CHAPTER 12

Industry and Services

Field Note Branding the Backboard

Figure 12.1
Skopje, Macedonia. The Nike "swoosh" is everywhere—even on the backboard of a basketball hoop in this relatively poor neighborhood of Skopje, Macedonia. © Alexander B. Murphy.

Walking through a relatively poor neighborhood in Skopje, Macedonia, with the midday Muslim call to prayer ringing in my ears, the last thing I expected to see was something from my home State of Oregon (Fig. 12.1). But there it was—the unmistakable Nike swoosh on the backboard of a basketball hoop where the local kids play pick-up games!

As ubiquitous as the Nike brand of athletic shoes and its trademark swoosh are on the landscape, the cultural landscape does not tell us where Nike shoes are produced. University of Oregon track coach Bill Bowerman and one of his former runners, Phil Knight, founded Nike in 1961. Knight designed the waffle sole to create more traction for runners, and Nike sold $8000 in footwear in its first year. Nike has grown to be a giant in the shoe and apparel business with sales of over $19 billion in 2009. With headquarters in Beaverton, Oregon, a suburb of Portland, the company is far more than an Oregon concern. Although several thousand

people work for Nike in Beaverton, not a single individual in Oregon is directly involved in the process of putting a shoe together. Worldwide, some 30,000 people work directly for Nike today, and according to Nike, upwards of 800,000 workers are employed by Nike's almost 700 contract factories in 52 countries. Nike began production in the 1960s by contracting with an Asian firm to manufacture its shoes. In 1974, Nike set up its first domestic shoe manufacturing facility in the small town of Exeter, New Hampshire. By the end of that year, Nike's workforce was still modest in number. The Oregon contingent concentrated on running the company and expanding sales, while the New Hampshire and the Asian contingents focused primarily on the production of shoes.

As Nike grew to become the world's leading manufacturer of athletic shoes with almost a 40 percent share of the world's athletic shoe market, its employment numbers skyrocketed and many new manufacturing plants were established in Asia and beyond. This transformation did not translate into manufacturing jobs in Beaverton, Oregon, however. The employment opportunities now provided by Nike at its world headquarters are for the financial administrators, marketing and sales specialists, information technology directors, computer technicians, lawyers, and support personnel needed to run an international company with over $19 billion in annual revenues. The local social and economic geography of Beaverton bears little resemblance to what one might have expected in a town housing an important shoe company 85 years ago.

Eighty-five years ago, economic geographer J. Russel Smith reported that "three hundred shoe factories have sales offices located within a few blocks of each other in Boston." In a leather district close to the city, hides were imported from around the world, and tanneries prepared the hides. In a ring of suburbs around Boston, great "shoe towns" such as Haverhill, Brockton, and Lynn had factories specializing in both men's and women's shoes. Writing in 1925, Smith described the process of shoe production in the shoe factory town of Lynn:

> *Walking the streets of Lynn one realizes what concentration an industry can have; the signs upon the places of business read—heels, welts, insoles, uppers, eyelets, thread, etc., etc. It is an astonishing proof of the degree to which even a simple commodity like a shoe, so long made by one man, can be subdivided and become the work of scores of industries and thousands of people.*

Shoe salespeople periodically flocked to shoe company headquarters in Boston to learn about the company's newest offerings and filled their sample suitcases with shoes to show their clients as they made the rounds of their sales territories.

Today, the production and marketing of Nike shoes and apparel involves an elaborate global network of international manufacturing and sales. The global processes have local consequences, as each node of the Nike network is functionally specialized, dependent on other nodes, and influenced by the niche it occupies in the network.

The contemporary geography of industry and services is a product of shifting forces that have shaped production and consumption over time. In this chapter, we begin by looking at the origins of the Industrial Revolution in Great Britain and its diffusion into mainland Europe. In addition, we look at the rise of manufacturing belts in Europe, Asia, and North America. We then explore how industrialization has changed, focusing on the emergence of global labor networks and such concepts as flexible production and the global division of labor. We also consider how the expanding service economy is changing the nature of employment and the economic bases of many places.

Key Questions For Chapter 12

1. Where did the Industrial Revolution begin, and how did it diffuse?
2. How have the character and geography of industrial production changed?
3. How have deindustrialization and the rise of service industries altered the economic geography of production?

WHERE DID THE INDUSTRIAL REVOLUTION BEGIN, AND HOW DID IT DIFFUSE?

The manufacturing of goods began long before the Industrial Revolution. Families and communities produced goods in workshops, and merchants traded manufactured products throughout the world. For example, in the towns and villages of India, workshops produced goods made of iron, gold, silver, and brass. India's carpenters were artists as well as artisans, and their work was in demand wherever it could be bought. India's textiles, made on individual spinning wheels and hand looms, were considered the best in the world. These industries were sustained both by local aristocrats and by international trade. Within individual homes in rural villages of Great Britain, rural residents spun thread or wove fabric into textiles during the winter months. The quality of production varied according to place. India's textiles were so finely produced that British textile makers rioted in 1721, demanding legislative protection against imports from India.

China and Japan also possessed a substantial industrial base long before the Industrial Revolution. European industries, from the textile makers of Flanders and Britain to the iron smelters of Thüringen, had become substantial operations. However, in price and quality, Europe's products could not match those of other parts of the world. Commercial companies, including the Dutch and British East India Companies, laid the groundwork for Europe's colonial expansion. Europeans gained control over local industries in India, Indonesia, and elsewhere, profiting from political chaos that ensued in the wake of European intervention, and pitted local factions against one another. British merchants imported tons of raw fiber for their expanding textile industries. With the eventual development of technologies that allowed for mass production, the British were able to bury local industries in Asia and Africa by flooding the market with inexpensive products and forcing their colonies to purchase imported goods.

