

The Montreal area along the upper St. Lawrence River also forms part of the Canadian industrial zone. This area is no match for the Ontario district, but it has one big advantage: cheap hydroelectric power. Aluminum-refining and papermaking industries therefore are located there.

Westward lies the remainder of the U.S. industrial heartland. This comprises the interior industrial district, with nodes such as the Pittsburgh–Cleveland area, the Detroit–Southeast Michigan area, Chicago–Gary–Milwaukee, and smaller areas centered on Minneapolis, St. Louis, Cincinnati, and other areas. There industrial power truly transformed the landscape during the twentieth century as Appalachian coal and Mesabi iron ore were converted into autos, bulldozers, harvesters, armored cars, and tanks.

The Former Soviet Union

The Soviet effort to industrialize focused on manufacturing in the western part of Russia, the region of the Soviet Union that was the base of the Russian culture and the location of the country's capital, Moscow. In Moscow, the city and its surrounding area offered an important local market, converging transport routes, a large labor force, and strong centrality—just like Paris, London, and New York. Light manufacturing could already be found in this district during Tsarist times, but under communist rule heavy industries were added. Nizhni Novgorod (southeast of Moscow), with its huge automobile factories, became the “Soviet Detroit.”

The Soviet Union had an enormous expanse of resources and raw materials within its borders. East of Moscow, the Ural Mountains yield an incredible variety of metallic ores, including iron, copper, nickel, chromite, bauxite, and many more. In the first decades of the 1900s, Russia tapped a large supply of coal and iron ore in Siberia. Russia's eastern region afforded a great deal of resources and raw materials for the industrialization of Russia's west. Between the Kuzbas and Lake Baykal lies the Krasnoyarsk–Baykal Corridors region. Served by the Trans-Siberian Railroad and several important rivers, this 1600-kilometer-long (1000-mile-long) region contains impressive resources, including coal, timber, and water.

The St. Petersburg area is one of Russia's oldest manufacturing centers. It was chosen by Tsar Peter the Great not only to serve as Russia's capital but also to become the country's modern industrial focus. The skills and specializations that Peter the Great nurtured with the help of Western European artisans still mark the area's key industries: high-quality machine building, optical products, and medical equipment. Industries such as shipbuilding, chemical production, food processing, and textile making were also located there.

The Volga experienced major development beginning in the mid-1930s, where the combination of accessi-

ble raw materials and ease of transport facilitated its development. When the Ukraine and Moscow areas were threatened by the German armies in World War II, whole industrial plants were dismantled and reassembled in Volga cities—protected from the war by distance. Samara (formerly Kuibyshev) even served as the Soviet capital for a time during World War II. This was part of a more general eastward shift of industry that occurred during World War II, when Russia was invaded from the west.

After the war, the industrialization program continued. A series of dams, constructed on the Volga River, made electrical power plentiful. Known oil and natural gas reserves were larger there than anywhere else in the former USSR. Canals linked the Volga to both Moscow and the Don River, making it easy to import raw materials. The cities lining the Volga, spaced at remarkably regular intervals, were assigned particular industrial functions in the state-planned economy. Samara became an oil refinery center, Saratov acquired a chemical industry, and Volgograd became known for its metallurgical industries. The Volga was set on a course that has allowed it to remain one of Russia's dominant industrial regions to this day (Fig. 12.11).

The Ukraine Manufacturing Belt

Before its incorporation into the Soviet Empire, in the last decades of the nineteenth century, Ukraine and other western portions of the former Soviet Union had started to industrialize. After World War I, the Soviet Union annexed Ukraine (the people of the Ukraine fought annexation every step of the way and suffered greatly under Stalin's purges) and used the rich resources and industrial potential of Ukraine to become an industrial power. Ukraine produced as much as 90 percent of all the coal mined in the then Soviet Union, and, with iron ores from the Krivoy Rog reserve (in Ukraine) and later from Russia's Kursk Magnetic Anomaly, the Soviet Union grew into one of the world's largest manufacturing complexes during the mid-twentieth century.

Eastern Asia

Japan and China were the most significant areas of East Asia that avoided direct European colonization—and these are the Asian countries where large-scale industrialization first took root. Of the two, Japan was clearly the early dominant player. China's industrialization came later, and we discuss China as one of the newly industrialized countries later in this chapter.

In less than a century after the beginning of the Industrial Revolution, Japan became one of the world's leading industrial countries. This accomplishment is all the more remarkable when one realizes that Japan has limited natural resources. Much of what Japan manufactures is made from raw materials imported from all over

