than three-fourths of shirts, trousers, and underwear sold in the United States (Figure 11-23). Imports were divided about equally among Latin America, China, other Asian countries, and the rest of the world.

Outsourcing

Transnational corporations have been especially aggressive in using low-cost labor in LDCs. To remain competitive in the global economy, they carefully review their production processes to identify steps that can be performed by low-paid, low-skilled workers in LDCs. Given the substantial difference in wages between MDCs and LDCs, transnational corporations can profitably transfer some work to LDCs, despite greater transportation cost. At the same time, operations that require highly skilled workers remain in factories in MDCs. This selective transfer of some jobs to LDCs is known as the new international division of labor.

Transnational corporations allocate production to low-wage countries through outsourcing, which is turning over much of the responsibility for production to independent suppliers. Outsourcing contrasts with the approach typical of traditional mass production, called vertical integration, in which a company would control all phases of a highly complex production process.

Vertical integration was traditionally regarded as a source of strength for manufacturers, because it gave them the ability to do and control everything. Carmakers once made nearly all of their own parts, for example, but now most of them are outsourced to other companies able to make them cheaper and better.

Outsourcing has had a major impact on the distribution of manufacturing, because each step in the production process is now scrutinized closely in order to determine the optimal location. For example, carmakers have outsourced production of seats to independent companies. The seats installed in U.S. motor vehicles are invariably put together in the United States, but many of the parts in the seats are made in other countries (see Global Forces, Local Impacts box).

Renewed Attraction of Traditional Industrial Regions

Given the strong lure of low-cost labor in new industrial regions, why would any industry locate in one of the traditional regions, especially in northeastern United States or northwestern Europe? Two location factors influence industries to remain in these traditional regions—availability of skilled labor and rapid delivery to market.

Proximity to Skilled Labor

Henry Ford boasted that he could take people off the street and put them to work with only a few minutes of training. That has changed for many industries, including motor vehicle assembly, which now want skilled workers instead. The search for skilled labor has important geographic implications,
GLOBAL FORCES, LOCAL IMPACTS
Locating Car Parts Plants

The motor vehicle industry has been especially buffeted by contradictory location trends under the influence of lean production. The leading carmakers are visible examples of transnational corporations with global-scale production operations. At the same time, a host of local-scale decisions underlie the location of motor vehicle manufacturing.

About 80 percent of world production is controlled by eight companies, all with global reach. These include U.S.-based Ford and General Motors, Germany-based Daimler-Chrysler, France-based Renault (which controls Japanese-based Nissan and Peugeot, and Japan-based Toyota and Honda. Nationality matters to these companies in terms of location of corporate headquarters, top managers, research facilities, and shareholders.

As bulk-gaining industries, the leading carmakers make most of their cars in the regions where they are to be sold. Thus, three-fourths of vehicles sold in the United States are assembled in the United States, and most of the remainder are assembled in Canada and Mexico. As discussed in the Contemporary Geographic Tools box earlier in this chapter, assembly plants have clustered in the interior of the United States to minimize the cost of shipping the finished vehicles to consumers.

As a result of outsourcing, though, carmakers account for only around 30 percent of the value of the vehicles that bear their names. The rest of the value is tied up in the thousands of parts that go into motor vehicles. The makers of these parts must also decide where to locate their factories (refer to Figure 11–13).

For some parts makers, just-in-time delivery dictates that they build their factories as close as possible to their customers, the final assembly plants.Seats, for example, are invariably manufactured at a location within an hour of the final assembly plant. The reason is that a seat is an especially large and bulky object, and carmakers do not want to waste valuable space in their assembly plants by piling up an inventory of them. Most engines, transmissions, and metal body parts are also produced at locations only a couple of hours away from an assembly plant.

On the other hand, many parts do not need to be manufactured close to the customer. For them, changing site factors are more important. Some locate in Mexico to take advantage of lower labor costs. Others come from China, where labor costs are higher but shipping costs are also higher. Thus, most wiring is made in Mexico, whereas China is the leading source of aluminum wheels.

In the United States, one-half of the parts are made in the United States by U.S.-owned companies, one-fourth are made in the United States by foreign-owned transnational corporations, and one-fourth are made overseas and imported into the United States. As variations in situation and site costs continually shift from one country to another, these percentages are bound to change.

because it is an asset found principally in the traditional industrial regions.

Factories traditionally assigned each worker one specific task to perform repeatedly. Some geographers call this approach Fordist or mass production, because the Ford Motor Company was one of the first to organize its production this way early in the twentieth century. At its peak, Ford’s factory complex along the River Rouge in Dearborn, Michigan, near Detroit, employed more than 100,000. Most of these workers did not need education or skills to do their jobs, and many were immigrants from Europe or the southern United States.