The Industrial Revolution

During the eighteenth century, markets for European goods were growing, especially in the colonies. Producers urgently needed better machines, especially for spinning and weaving. The first steps in the **Industrial Revolution** did not involve a revolutionary energy source; improved spinning wheels were powered by foot pedals, and new water looms were driven by water running downslope.

The eighteenth century was marked with a series of inventions that brought new uses for known energy sources (coal) and new machines to improve efficiencies (steam engines), which in turn enabled other new inventions including water pumps and railroads. Funding inventions and supporting inventors and inventions required money. The eighteenth century was marked by an expanding trade network focused on western Europe that brought wealth to those in a position to take advantage of changing circumstances (Fig. 12.2). These developments enabled investors to fund inventors and to perfect inventions. For example, James Watt is credited with improving the steam engine by creating a separate chamber to house the steam and by perfecting the pistons and getting them to perform correctly. The invention did not happen overnight: a series of attempts over a few decades finally worked when Watt partnered with toymaker and metal worker Matthew Boulton who inherited great wealth from his wife. Boulton financed the final trials and errors that made Watt's steam engine functional and reliable.

During the Industrial Revolution, innovations in iron manufacturing enabled the production of the steam engine and a variety of other products. In Coalbrookdale, England, in 1709, iron worker Abraham Darby found a way to *smelt* iron. By burning coal in a vacuum-like environment, the English already knew they could cook off impurities, leaving behind coke, the high-carbon portion of coal. In 1709, Darby put iron ore and coke in a blast furnace, and then pushed air into the furnace, a combination that allowed the furnace to burn at a much higher temperature than wood charcoal or coal allowed. Mixing the iron ore with limestone (to attract impurities) and water and smelting it with coke enabled iron workers to pour melted iron ore into molds (instead of shaping it with anvils), yielding *cast iron*. The use of molds allowed more consistency in iron parts and increased production of iron components. As the toponym indicates, the residents of Ironbridge, a town neighboring Coalbrookdale, still take pride in their

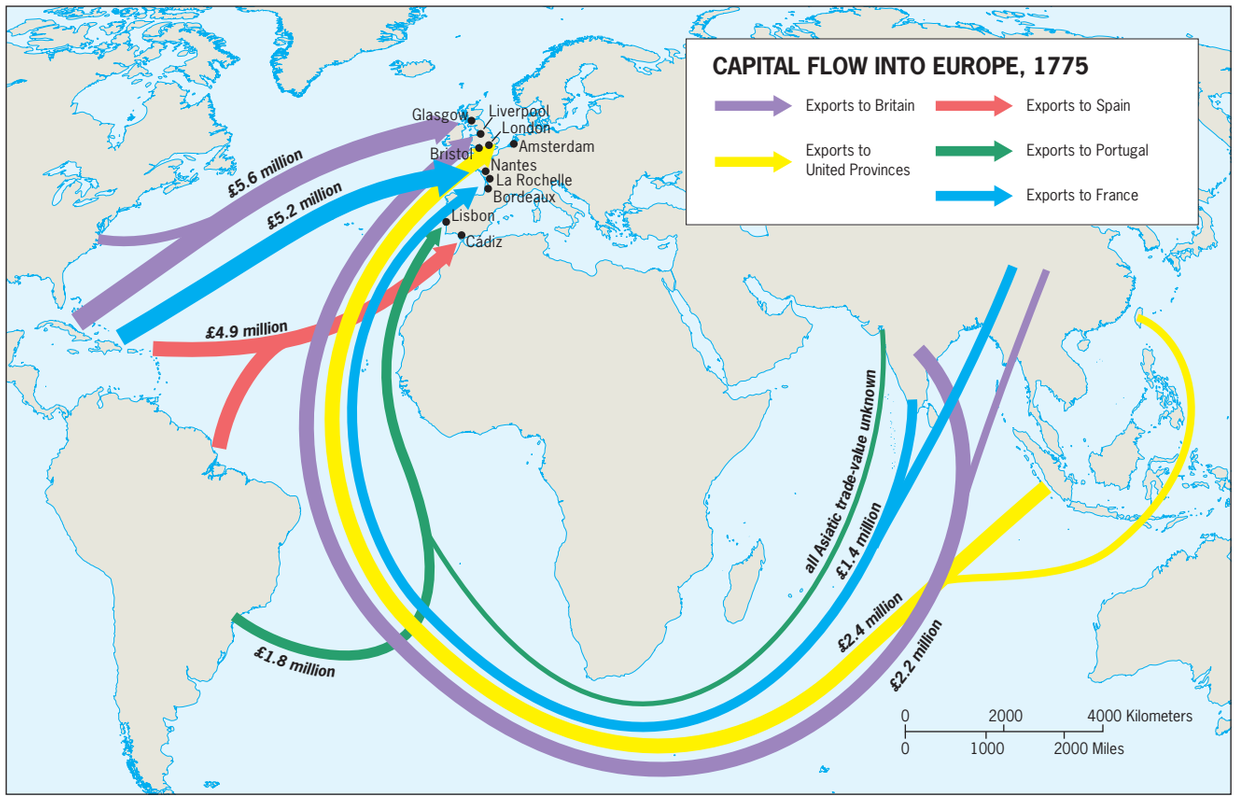


Figure 12.2

Capital Flows into Europe during the Period of European Colonialism. This map shows the major flows of capital into Europe from Europe's colonies. The capital helped fuel Europe's Industrial Revolution at the end of the 1700s and into the 1800s. *Adapted with permission from:* Geoffrey Barraclough, ed. *The Times Concise Atlas of World History*, 5th edition, Hammond Incorporated, 1998.

town's bridge, the first in the world to be constructed entirely from cast iron in 1779 (Fig. 12.3).