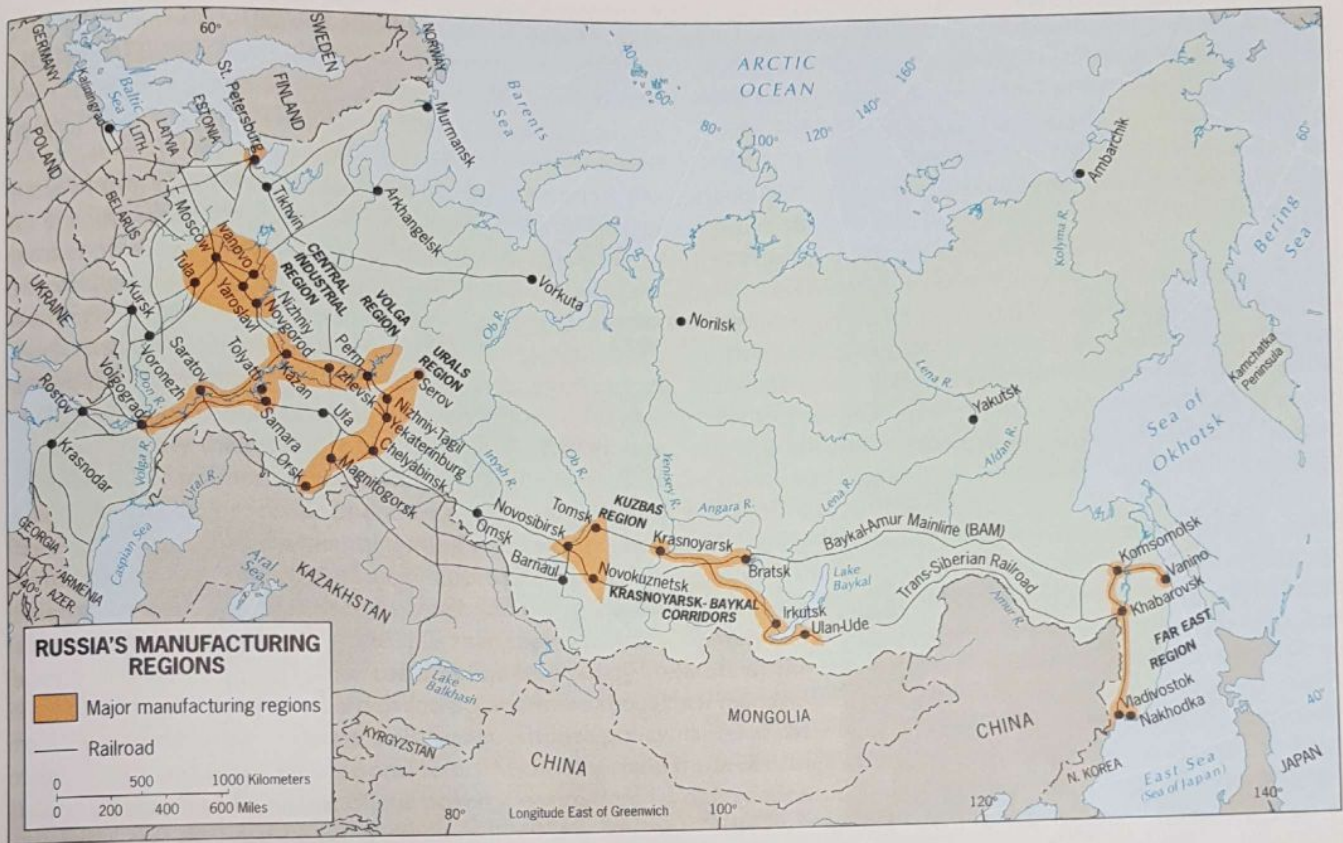


Figure 12.11
Major Manufacturing Regions of Russia. The major manufacturing regions of Russia reflect the dominance of the west in the country's economic geography. © H. J. de Blij, A. B. Murphy, E. H. Fouberg, and John Wiley & Sons, Inc.

the world. Japan's national territory is just one twenty-fifth the size of the United States, and its population is less than half the U.S. total. Its transformation into the world's second-largest economy has often been described as a miracle.

Yet, Japan's economic development was not a miracle; like Europe's, it was built on capital from colonization and on government policies that had the specific goal of industrialization. Japan's economic development began during the second half of the nineteenth century, when it embarked on a campaign of industrialization and colonization. Between 1866 and 1869, under the banner of the Meiji Restoration, reformers mechanized Japan's domestic industries, moved the capital from the interior to the coast, organized its armed forces, and obtained advice from British experts on issues ranging from education to transportation (which is why the Japanese drive on the left side of the road). The Japanese also established colonies, and soon raw materials and capital were flowing to Japan from an expanding colonial empire in Korea, Taiwan, and mainland China.

The 1930s and early 1940s brought triumph and disaster: triumph in the form of a military campaign that in-

cluded vast conquests in the Pacific, East Asia, and Southeast Asia and a surprise attack on Pearl Harbor in Hawaii, and disaster when Japanese forces were driven back with great loss of life. The war ended with the utter destruction of two Japanese cities by American atomic bombs. When U.S. forces took control of Japan in 1945, the nation's economy was in shambles. Yet a few decades later Japan had not only recovered but had become a global economic power.

The Japanese Manufacturing Belt

Japan's dominant region of industrialization and urbanization is the *Kanto Plain* (Fig. 12.12), which contains about one-third of the nation's population and includes the Tokyo-Yokohama-Kawasaki metropolitan area. This gigantic cluster of cities and suburbs (the second biggest metropolis on Earth, behind only Mexico City) forms the eastern anchor of the country's core area. The Kanto Plain possesses a fine natural harbor at Yokohama and is centrally located with respect to the country as a whole. It has also benefited from Tokyo's designation as the country's capital. When Japan embarked on its planned course of economic development, many industries and businesses



Figure 12.12

Major Manufacturing Regions of East Asia. In China, the Northeast District Manufacturing Region was the first to take off. The Chang District followed, and most recently, the Guangdong District is growing. © H. J. de Blij, A. B. Murphy, E. H. Foubert, and John Wiley & Sons, Inc.

chose Tokyo as their headquarters in order to be near government decision makers. During the mid-twentieth century, the Tokyo–Yokohama–Kawasaki metropolitan area became Japan’s leading manufacturing complex, producing more than 20 percent of the country’s annual output.

Japan’s second largest industrial complex extends from the eastern end of the Seto Inland Sea to the Nagoya area and includes the Kobe–Kyoto–Osaka triangle. This, the *Kansai district*, comes close to rivaling the Kanto area:

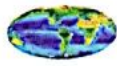
it is a vast industrial region with steel mills, a major chemical industry, automobile manufacturing, shipbuilding, textile factories, and many other types of production. The Kansai district lies on the eastern edge of the Seto Inland Sea, Japan’s pivotal waterway. During the nineteenth century, raw materials from Korea and later from Northeast China moved in large quantities along the Seto Inland Sea, bringing a stream of raw materials into the Kansai district.

Even after Japan lost its colonial empire with the end of World War II, its industries continued to be sustained by a large, highly skilled labor force (which, before recent wage increases, was relatively cheap). Japanese products dominated markets around the world and allowed Japanese industries to purchase needed raw materials virtually anywhere. Australia, for example, became one of Japan's leading suppliers. The availability of cheap semi-skilled labor has had an immense impact on regional industrial development. Even in an era of automated assembly lines and computerized processing, the prospect of a large, low-wage, trainable labor force continues to attract manufacturers. Japan's postwar success was based in large measure on the skills and the low wages of its labor force, which allowed manufacturers to flood foreign markets with low-priced goods. Into the 1950s, Japanese goods had little reputation for quality but were known for their affordability. But then Japan's factories began to excel in quality as well. This development in turn led to higher prices, higher wages, and, inevitably, competition from countries where cheaper labor could be found.

Our world map of major manufacturing belts prior to 1950 shows other industrialized zones within each of these major industrial regions and some smaller industrialized zones outside of these four regions. Nonetheless, the map and this overview describe where the largest manufacturing belts in the world were prior to 1950 and help us understand why these places were the first to develop major manufacturing belts.



THINKING GEOGRAPHICALLY



Think of an industrial area where you live, either an industrial park or a major conglomeration of industries. Drive through the area or look online or in the phone book to see what industries are located there. Consider the models of industrial location described in this section of the chapter and determine whether any of the models apply to this place.

HOW HAS INDUSTRIAL PRODUCTION CHANGED?