In recent years, some factories have adopted new work rules, known as lean or flexible production. The term post-Fordist production is sometimes used to describe flexible production, as a contrast with Fordist production. Again, a carmaker is best known for pioneering lean production—in this case, Toyota.

Three types of work rules distinguish post-Fordist lean production:

1. **Teams.** Workers are placed in teams and told to figure out for themselves how to perform a variety of tasks.

2. **Problem solving.** A problem is addressed through consensus after consulting with all affected parties rather than through filing a complaint or grievance.

3. **Leveling.** Factory workers are treated alike and managers and veterans do not get special treatment; they wear the same uniform, eat in the same cafeteria, park in the same lot, and participate in the same athletic and social activities.

Computer manufacturing is an example of an industry that has concentrated in relatively high-wage, high-skilled regions of the United States, especially California, along with Massachusetts, New York, and Texas. These states have concentrations of skilled workers in association with proximity to major university centers (Figure 11–24).
Just-in-Time Delivery

Proximity to market has long been important for many types of manufacturers, as discussed earlier in this chapter. The factor has become even more important in recent years because of the rise of just-in-time delivery. As the name implies, just-in-time is shipment of parts and materials to arrive at a factory moments before they are needed. Just-in-time delivery is especially important for delivery of inputs, such as parts and raw materials, to manufacturers of fabricated products, such as cars and computers.

Under just-in-time, parts and materials arrive at a factory frequently, in many cases daily if not hourly. Suppliers of the parts and materials are told a few days in advance how much will be needed over the next week or two, and first thing each morning exactly what will be needed at precisely what time that day.

Just-in-time delivery reduces the money that a manufacturer must tie up in wasteful inventory. In fact, the percentage of the U.S. economy tied up in inventory has been cut in half during the past quarter-century. Manufacturers also save money through just-in-time delivery by reducing the size of the factory, because space does not have to be wasted on piling up a mountain of inventory.

To meet a tight timetable, a supplier of parts and materials must locate factories near its customers. If only an hour or two notice is given, a supplier has no choice but to locate a factory within 50 miles or so of the customer.

Leading computer manufacturers like Dell and Gateway have eliminated inventory altogether. Computers are built only in response to customer orders placed primarily by telephone or through the Internet.

In some cases, though, just-in-time delivery merely shifts the burden of maintaining inventory to suppliers. Wal-Mart, for example, holds low inventories but tells its suppliers to hold high inventories “just in case” a sudden surge in demand requires restocking on short notice.

Just-in-time delivery means that producers have less inventory to cushion against disruptions in the arrival of needed parts. Two kinds of disruptions can result from reliance on just-in-time delivery. First is labor unrest. A strike at one supplier plant can shut down the entire production within a couple of days. Also disrupting deliveries could be a strike in the logistics industry, such as a strike by truckers or dockworkers.

Disruptions can also result from “acts of God.” Most common are weather-related incidents, such as blizzards that close highways or floods that damage factories. The most notable non-weather-related disruption in recent years followed the September 11, 2001, terrorist attacks on the United States. The grounding of all civilian aircraft for several days after the attacks prevented delivery of compact high-value parts. Although trucks and trains could still move across the United States after the attacks, suppliers in Canada and Mexico were unable to maintain just-in-time deliveries to manufacturers in the United States because the border crossings were closed.
SUMMARY

Three recent changes in the structure of manufacturing have geographic consequences:

1. Factories have become more productive through introduction of new machinery and processes. A factory may continue to operate at the same location but require fewer workers to produce the same output. Faced with meager prospects of getting another job in the same community, workers laid off at these factories migrate to other regions.

2. Companies are locating production in communities where workers are willing to adopt more flexible work rules. Firms are especially attracted to smaller towns where low levels of union membership and high visibility reduce vulnerability to work stoppages, even if wages are kept low and layoffs become necessary.

3. By spreading production among many countries, or among many communities within one country, large corporations have increased their bargaining power with local governments and labor forces. Production can be allocated to locations where the local government is especially helpful and generous in subsidizing the costs of expansion, and the local residents are especially eager to work in the plant.

These, again, are the key issues in the geography of industry:

1. **Where is industry distributed?** In contrast to agriculture, which covers a large percentage of Earth’s land area, industry is highly concentrated. Four regions where industry clustered during the twentieth century include Western Europe, Eastern Europe, Northeastern North America, and Japan.

2. **Why do industries have different distributions?** Factories try to identify a location where production cost is minimized. Critical industrial location costs include situation factors for some firms and site factors for others. Site factors involve the cost of transporting both inputs into the factory and products from the factory to consumers. Site factors—land, labor, and capital—control the cost of doing business at a location.

3. **Where is industry expanding?** New industrial regions have emerged in recent years, led by China, which is now the world’s largest manufacturing region by some measures. Within MDCs, industry has been expanding in new areas, especially the South and West in the United States and the South and East in Europe.