The steam engine, with its multitude of uses, also had a dramatic impact on industry. It was used to pump water out of coal mines, enabling coal workers to reach deeper coal seams, to power spinning wheels that spun 100 plus spools of thread at a time, to power dozens of looms in a factory all at once, and to create a new mode of transportation: the railroad. In 1830, Manchester, a center of textile manufacturing, was connected by rail to the nearby port of Liverpool, a westward-facing port that linked Britain with the colonies. In the next several decades, thousands of miles of iron and then steel track were laid. Ocean shipping also entered a new age when the first steam-powered vessel crossed the Atlantic in 1819.

With the advent of the railroad and steam ship, Great Britain enjoyed even greater advantages over the rest of the world than it did at the beginning of the Industrial Revolution. Not only did the British hold a near-monopoly over the production of many products that were in demand around the world, but it alone possessed the skills necessary to make the machines that manufactured them. Continental Europe and America wanted railroads and locomotives, and England had the know-how, the experience, and the capital to supply them. Soon, British influence around the world was reaching its peak.

Meanwhile, the spatial pattern of modern Europe's industrial development began to take shape. In the early part of the Industrial Revolution, before the railroad connected nodes of industry and reduced the transportation costs of coal, manufacturing needed to be located close to coalfields. Manufacturing plants also needed to be connected to ports, where raw materials could arrive and finished products could depart. In the first decades of the Industrial Revolution, plants were usually connected to ports by a broad canal or river system. In Britain, densely populated and heavily urbanized industrial regions developed near the coal fields (Fig. 12.4). The largest such region was the Midlands of north-central England.

Figure 12.3
Ironbridge, England. The world's first bridge made entirely of cast iron was constructed in the late eighteenth century near Coalbrookdale, England, reflecting the resources, technology, and available skills in this area at the time. © John Robertson/Alamy.