The manufacturing boom of the twentieth century can be traced to early innovations in the production process. Perhaps the most significant of these innovations was the mass-production assembly line pioneered by Henry Ford, which allowed for the production of consumer goods at a single site on a previously unknown scale. So significant was Ford's idea that the dominant mode of mass production that endured for much of the

past century is known as **Fordist**. In addition to the process of mass production, economic geographers also see the Fordist system as including a set of social structures (corporations and countries supporting each other) and financial orders (such as Bretton Woods in which countries adopted the gold standard, agreeing to peg the values of their currency to gold) that supported mass production by corporations.

The world-economy is now a **post-Fordist** system—a more flexible set of production practices in which goods are not mass produced; instead, production has been accelerated and dispersed around the globe by multinational companies that shift production, outsourcing it around the world and bringing places closer together in time and space than would have been imaginable at the beginning of the twentieth century.

Geographically, the concept of time-space compression is the easiest way to see the dramatic changes in the ways we think about time and space in the global economy. Time-space compression is the notion that some places in the world are more connected through communication and transportation technologies than ever before (see Chapter 4). David Harvey, who coined the term *time-space compression*, believes that modern capitalism has so accelerated the pace of life and so changed the nature of the relationship between places that “the world seems to collapse inwards upon us.” Fluctuations in the Tokyo stock market impact New York just hours, if not minutes, later. Overnight, marketing campaigns can turn a product innovation into a fad in far-flung corners of the globe. Kiwis picked in New Zealand yesterday can be in the lunch boxes of boys and girls in Canada tomorrow. And decisions made in London can make or break a fast-developing deal over a transport link between Kenya and Tanzania.

Time-space compression has fundamentally altered the division of labor. When the world was less interconnected, most goods were produced close to the point of consumption. Thus, the major industrial belt in the United States was in the Northeast both because of the readily available coal and other raw materials and because of the major concentration of the North American population there. With **just-in-time** delivery (rather than keeping a large inventory of components or products, companies keep just what they need for short-term production and new parts are shipped quickly when needed), corporations can draw from labor around the globe for different components of production, creating a **global division of labor**.

The major global economic players, such as General Motors, Philips, Union Carbide, and Exxon, take advantage of low transportation costs, favorable governmental regulations, and expanding information technology around the world to construct vast economic networks in which different facets of production are carried out in different

places in order to benefit from the advantages of specific locations. Publicly traded companies (companies whose stock you can buy or sell publicly on the stock exchange) are pressured by shareholders to grow their profits annually. One way to grow profits is to cut costs, and labor (wages, benefits, insurance) makes up a sizable proportion of production costs. Most multinational corporations have moved the labor-intensive manufacturing, particularly assembly activities, to peripheral countries where labor is cheap, regulations are few, and tax rates are low. The manufacturing jobs that remain in the core are usually highly mechanized, have a high cost of transportation for finished products, and/or rely on regional consumption. Technologically sophisticated manufacturing also tends to be sited in the core because both the expertise and the infrastructure are there.

Research and development activities tend to be concentrated in the core, where high levels of education and access to technology are the norm. The global division of labor has reshaped the role different economic sectors play within countries. With mechanized, highly efficient agriculture (see Chapter 11) and with the move of manufacturing jobs to the semi-periphery and periphery, core countries now have large labor forces employed in the tertiary sector of the economy.

Supporting the global division of labor are elaborate trading networks and financial relations. Trade itself is a tertiary economic activity of considerable importance to the global economy. Regardless of where goods are produced, most of the consumption still takes place in the core. The newly industrializing countries of the semi-periphery send manufactured goods to the core (thus the "made in China" labels found on goods throughout the United States). Trade flows among countries in the periphery are typically low because for peripheral countries the dominant flow of goods is exports to the core.

Televisions—the Core, the Semi-periphery, and the Periphery

Following the production of televisions around the globe gives us insight into the workings of the global division of labor and the shifts in production that occur as goods become standard commodities of trade. Commercial production of television sets began after World War II, with a variety of small and medium-sized firms in Europe, Asia, and North America involved in production. Firms in the United States, such as Zenith, were the dominant producers of televisions until the 1970s. During the 1970s and 1980s a dramatic shift occurred, with a small number of large Asian producers—particularly in Japan—seizing a much larger percentage of the market and with a few European firms increasing their position as well. By 1990, ten large firms were responsible for 80 percent of the

world's color television sets; eight of them were Japanese and two European. Only one firm in the United States, Zenith, remained, and its share of the global market was relatively small.

The television production industry has three key elements: research and design; manufacture of components; and assembly. Research and design was and continues to be located in the home countries of the major television manufacturers. During the 1970s, the major firms began to move the manufacture of components and assembly "offshore." U.S. firms moved these functions to the *maquiladora* of Mexico (discussed in Chapter 10) and the special economic zones of China (described in Chapter 9); Japanese firms moved component manufacturing and assembly to Taiwan, Singapore, Malaysia, and South Korea. Because the assembly stage was the most labor intensive, television manufacturers tapped into labor pools around the world, locating assembly plants not just in Mexico, China, and Southeast Asia, but also in India and Brazil. By the 1990s, television manufacturing methods had changed to employ greater mechanization in the production and assembly process. Starting in the 1980s, the major television producers in Japan (by then dominating the market) moved a number of their offshore production sites to Europe and the United States, regions with suitable infrastructure, skilled labor, and accessible markets. Recently, the process began again, with research and development in high-definition and plasma televisions leading to production of these high-end televisions in Japan. Production is expanding into China and South Korea today.

Tracing the production of televisions throughout the world over time helps us see how the global division of labor currently works. (Similarly, the production of textiles described in Chapter 10 is shaped by the global division of labor.) Labor is moved to the periphery and semi-periphery to take advantage of lower labor costs. And as methods of assembly and the product itself change, the production may be moved again to take advantage of infrastructure, skilled labor, and accessible markets.

New Influences on the Geography of Manufacturing

Any multinational company (whether producing television or anything else) is involved in designing products and finding buyers for the products. Many multinationals hire out the other steps in manufacturing, including extraction of raw materials, manufacturing products, marketing, and distribution, to outside companies or subsidiaries. In the post-Fordist era, the major influences on industrial location include the low wages we have already discussed, along with intermodal transportation, regional and world trade agreements, and availability of energy.