4. **Why are location factors changing?** New industrial regions are able to attract some industries, especially because of low wage rates. For their part, traditional industrial regions have been able to offer manufacturers skilled workers and proximity to customers demanding just-in-time delivery.

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**CASE STUDY REVISITED
Free Trade in North America**

Competition to attract new industries and to retain existing ones extends across international borders. The governments of Canada, Mexico, and the United States have agreed to eliminate barriers to free trade among the three countries. As competition increases among regional blocs of countries, U.S. and Canadian business and government leaders see substantial benefits to including Mexico in a free trade zone. With the addition of Mexico and other Latin American countries, the North American free trade area can rival the European Union as the world’s most populous and wealthy market.

But creating an integrated North American economy is a formidable task, given the substantially lower standard of living in Mexico and Latin America than in the United States and Canada. U.S. and Canadian labor union leaders are concerned that with the removal of barriers, more manufacturers will relocate production to Mexico to take advantage of lower wage rates. Such labor-intensive industries as food processing and textile manufacturing may be especially attracted to a region where prevailing wage rates are lower.

Environmentalists fear that under a free trade agreement, firms will move production to Mexico, where laws governing air- and water-quality standards are less stringent than in the United States and Canada. Mexico has adopted regulations to reduce air pollution in Mexico City; catalytic converters were required on Mexican automobiles beginning in 1991. But enforcement of environmental protection laws is still lax in Mexico.

According to industrial location theory, firms select locations for various situation and site factors. Wage rates and environmental controls are two important site factors, but such factors as access to markets and to skilled workers are also critical. Geography’s global perspective in analyzing industrial location reinforces the fact that the problems of an unemployed steelworker in Gary, Indiana, or Youngstown, Ohio, are not just local but are related to worldwide characteristics of the steel industry. The future health of industry in the United States depends on a national commitment to a combination of competition and cooperation in a global economy.

To recapture competitiveness with other countries’ industries, North American business leaders must learn more about the culture, politics, and economy of other nations. The success enjoyed by Asian businesses in North America derives to a considerable extent on their ability to adapt their products and production techniques to the North American market.

(Continued)
CASE STUDY REVISITED (Continued)

extent from the fact that executives there know more about U.S. society than Americans know about Asia. Asian officials are likely to speak English and are familiar with the tastes and preferences of American consumers, whereas few American officials speak Japanese, Korean, or Mandarin, and they have relatively little knowledge of the buying habits of Asians.

At the same time, global industrial development depends on increased cooperation among different countries. As a result of lower transportation cost, more people worldwide have access to more goods at lower prices than in the past. Given this trend, consumers in MDCs are increasingly challenged to choose between the purchase of the highest-quality, lowest-cost goods regardless of where they were made, and support for local industries against foreign competitors at any price.

Meanwhile, Mexico faces its own challenges: it has lost a quarter million maquiladora jobs since 2000. Electronics firms are especially likely to pull out of Mexico. The reason: at $2 an hour, Mexican wages are higher than in other LDCs, although much lower than in the United States. Many firms are moving to China, where wages are only $1 an hour.

KEY TERMS

Break-of-bulk point (p. 379)
Bulk-gaining industry (p. 375)
Bulk-reducing industry (p. 373)
Cottage industry (p. 380)
Fordist (p. 391)
Industrial Revolution (p. 367)
Labor-intensive industry (p. 379)
Maquiladora (p. 366)
New international division of labor (p. 390)
Outsourcing (p. 390)
Post-Fordist (p. 391)
Right-to-work laws (p. 385)
Site factors (p. 372)
Situation factors (p. 372)
Textile (p. 379)

THINKING GEOGRAPHICALLY

1. What have been the benefits and costs to Canada of its free trade agreement with the United States? How are the benefits and costs to Canada likely to change with the implementation of NAFTA?

2. To induce Kia to build its U.S. production facility in Georgia, the state spent $36 million to buy the site; $25 million to prepare the site, including grading; $30 million to provide road improvements, including an interchange off I-85; $6 million to build a rail spur; $20 million to construct a training center; $6 million to operate the center for 5 years; $6 million to develop a training course; $76 million in tax credits; $14 million in sales tax exemptions; and $41 million in training equipment. Did Georgia overpay to win the Kia factory? Explain.

3. Foreign cars account for one-fourth of the sales in the midwestern United States, compared to half in California and other West Coast states. What factors might account for this regional difference?

4. Draw a large triangle on a map of Russia, with one point near Moscow, one point in the Ural Mountains, and one point in Central Asia. What are the principal economic assets of the three regions at each side of the triangle? How do the distributions of markets, resources, and surplus labor vary within Russia?

5. What are the principal manufacturers in your community or area? How have they been affected by increasing global competition?

FURTHER READINGS