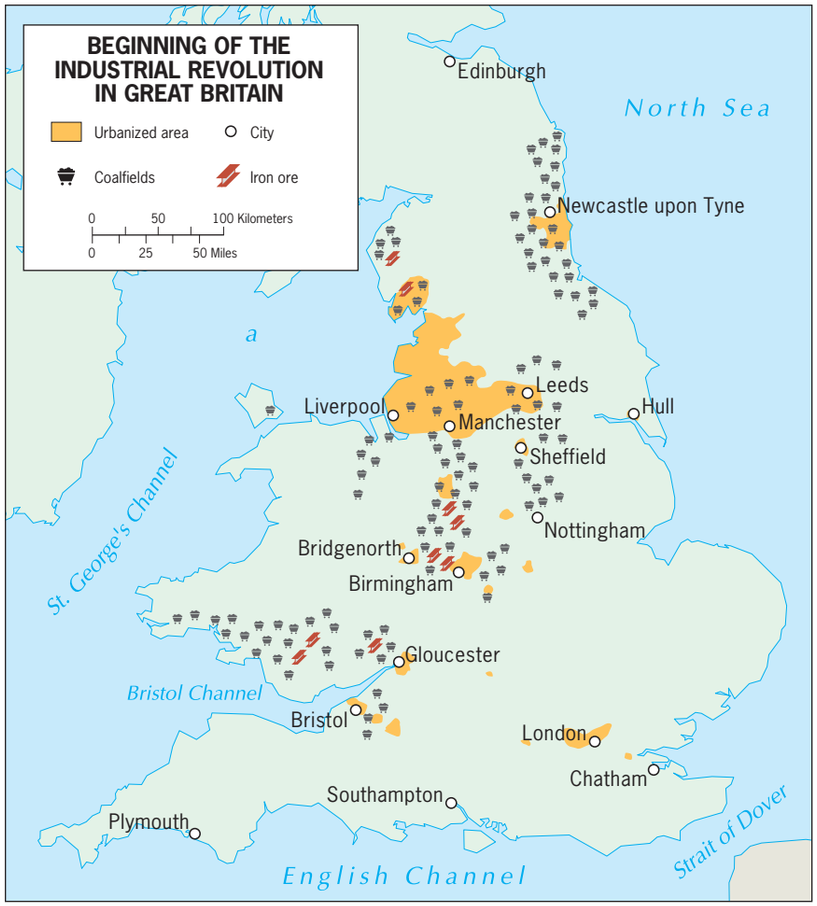


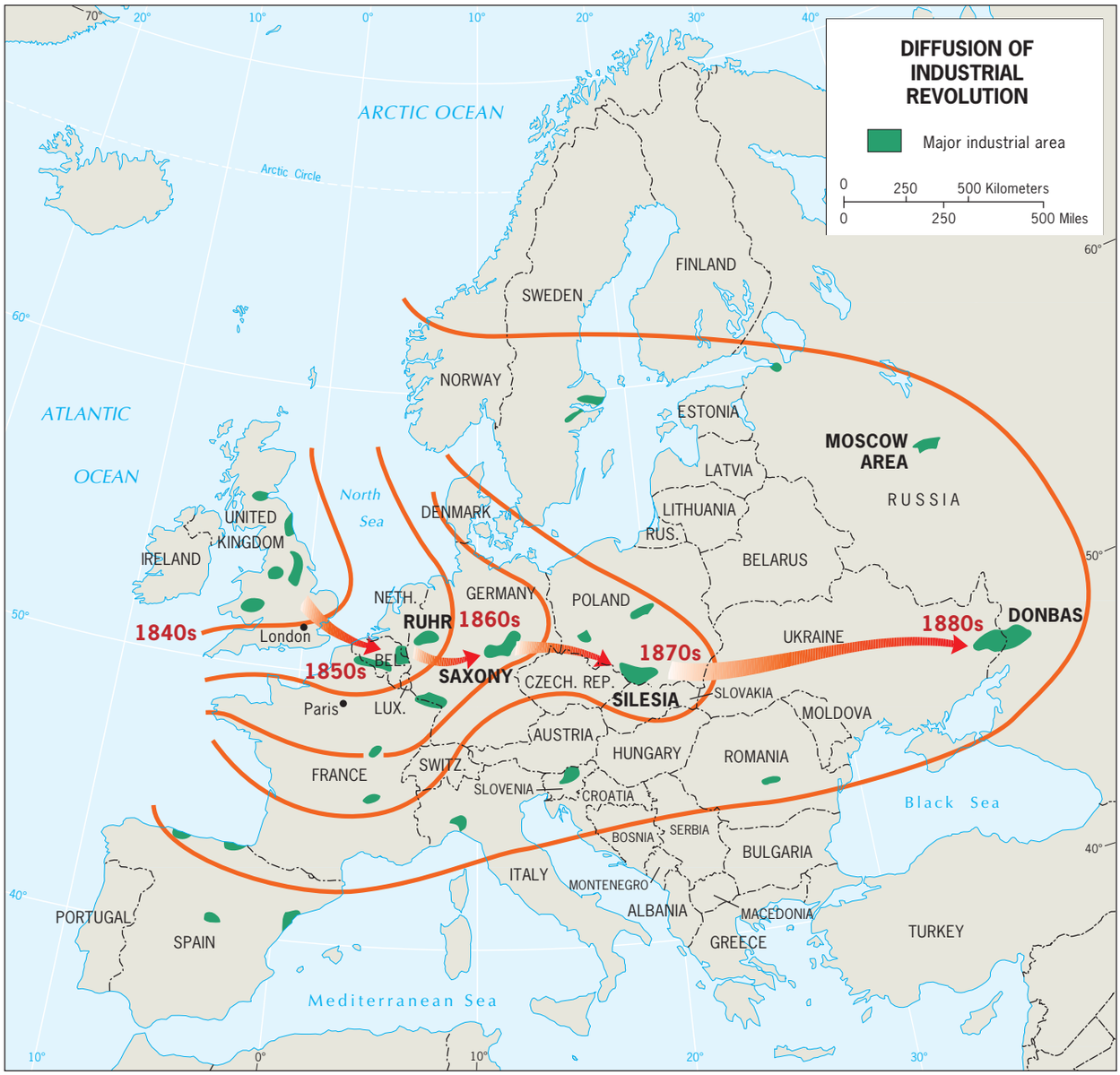
Figure 12.4
The Origins of the Industrial Revolution. The areas of Great Britain that industrialized earliest were those closest to the resources needed for industrialization: coal, iron ore, and capital. Large areas of urbanization grew near industrial zones and in the port cities where materials came in and from which industrialized products went out. *Adapted with permission from*: Geoffrey Barraclough, ed. *The Times Concise Atlas of World History*, 5th edition, Hammond Incorporated, 1998.

Diffusion to Mainland Europe

In the early 1800s, as the innovations of Britain's Industrial Revolution diffused into mainland Europe, the same set of locational criteria for industrial zones applied: proximity to coal fields and connection via water to a port remained crucial to industrial development. A belt of major coal fields extends from west to east through mainland Europe, roughly along the southern margins of the North European Lowland—across northern France and southern Belgium, the Netherlands, the German Rühr, western Bohemia in the Czech Republic, and Silesia in Poland. Colonial empires gave France, Britain, Belgium, the Netherlands, and, later, Germany, access to the capital necessary to fuel industrialization and in some cases the raw materials necessary for production. Iron ore is dispersed along a similar belt, and the map showing the pattern of diffusion of the Industrial Revolution into Europe reflects the resulting concentrations of economic activity (Fig. 12.5).

Figure 12.5

Diffusion of the Industrial Revolution. The eastward diffusion of the Industrial Revolution occurred during the second half of the nineteenth century.



Field Note

"Paris and the Paris Basin form the industrial as well as agricultural heart of France. The city and region are served by the Seine River, along which lies a string of ports from Le Havre at the mouth to Rouen at the head of navigation for oceangoing ships. Rouen has become a vital center on France's industrial map. As we approached on the river, you could see the famous cathedral and the city's historic cultural landscape to the left (north), but on the right bank lay a major industrial complex including coal-fired power facilities (although France leads Europe in nuclear energy), petrochemical plants, and oil installations. It is all part of the industrial region centered on Paris."