Importance of Transportation in Industrial Location

One factor we can map is transportation. Efficient transportation systems enable manufacturers to purchase raw materials from distant sources and to distribute finished products to a widely dispersed population of consumers. Manufacturers desire maximum transport effectiveness at the lowest possible cost. They will also consider the availability of alternative systems in the event of emergencies (e.g., truck routes when rail service is interrupted). Since World War II, major developments in transportation have focused on improving **intermodal connections**, places where two or more modes of transportation meet (including air, road, rail, barge, and ship), in order to ease the flow of goods and reduce the costs of transportation.

The current volume of resources and goods shipped around the globe daily could not be supported without the invention of the container system, whereby goods are packed in containers that are picked up by special, mechanized cranes from a container ship at an intermodal connection and placed on the back of a semi-trailer truck, on a barge, or on a railroad car. This change lowered costs and increased flexibility, permitting many manufacturers to pay less attention to transportation in their location decisions. The container system also eases the shipment of refrigerated goods around the globe.

Jacques Charlier has studied the major changes to the Benelux (Belgium, the Netherlands, and Luxembourg) seaport system and the role containerization played in these changes. Charlier stressed the importance of containerization to the growth of sea trade in the Benelux ports and explained the locational advantage of Rotterdam, which is about six hours by rail or truck to 85 percent of the population of Western Europe.

The container system and the growth in shipping at Rotterdam and other Benelux ports have promoted the growth of other industries in the region, helping to make the Netherlands, in Charlier's words, a warehouse for Europe. The Netherlands is now home to more than 1800 U.S. firms, including call centers, distribution centers, and production centers, especially for food. In 2003, over 50 percent of all goods entering the European Union went through Rotterdam or Amsterdam (also in the Netherlands).

Importance of Regional and Global Trade Agreements

Regional trade organizations such as the North American Free Trade Agreement (NAFTA) and the European Union (EU) have trade agreements that set up quotas for where imported goods (and components of goods) can be produced. Similarly, governments have individual agreements with each other about production and imports, and

most governments (148 states in 2005) are part of the World Trade Organization (WTO), which works to negotiate rules of trade among the member states.

The WTO promotes freer trade by negotiating agreements among member states, agreements that push the world in the direction of free trade, typically dismissing import quota systems and discouraging protection by a country of its domestically produced goods. Agreements negotiated under the WTO are typically enacted in steps in order to avoid a major shock to any state's economy. In 2001 when Europe and the United States agreed to allow China to become a member of the WTO, they also agreed to remove the quota system that restricts the importation of Chinese goods into Europe and the United States (discussed in Chapter 10). Soon after these quotas were eliminated, both the United States and the European Union issued "safeguard quotas" against Chinese imports. The safeguard quotas were part of the agreement that permitted the admission of China to the WTO, and the United States and the European Union will not be able to use them in a few years. In the meantime, the safeguards are slowing the importation of Chinese textiles once again, in attempt to buffer the impact on domestic textile producers in the core.

In addition to the growth of the purview of the WTO, the proliferation of regional trade associations in the last two decades is unprecedented. The list of acronyms for regional trade associations is almost overwhelming: EU, NAFTA, MERCOSUR, SAFTA, CARICOM, ANDEAN AFTA, COMESA, to name but a few. The World Trade Organization estimates that close to 300 regional trade organizations are in existence. Regional trade organizations are similar to bilateral agreements on trade between two countries, although they involve more than two countries. Most regional trade agreements encourage movement of production within the trade region and promote trade by diminishing (or deleting) trade quotas and tariffs among member countries. A regional trade agreement sets up a special free trade agreement among parties to the association, leaving nonmember countries to trade through the rules of the WTO or an existing bilateral agreement. Whether regional or global, trade agreements directly affect the location of production and even what is produced in a place.

Importance of Energy in Industrial Location

During the mid-twentieth century, the use of coal as an energy source in industry increasingly gave way to the use of oil and gas. Dependence on external fuel supplies affects three of the four world industrial regions that were the principal regions of industrial development during the mid-twentieth century. Despite discoveries of oil and gas in the North Sea, Europe still depends on foreign shipments of petroleum. The United States has two neighbors

with substantial fossil fuel reserves (Mexico's oil and gas may rank among the world's largest), but its own supplies remain rather limited. Japan is almost totally dependent on oil from distant sources.

The role of energy supply as a factor in industrial location decisions has changed over time. During the Industrial Revolution, manufacturing plants were often established on or near coal fields; today major industrial complexes are not found near oil fields. Instead, a huge system of pipelines and tankers delivers oil and natural gas to manufacturing regions throughout the world. For some time during and after the global oil supply crises of the 1970s, fears of future rises in oil costs led some industries that require large amounts of electricity to move to sites where the environment is moderate and heating and air-conditioning costs are low. When the crisis waned, national energy-conservation goals were modified, and in the early 2000s the reliance of the United States on foreign energy resources was even greater than it had been in the 1970s. Energy supply has become a less significant factor in industrial location, but securing an energy supply is an increasingly important national priority.

Nowhere was this more true than in the United States. U.S. consumption of petroleum and natural gas today is about 27 percent and 37 percent, respectively, of the annual world total. By 2001, the United States required no fewer than 20 million barrels of petroleum per day to keep its power plants, machinery, vehicles, aircraft, and ships functioning. However, U.S. production of oil in recent years has averaged about 18 percent of the world

total, and even including the known Alaskan potential, U.S. oil reserves are estimated to amount to only about 4 percent of the world total. The United States taps its oil resources, and in 2004, the country was the third largest oil producer in the world (Table 12.2). Even with this level of production, the United States remains heavily dependent on foreign oil supplies, with all the uncertainties that involves.

Petroleum is not the only energy source for which the United States leads world demand and consumption. As Figure 12.9 shows, natural gas often occurs in association with oil deposits. The use of natural gas has increased enormously since World War II. One result of the increased use of natural gas is the proliferation of pipelines shown on the map. In North America in 2002, there were over 2.5 million miles (4 million kilometers) of pipelines, including parts of a new pipeline designed to carry Alaskan natural gas across Canada to the U.S. market.

On the other side of the coin, countries with large reserves of oil and natural gas—Saudi Arabia, Kuwait, Iraq, Russia, and others—occupy a special position in the global economic picture. None of these except Russia is a major industrial power, but they all played a key role in the industrial boom of the twentieth century. And while oil has brought wealth to some in the Middle East, it has also ensured that outside powers such as the United States and Great Britain are involved and invested in what happens in the region. This has often produced an uneasy relationship at best between countries in the Middle East and the major industrial powers of the “West.”

TABLE 12.2
World's Largest Oil Producers.