Figure 12.6
Rouen, France. © H. J. de Blij.

Industrial developments in one area, such as the Rühr area of present-day Germany (Germany was not consolidated into a single country until the 1870s) changed the port cities to which they are linked—in this case Rotterdam in the Netherlands. The Rhine River flows through the Rühr area and enters the sea at Rotterdam. Over the last 200 years, the Dutch have radically altered the port of Rotterdam to facilitate transportation and make it the most important port in Europe and a hub of global commerce.

Once the railroads were well established, some manufacturing moved to or expanded inside of existing urban areas with large markets, such as London and Paris. London was a particularly attractive site for industry because of its port location on the Thames River and, more importantly, because of its major role in the flow of regional and global capital. By locating itself in London, an industry put itself at the center of Britain's global network of influence. Paris was already continental Europe's greatest city, but like London, it did not have coal or iron deposits in its immediate vicinity. When a railroad system was added to the existing network of road and waterway connections to Paris, however, the city became the largest local market for manufactured products for hundreds of miles. Paris attracted major industries, and the city, long a center for the manufacture of luxury items (jewelry, perfumes, and fashions), experienced substantial growth in such industries as metallurgy and chemical manufacturing. With a ready labor force, an ideal regional position for the distribution of finished products, the presence of governmental agencies, a nearby ocean port (Le Havre), and France's largest domestic market, Paris's development as a major industrial center was no accident.

London and Paris became, and remain, important industrial complexes not because of their coal fields but because of their commercial and political connectivity to the rest of the world (Fig. 12.6). Germany still ranks among the world's leading producers of both coal and steel and remains Europe's leading industrial power (Table 12.1). By the early twentieth century, industry began to diffuse far from the original European hearth to such places as northern Italy (now one of Europe's major industrial regions), Catalonia (anchored by Barcelona) and northern Spain, southern Sweden, and southern Finland.

Diffusion beyond Europe

Western Europe's early industrialization gave it a huge economic head start and put the region at the center of a developing world economy in the nineteenth century. But, it was not long before industrialization began to

TABLE 12.1
World's Largest Oil Producers.

TOP WORLD OIL PRODUCERS, 2009

Country	Rank	Total Oil Production (million barrels per day)
Russia	1	10.12
Saudi Arabia	2	9.76
United States	3	9.06
Iran	4	4.17
China	5	3.99
Canada	6	3.29
Mexico	7	3.00
United Arab Emirates	8	2.80
Brazil	9	2.57
Kuwait	10	2.49
Venezuela	11	2.47
Iraq	12	2.40
Norway	13	2.35
Nigeria	14	2.21
Algeria	15	2.13

Data from: United States Central Intelligence Agency, World Factbook, 2011.

diffuse beyond Europe's western fringe. The **primary industrial regions** that stand out on the world map of industrial centers by the 1950s were western Europe, eastern North America, western Russia and Ukraine, and East Asia (Fig. 12.7).

North America

By the beginning of the twentieth century, the only serious rival to Europe was a territory settled predominantly by Europeans and with particularly close links to Britain, which provided links to the capital and innovations that fueled industrialization there: North America. Manufacturing in North America began in New England during the colonial period, but the northeastern States were not especially rich in mineral resources. North America, however, benefited from the ability of its companies to acquire needed raw materials from overseas sources. Industries developed along the Great Lakes where canal, river, and lakes connected with railroads on land to move resources and goods in and out of industrial centers. There was no need to go abroad in search of energy, however. Coal was the chief fuel for industries at the time, and there was never any threat of a coal shortage in the United States: U.S. coal reserves are among the world's largest and are widely distributed, being found from Appalachian Pennsylvania to the northwestern Great Plains (Fig. 12.8).

Russia and Ukraine

The St. Petersburg region is one of Russia's oldest manufacturing centers. Tsar Peter the Great planned and constructed the city not only to serve as Russia's capital but also to become the country's industrial core. Peter the Great encouraged western European artisans with skills and specializations to migrate to the region, and he imported high-quality machine building, optical products, and medical equipment. The St. Petersburg region soon attracted industries including shipbuilding, chemical production, food processing, and textile making. After World War I, the newly formed Soviet Union annexed Ukraine and used the rich resources and industrial potential of Ukraine, especially the coal-rich Donbass region, to become an industrial power. The Soviet Union (and Russia today) was resource rich. Soviet leaders directed an economic plan to industrialize the Moscow region. Communist leaders developed industries in Nizhni Novgorod, southeast of Moscow, which came to be known as the "Soviet Detroit."

East Asia

In less than a century after the beginning of the Industrial Revolution, Japan became one of the world's leading industrial countries. With limited natural resources, manufacturing in Japan depended upon raw materials

imported from other parts of the world. In the late 1800s and early 1900s, Japan colonized Korea, Taiwan, and portions of mainland China, which brought capital and resources for industry. Japan's dominant region of industrialization and urbanization is the *Kanto Plain* (Fig. 12.7), which contains about one-third of the nation's population and includes the Tokyo–Yokohama–Kawasaki metropolitan area. 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, which is a vast industrial region with steel mills, a major chemical industry, automobile manufacturing, shipbuilding, textile factories, and many other types of production.

Examine the map of diffusion of the Industrial Revolution into Europe (Fig. 12.5) and hypothesize what other characteristics (aside from the presence of coal) were necessary for industrialization to take hold in these regions.