TOP WORLD OIL PRODUCERS, 2004		
Country	Rank	Total Oil Production (million barrels per day)
Saudi Arabia	1	10.37
Russia	2	9.27
United States	3	8.69
Iran	4	4.09
Mexico	5	3.83
China	6	3.62
Norway	7	3.18
Canada	8	3.14
Venezuela	9	2.86
United Arab Emirates	10	2.76
Kuwait	11	2.51
Nigeria	12	2.51
United Kingdom	13	2.08
Iraq	14	2.03

Data from: <http://www.eia.doe.gov/emeu/cabs/nonopec.htm>, last accessed October 2005.

The sensation of a shrinking world is so strong that a few commentators have proposed that we are entering an era characterized by the "end of geography." Alvin Toffler first suggested this idea in his *Future Shock* (1970). More recently, Richard O'Brien dealt with similar concepts in *Global Financial Integration: The End of Geography* (1992). Both Toffler and O'Brien argue that a combination of technological changes and developments in the global economy have reduced the significance of location and place to the point where they no longer matter. Geographers who study industrial production recognize that the nature and meaning of location and place have changed greatly in recent times, but they also note that these changes do not create an undifferentiated world. New production methods have reshaped the economic geography of the planet profoundly and rapidly. We need a greater understanding of how places have changed as a result of new production methods and new corporate structures, as well as an examination of the interplay between global processes and local places.



THINKING GEOGRAPHICALLY

Think about a cutting-edge, high-technology product that is still quite expensive to purchase and not yet broadly used (perhaps something you have read about but not even seen). Using the Internet, determine where this product is manufactured and assess why the product is manufactured there. Hypothesize which countries production will shift to and how long it will take for production costs (and the price of the product) to decrease substantially.

WHERE ARE THE MAJOR INDUSTRIAL BELTS IN THE WORLD TODAY AND WHY?

Over the last 20 years, many manufacturing regions have experienced **deindustrialization**, a process by which companies move industrial jobs to other regions with cheaper labor, leaving the newly deindustrialized region to switch to a service economy and to work through a period of high unemployment. At the same time, the places with lower labor costs and the right mix of laws attractive to businesses (often weak environmental laws and pro-free trade laws) become newly industrial regions. The new industrial regions emerge as shifts in politics, laws, capital flow, and labor availability occur.

Both Europe and the United States have large deindustrialized regions. In the United Kingdom, for example, the major industrial zones of Newcastle and Liverpool and Manchester lost much of their industrial bases

during the 1960s and 1970s. Similarly, the industrial zone of the northeastern United States (around the Great Lakes) lost much of its industrial base in the same time-frame with the loss of steel manufacturing jobs to areas of the world with lower wages. This region of the United States, which used to be called the Manufacturing Belt, is now commonly called the Rust Belt, evoking the image of long-abandoned, rusted out steel factories.

The economic processes leading to deindustrialization in some parts of the world have led to industrialization in other parts of the world. In this section of the chapter, we look at the major manufacturing belts that have developed since World War II. Two centuries after the onset of the Industrial Revolution, East Asia is the cauldron of industrialization. Some of the economic policies we discussed in Chapter 10, such as structural adjustments and import quotas, help encourage foreign direct investment in a country, and many draw industrial developers seeking to take advantage of economic breaks and inexpensive labor. From Japan to Guangdong and from South Korea to Singapore, the islands, countries, provinces, and cities fronting the Pacific Ocean are caught up in a frenzy of industrialization that has made the geographic term *Pacific Rim* synonymous with manufacturing. In this section of the chapter, we examine one newly industrialized region of the Pacific Rim, China.

China

Although some industrial growth occurred in China during the period of European colonial influence, and later during the Japanese occupation, China's major industrial expansion occurred during the communist period. When the communist planners took over in 1949, one of their leading priorities was to develop China's resources and industries as rapidly as possible.

China is a vast country and has a substantial resource base. The quality of its coal is good, the quantity enormous, and many of the deposits are near the surface and easily extracted. China's iron ores are not so productive and are generally of rather low grade, but new finds are regularly being made.

Until the early 1960s, Soviet planners helped promote China's communist-era industrial development. China was spatially constrained by the location of raw materials, the developments that had taken place before the 1949 communist takeover, the pattern of long-term urbanization in the country, the existing transport network, and the eastern clustering of the population. Like their then-Soviet allies, China's rulers were determined to speed up the industrialization of the economy, and their decisions created several major and lesser industrial districts.

Under state planning rules, the *Northeast district* (formerly known as Manchuria and called Dongbei in

China today) became China's industrial heartland, a complex of heavy industries based on the region's coal and iron deposits located in the basin of the Liao River. Shenyang became the "Chinese Pittsburgh," with metallurgical, machine-making, engineering, and other large factories. Anshan, to the south, emerged as China's leading iron- and steel-producing center. Harbin to the north (China's northernmost large city, with more than 2 million inhabitants) produced textiles, farm equipment, and light manufactures of many kinds (Fig. 12.12).

The second largest industrial region in China, the *Shanghai and the Chang (Yangzi) district*, developed in and around the country's biggest city, Shanghai. The communist planners never allowed Shanghai to attain its full potential, often favoring the Beijing–Tianjin complex over the great port at the mouth of the Chang called the Yangtzi River in its lower course. Nevertheless, the Chang district, containing both Shanghai and Wuhan, rose to prominence and, by some measures, exceeded the Northeast as a contributor to the national economy. As Figure 12.13 shows, still another industrial complex developed farther upstream along the Chang River focused on the city of Chongqing. Whether we view the Chang district as one industrial zone or three, it became a pacesetter for Chinese industrial growth, if not in terms of iron and steel production, then in terms of its diversified production and local specializations. Railroad cars, ships, books, foods, chemicals—an endless variety of products—come from the thriving Chang district.

China's large labor force could attract hundreds of companies in the world-economy's global division of labor. Add to the enormous labor force a low daily wage, and thousands of companies have moved their manufacturing to China. Rather than move entire companies to China, typically production of a good is moved to China to lower the cost of the product. Thousands of companies take advantage of the lower wages and favorable tax regulations in China's special economic zones, which has transformed cities and towns in the region.

In Chinese cities such as Dalian, Shanghai, Zhuhai, Xiamen, and Shenzhen, pollution-belching smokestacks rise above a smog-choked urban landscape. Streets are jammed with traffic ranging from animal-drawn carts and overloaded bicycles to trucks and buses. Bulldozers are sweeping away vestiges of the old China; cottages with porches and tile roofs on the outskirts of the expanding city must make way for often faceless tenements (Fig. 12.13). Decaying vestiges of the old city stand amid glass-encased towers that symbolize the new economic order.