HOW HAVE THE CHARACTER AND GEOGRAPHY OF INDUSTRIAL PRODUCTION CHANGED?

Economic geography provides context for understanding a multitude of human geographic developments. In this book, we have already made reference to economic geography to help explain globalization in Chapter 1, local and popular cultures in Chapter 4, identities and scale in Chapter 5, language loss and toponyms in Chapter 7, colonialism and political disputes in Chapter 8, and the geography of development in Chapter 10. In this section of the chapter, we incorporate economic geography principles we introduced in earlier chapters with other economic geography concepts to provide a context for understanding changes in the character and geography of manufacturing and service industries since World War II.

In Chapter 1, we defined **globalization** as a set of processes that are increasing interactions, deepening relationships, and heightening interdependence without regard to country borders. We explained that globalization is also a set of outcomes that are felt from these global processes—outcomes that are unevenly distributed and differently manifested across the world. Improvements in transportation and communication technologies are at the root of globalization. The improvement of sailing ships and navigation methods helped establish global trade routes and the first wave of colonialism (Chapter 8). The advent of the steam ship, the diffusion of railroads, and the telegraph and then telephone quickened global trade and connected empires in the second wave of colonialism. Through colonialism and trade, capitalism became the economic foundation of the world-economy (Chapter 8).

Fordist Production

The manufacturing boom of the twentieth century can be traced in part 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 inexpensive 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 from 1945 to 1970 is known as **Fordist**. In addition to of its role in facilitating mass production, economic geographers also see the Fordist system as encompassing a set of political-economic structures (corporations and political institutions supporting each other) and financial orders (such as the Bretton Woods arrangement, under which countries adopted the gold standard, agreeing to peg the values of their currency to the price of gold) that supported mass production by corporations.

The Fordist period is marked by a surge in both mass production and mass consumption. On the Ford assembly line, machines replaced people, and unskilled workers instead of craftsmen worked on the assembly lines. Ford paid his workers a good wage, and droves of job seekers migrated to the Detroit area to work in the automobile industry (see Chapter 9). Ford's goal was to mass produce goods at a price point where his workers could afford to purchase them. Production of automobiles at Ford's River Rouge plant in Dearborn, Michigan (Fig. 12.9) exemplified the **vertical integration** of production common during the Fordist period. Ford imported raw materials, from coal to rubber to steel, from around the world and brought them to his plant on the River Rouge in Dearborn, just west of Detroit. The massive River Rouge Ford plant is better described as an industrial complex. The Henry Ford Foundation describes Ford's goal in building the complex of 93 buildings with more than 120 miles of conveyor belts that covered an area 1 by 1.5 miles as follows: "Henry Ford's ultimate goal was to achieve total self-sufficiency by owning, operating and coordinating all the resources needed to produce complete automobiles." The River Rouge complex included a power plant, boat docks, fire stations, a police department, and a railroad.

Under Fordist production, distance was a major consideration in the location of industry. For example, in the