At the same time, the Northeast has become China's Rust Belt. Many of its state-run factories have been sold or closed, or are operating below capacity. Unemployment is high, and economic growth has stopped. Eventually, the Northeast is likely to recover because its resources and its geography favor it. But under the new economic policies the dynamic eastern and southern provinces have grown

Field Note

"Beijing, Shanghai, and other Chinese cities are being transformed as the old is swept away in favor of the new. Locals, powerless to stop the process, complain that their neighborhoods are being destroyed and that their relocation to remote apartment complexes is a hardship. Urban planners argue that the 'historic' neighborhoods are often dilapidated, decaying, and beyond renovation. The housing shown in Fig. 12-13 top was demolished to make room for what is going up in Fig. 12-13 bottom, a scene repeated countless times throughout urbanizing China."

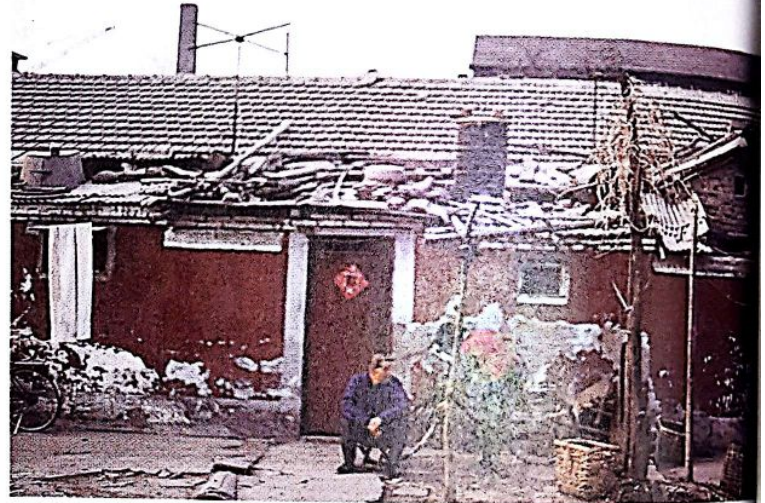


Figure 12.13 top
Beijing, China. © H. J. de Blij.



Figure 12.13 bottom
Beijing, China. © H. J. de Blij.

into major manufacturing belts and have changed the map of this part of the Pacific Rim.

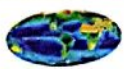
Today, China is pushing industrialization into the interior of the country. A fall 2004 issue of *The Economist* highlighted the growth of China's industrial economy and the push to spread the wealth into the interior of the country, rather than just the coastal export-oriented zones. On the coast, Shanghai recently trumped the Netherlands' Rotterdam as the world's busiest port. The Chinese government's new focus is on generating a greater economic activity in the interior. *The Economist* reported that:

[t]hough China's seaboard is still far richer than its interior, the coast has a mighty and growing hinterland, extending back hundreds of miles. The economic dynamo that is Shanghai has lit up a corridor running much of the length of the Yangtze. And, as we report, Guangdong province in the south, long one of the world's great workshops, now aspires to extend its reach a thousand miles inland, almost to the border with India. Its party secretary is promoting a plan he calls "9 + 2"; the creation of an integrated free-trade area as populous as the European Union, including nine provinces and the special administrative regions of Hong Kong and Macau. It is home to nearly a third of China's population.

China is a major recipient of industrial work that is **outsourced** or moved **offshore**. Each of the steps in commodity production that used to take place within the confines of a single factory is now often outsourced to suppliers, who focus their production and offer cost savings. When outsourced work is located outside of the country, it is called *offshore*. The movement of industry into China's interior will likely occur through the outsourcing of production from China's coasts to the interior.



THINKING



GEOGRAPHICALLY

How does a place change when deindustrialization occurs? Consider a place that has experienced deindustrialization, and research recent news articles on the Internet to find out how the economy of the place has changed since the loss of industry. What has happened to the place and its economy?

WHAT IS THE SERVICE ECONOMY, AND WHERE ARE SERVICES CONCENTRATED?

By the end of World War II, the increasing saturation of consumer markets, the tremendous growth in governmental activity, rising labor activism, and declines in

the cost of transportation and communication began to challenge the Fordist order. The challenge shifted into high gear in the early 1970s, when a sharp rise in oil prices during a period of international financial instability and inflation produced a dramatic downturn in the global economy. Under these circumstances, it became increasingly difficult for the core industrial regions to sustain their competitive advantage without significant readjustment. The direction that readjustment would take was toward mechanization and the development of service and information industries. These changes worked together with the need for new markets and the growth of multinational concerns to bring about a postindustrial or post-Fordist economic order in many of the core economies.

Service industries (tertiary industries) do not generate an actual, tangible product; instead, they include the range of services that are found in modern societies. So many different types of activities can be thought of as service activities that, as we saw in Chapter 11, specialized aspects of the service economy were given their own designations: *quaternary industries* for the collection, processing, and manipulation of information and capital (finance, administration, insurance, legal services, computer services) and *quinary industries* for activities that facilitate complex decision making and the advancement of human capacities (scientific research, higher education, high-level management).

Distinguishing among types of services is useful, given the extraordinary growth in the size and complexity of the service sector. In the global economic core, service industries employ more workers than the primary and secondary industries combined, yet these service industries range from small-scale retailing to tourism services to research on the causes of cancer. Placing all of these activities in a single category seems unwarranted.

Specificity in terminology is also useful in highlighting different phases in the development of the service sector. In the early decades of the twentieth century, the domestic and quasidestimate tertiary industries were experiencing rapid growth in the industrialized world. With the approach of World War II, the quaternary sector began expanding rapidly, and this expansion continued after the war. During the last three decades, both the quaternary and quinary sectors have experienced very rapid growth, giving greater meaning to the term *postindustrial*.

The expanding service sector in the core economies is only one aspect of the changing global economy. Accompanying, and in some cases driving, this expansion are several other developments that have already been mentioned: the increasing mechanization of production, particularly in manufacturing enterprises operating in the core; the growth of large multinational corporations; and the dispersal of the production process, with components for complex products such as automobiles and con-

sumer electronics coming from factories in many different countries.