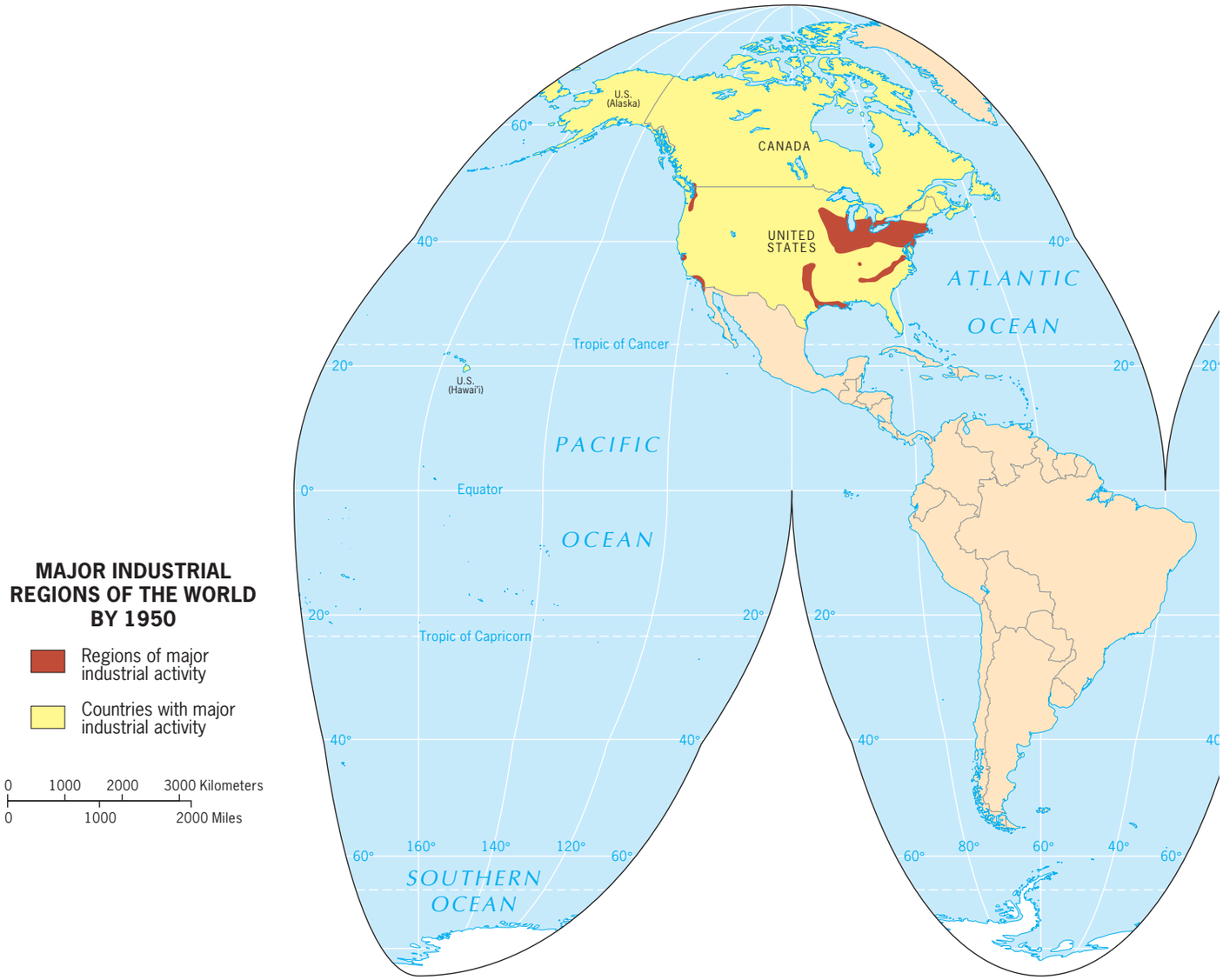
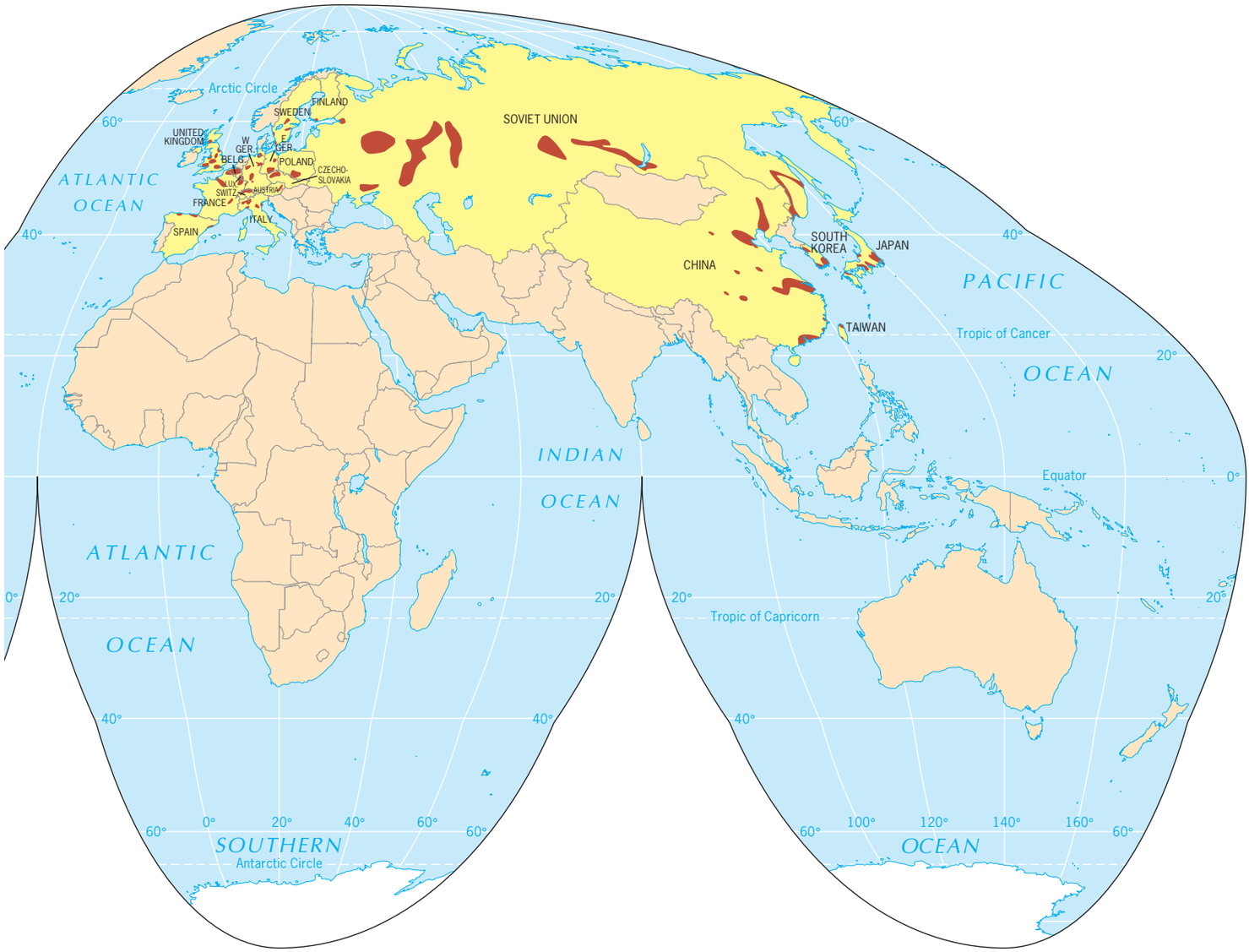


Figure 12.7
Major Industrial Regions of the World in 1950. This map shows the major industrial districts of Europe, North America, Russia, and East Asia in approximately 1950. © E. H. Fouberg, A. B. Murphy, H. J. de Blij, and John Wiley & Sons, Inc.