Geographical Dimensions of the Service Economy

Deindustrialization and the growth of the service economy unfolded in the context of a world-economy that was already characterized by wide socioeconomic disparities. Only areas that had industry could deindustrialize, of course, and at the global scale the wealthier industrial regions were the most successful in establishing a postindustrial service economy. We should not be surprised that deindustrialization did little to change the basic disparities between core and periphery that have long characterized the global economy. Indeed, even in the manufacturing realm, mechanization and innovative production strategies have allowed the core industrial regions to retain their dominance. In the first decade of the twenty-first century, eastern Asia, western Russia and Ukraine, Western Europe, and North America still account for well over 75 percent of the world's total output of manufactured goods.

Despite its continued dominance in the manufacturing arena, the core has experienced some wrenching changes associated with the economic shifts of the past three decades. Anyone who has ever spent time in northern Indiana, the British Midlands, or Silesia (southern Poland and northeastern Czech Republic) knows that there are pockets of significant hardship within the core and semi-periphery (Fig. 12.14). These examples serve to remind us that not all deindustrialized regions (even in the

core) are finding their way into the tertiary sector. Location, albeit often defined in new ways, affects where and what kinds of service economies are developed.

Some secondary industrial regions have made the transition to a service economy while retaining the manufacturing base. The **Sunbelt** is the southern region of the United States, stretching through the Southeast to the Southwest. The population and economy of the Sunbelt region has grown over the last few decades, as companies from the service sector have chosen to locate in areas such as Atlanta and Phoenix where the climate is warm and the local laws welcome their presence. The eastern part of the Sunbelt served as a secondary industrial region, with Birmingham developing an iron and steel economy and Atlanta an industrial economy around cotton, tobacco, and furniture. In recent decades, high-tech and financial industries changed the economy and landscape of the Sunbelt, as can be seen in the toponyms of stadiums in the region, such as Alltel Stadium in Jacksonville, Florida, Bank of America Stadium in Charlotte, North Carolina, and Bank One Ballpark in Phoenix, Arizona.

New Influences on Location

With the striking growth of the service sector and information technologies, new factors have come into play that are affecting patterns of economic activity. Most service industries are not tied to raw materials and do not need large amounts of energy. Hence, those factors of production are markedly less important for service industries than for traditional manufacturing concerns. Market accessibility is more relevant for the service sec-

Figure 12.14

Liverpool, England, United Kingdom. With the deindustrialization of the Liverpool region, the city has lost thousands of jobs and the city's population has decreased by one-third. Abandoned streets, such as this one, are a reflection of the city's industrial decline.

© Philip Wolmuth/Panos Pictures.



Guest Field Note

Fayetteville, Arkansas

For most geographers the simple act of daily observation of the world around them becomes a profoundly satisfying habit. For the last fourteen years my daily observations have been of the rapidly changing urban/economic landscape of northwest Arkansas, one of the fastest growing metropolitan areas in the U.S. Wal-Mart originated in Bentonville, Arkansas and as it became increasingly successful it remained committed to its home in this affordable, rural corner of the Mid-South. By the early 1990s the company's growth had fueled the growth of other service industries and had contributed to the retention of several other major corporations. A recent decision to require Wal-Mart suppliers to locate offices in the region has similarly boosted growth in the area. Procter & Gamble put its office in Fayetteville, only 25 miles from Wal-Mart's home in Bentonville. Dozens of other major corporations have a presence in the region, as well. The results have been both positive and negative. Property prices have risen, with rising tax revenues and better public service provision and the corporations have proven to be generous philanthropists. However, sprawl, congestion, overcrowded schools and serious waste disposal issues have also followed. This once-rural corner of America has become a metropolitan growth pole, complete with national coffee shops, rush hour congestion and sprawling golf-course subdivisions of 6,000 square foot "European" mansions.



Figure 12.15

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Credit: Fiona M. Davidson, University of Arkansas

tor, but advances in telecommunications have rendered even that factor less important for some types of service industries.

To understand these new influences on the location of services, it is useful to go back to our distinction among tertiary, quaternary, and quinary industries. Tertiary services related to transportation and communication are closely tied to population patterns and to the location of primary and secondary industries. As the basic facilitators of interaction, they are strongly linked to the basic geography of production and consumption. Other tertiary services—restaurants, hotels, and retail establishments—are influenced mainly by market considerations. If they are located far from their consumers, they are unlikely to succeed.

Economic geographers working for corporations use these location theories. Employing technologies such as Geographic Information Systems (GIS), Remote Sensing, and Global Positioning Systems (see Chapter 1), geographers model best locations for new businesses, office complexes, government centers, or transportation connections. Major retailers not only shape the land-

scapes of the places where they choose to put stores, they also change the landscapes of their hometowns, the location of their headquarters. The most extreme example of this is Wal-Mart's headquarters in Bentonville, Arkansas. In order to have their consumer products sold in Wal-Mart stores, producers must travel to Bentonville, Arkansas to negotiate deals with Wal-Mart. In order to provide low prices to consumers, Wal-Mart negotiates lower and lower prices with major producers. To create lower-priced products, companies have moved production abroad, and to create good relationships with the world's number one retailer (with sales and net income rising to \$256.33 billion in fiscal year 2004), companies have moved into Bentonville, Arkansas (Fig. 12.15).

The location influences on quaternary services—high-level services aimed at the collection, processing, and manipulation of information and capital—are more diverse. Some of these services are strongly tied geographically to the locus of economic activity. Retail banking and various types of administrative services require a high level of interpersonal contact and therefore tend to be located near the businesses they are serving. Other

types of quaternary services, however, can operate almost anywhere as long as they have access to digital processing equipment and telecommunications. When you send in your credit card bill, it is unlikely to go to the city where the headquarters of the issuing bank is located. Instead, it is likely to go to North Dakota, South Dakota, or Nebraska, or Colorado. Similarly, many “back-office” tasks related to insurance are performed in places such as Des Moines, Iowa, not Chicago or Hartford. Many of the call centers for technical help for computers and related industries (software, hardware) are located in India and the Philippines. With relatively high levels of college attainment, vast numbers of English-speakers, and phones routed through the Internet, “help desks” need not be located down the hall or even down the street. These location curiosities occur because technological advances in the telecommunications sector have made it possible for all sorts of quaternary industries to be located far away from either producers or consumers. What matters most is infrastructure, a workforce that is sufficiently skilled but not too expensive, and favorable tax rates.

Those who work in the quinary sector tend to be concentrated around nodes of quinary activity—governmental seats, universities, and corporate headquarters. Corporate headquarters tend to be located in large metropolitan areas, whereas seats of government and universities can be found in places that were chosen long ago as appropriate sites for administrative or educational activities based on cultural values or political compromises. The American ideal of the university town (which originated in Germany) led to the establishment of many universities at a distance from major commercial and population centers, in such towns as Champaign-Urbana, Illinois; Norman, Oklahoma; and Eugene, Oregon. Political compromises led to the establishment of major seats of government in small towns. Ottawa, Canada, and Canberra, Australia, are examples of this phenomenon. The point is that historical location decisions influence the geography of the quinary sector. And it is not just university professors and government officials who are affected. All sorts of high-level research and development activities are located on the fringes of universities, and a host of specialized consultants are concentrated around governmental centers. These then become major nodes of quinary activity.

High-Technology Corridors

A high-technology corridor is an area designated by local or state government to benefit from lower taxes and high-technology infrastructure with the goal of providing high-technology jobs to the local population. The goal of a high-technology corridor is to attract technology: com-

puters, semiconductors, telecommunications, sophisticated medical equipment, and the like.

California’s Silicon Valley is a well-known example of a high-technology corridor. Several decades ago a number of innovative technology companies located their research and development activities in the area around the University of California, Berkeley, and Stanford University near San Francisco, California. They were attracted by the prospect of developing links with existing research communities and the availability of a highly educated workforce. Once some of high-technology businesses located in the Silicon Valley, others were attracted as well. Today, the Silicon Valley is home to dozens of computer companies, many of which are familiar to the computer literate (such as Cisco Systems, Adobe, Hewlett-Packard, Intel, IBM, and Netscape). The resulting collection of high-technology industries produced what Manuel Castells, Peter Hall, and John Huriyik call a **technopole**, an area planned for high technology where agglomeration built on a synergy among technological companies occurs. A similar sort of technopole developed outside Boston, where the concentration of technology-based businesses close to Harvard and the Massachusetts Institute of Technology gave rise to what is called the Route 128 high-technology corridor. The Route 128 corridor has been largely supported by the federal government rather than the local government, which supports many other technopoles.

Technopoles can be found in a number of countries in Western Europe, Eastern Asia, North America, and Australia. Few are of the scale of Silicon Valley, but they are noticeable elements of the economic landscape. Many of them have sprung up on the edges of good-sized cities, particularly near airports. In Brussels (Belgium), for example, the route into the city from the airport passes an array of buildings occupied by computer, communication, and electronics firms. In Washington, D.C., the route from Dulles International Airport (located in the Virginia suburbs) to the city passes an array of headquarter buildings of companies such as AOL, MCI, and Orbital Sciences (the Dulles Corridor). In the Telecom Corridor of Plano-Richardson (just outside of Dallas, Texas), telecom companies like Nortel and Ericsson have taken root, but so too have numerous high technology companies that are not telecom related (Fig. 12.16). In each of these technopoles, the presence of the major multinational companies attracts other startup companies hoping to become major companies, provide services to major companies, or be bought by major companies.

Many of the technology firms are multinationals, and like their counterparts in other countries, they function in an information environment and market their products all over the world. Being near raw materials or even a particular market is unimportant for these firms;

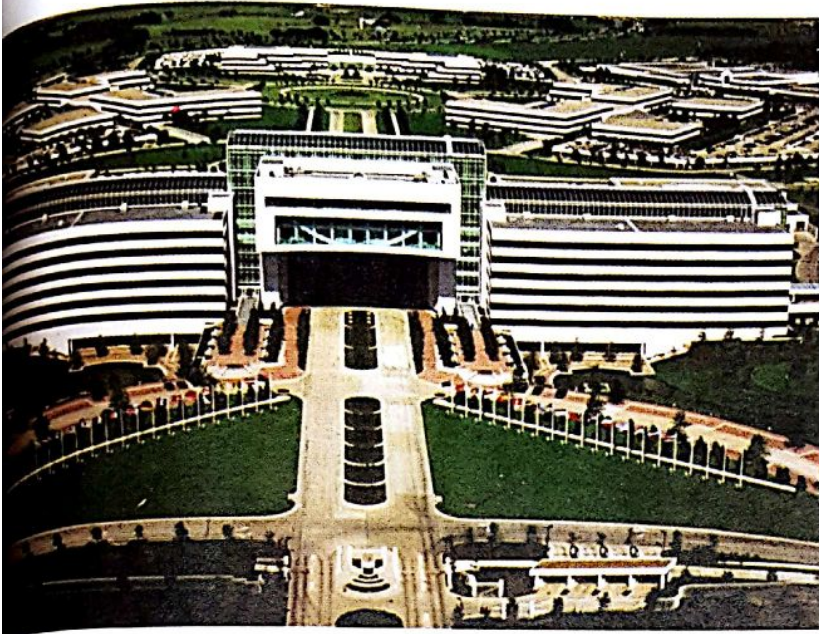


Figure 12.16
Plano-Richardson, Texas. The Plano-Richardson Telecom Corridor is located just north of Dallas and is home to telecom corporate headquarters, such as Electronic Data Systems Corporation's headquarters in this photograph. © AP Photo/EDS.

what matters to them is proximity to major networks of transportation and communication. High-technology industries have become such an important symbol of the postindustrial world that local, regional, and national governments often pursue aggressive policies to attract firms in this sector. These industries are thought to be pollution free and to offer positive benefits for the communities in which they are located. Bidding wars sometimes develop between localities seeking to attract such industries. Although high-technology industries do indeed bring a variety of economic benefits, they have some drawbacks as well. Communities that have attracted production facilities find that the manufacture of computer chips, semiconductors, and the like requires toxic chemicals and large quantities of water. And even more research-oriented establishments sometimes have negative environmental im-

pacts in that land must be cleared and buildings constructed to house them. Despite these drawbacks, the high-technology sector is clearly here to stay, and areas that can tap into it are likely to find themselves in an advantageous economic position in coming years.



THINKING



GEOGRAPHICALLY

What majors are most popular at your college or university? Consider what service/high-technology corridors may already exist near your college or university. Propose (where, why, how) a new service/high-technology corridor for your region based on what your college/university has to offer the industry.

Summary

The Industrial Revolution transformed the world economically, politically, and socially. Many of the places where industrialization first took hold have since become deindustrialized, both with the relocation of manufacturing plants and with the outsourcing of steps of the production process domestically and offshore. With changing economics, places change. Some now look like ghost towns, serving merely as a reminder that industrialization took place there. Others have booming economies and thriving towns, having kept industry or having successfully cultivated a service economy. Other places are still redefining themselves. In the next chapter, we consider another lasting effect of industrialization and deindustrialization: environmental change.