United States, furniture manufacturing shifted from Boston in 1875 to Cincinnati by 1890 and then Grand Rapids, Michigan by 1910. Furniture manufacturing took off in North Carolina when northern entrepreneurs built manufacturing plants there in the early 1900s to take advantage of North Carolina's "abundance of lumber, low-cost labor combined with Reconstruction era wood-working skills and attitudes, and infrastructure providing good proximity" to customers as well as a humid climate (Walcott 2011, 10). High Point and other furniture centers clustered together to take advantage of not only the location and resources but also the services and infrastructure that grew to accommodate and aid furniture manufacturers in the region.

Finished furniture is a bulky commodity. Whenever furniture manufactures have considered locating outside of North Carolina and the Piedmont region or moving operations abroad, one of the key issues has been the **friction of distance**: the increase in time and cost that usually comes with increased distance over which commodities must travel. If a raw material has to be shipped hundreds of miles to a factory, rather than being manufactured right next door, the friction of distance increases. A corollary to



the concept of the friction of distance is what geographers call distance decay (see Chapter 4), which assumes that the impact of a function or an activity will decline as one moves away from its point of origin. Distance decay suggests that manufacturing plants will be more concerned with serving the markets of nearby places than more distant places. This basic principle is important in understanding the locational dynamics of furniture manufacturing. The vast majority of North Carolina's furniture customers were in the northeast or in the southeast. Either way, furniture could be trucked to customers in less than a day.

Agglomeration

British economist Alfred Marshall (1842–1924), a leader in economic theory who is often credited with pioneering the field of industrial location theory, argued that a particular industry, whether automobile manufacturing or furniture production, clusters in an area. He called this process *localization*. Marshall held that localized industries would attract workers with industry-specific skills, share information, and attract industry-specific support services.

Marshall explained why industries would cluster, and German economic geographer Alfred Weber

Figure 12.8

Major Deposits of Fossil Fuels in North America. North America is the world's largest energy consumer, and the country is also endowed with substantial energy sources. © H. J. de Blij, P. O. Muller and John Wiley & Sons, Inc.

(1868–1958) developed a basic model explaining where industries would cluster. Weber helped develop locational studies in economic geography by focusing on the location of manufacturing facilities. In *Theory of the Location of Industries* (1909), Weber focused on specific factors that would pull industry to particular locations.

Weber's **least cost theory** focused on a factory owner's desire to minimize three categories of costs. The first and most important of these categories was *transportation*. Weber suggested that the site where transportation costs are lowest is the place where it is least expensive to bring raw materials to the point of production and to distribute finished products to consumers. The second cost was that of *labor*. Higher labor costs tend to reduce the margin of profit, so a factory might do better if it is farther away from raw materials and markets if cheap labor compensates for the added transport costs.

The third factor in Weber's model was similar to Marshall's theory of localization. Weber described the advantages afforded by like industries clustering, which

Figure 12.9
Dearborn, Michigan. The industrial complex of the Ford River Rouge Plant is shown in this photograph, which was taken in the 1940s. © Alamy.

he termed **agglomeration**. When a substantial number of enterprises cluster in the same area, as happens in a large industrial city, Weber held that the industries can assist each other through shared talents, services, and facilities. For example, all manufacturers need office furniture and equipment. One or more office equipment store in a city could provide supplies for all industries in the area. As such, agglomeration can make a big-city location more attractive, potentially overcoming higher transportation or labor costs.

Flexible Production and Product Life Cycle

Fordist production was based on both mass production and mass consumption. Money flowed through the world-economy as consumers purchased like items often manufactured in large-scale complexes. As the global economy became more integrated and transportation costs decreased, the advantages of concentrating production in large-scale complexes declined. As a result, in the latter third of the twentieth century many enterprises began moving toward a *post-Fordist*, flexible production model. The post-Fordist model refers to a set of production processes in which the components of goods are made in different places around the globe and then brought together as needed to meet customer demand. The term **flexible production systems** is used to describe this state of affairs because firms can pick and choose among a multitude of suppliers and production strategies in distant places, and then quickly shift their choices in response to adjustments in production costs or consumer demand. These systems are thus designed to respond to consumers who want the newest/best/greatest offering or a custom offering that helps distinguish them from other consumers.

Capitalism continues as an economic system not only because people consume but also because producers continue to promote and respond to consumer demand. They do this by adapting to changing consumer preferences and by commodifying goods. Through the process of **commodification**, goods that were not previously bought, sold, and traded gain a monetary value and are bought, sold, and traded on the market. A new good, such as a mobile tablet, starts at a high price and becomes somewhat of a status symbol because of its high cost. The longer the mobile tablet is on the market and the greater the number of firms producing mobile tablets, the lower the price drops. Eventually, companies move the production of mobile tablets to lower the price of production and thus the price of the good, in order to compete. Changes in the production of a good over time take place as part of a **product life cycle**.

Following the production of televisions around the globe gives us insight into the workings of the product life cycle, the global division of labor, and 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, including 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 out of the country. 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—and more recently into China and South Korea.

The Global Division of Labor

Tracing the production of televisions throughout the world over time helps us see how the **global division of labor** currently works. Under this arrangement, labor is concentrated in the global economic periphery and semiperiphery to take advantage of lower labor costs, whereas research and development is primarily located in the core. But nothing is fixed, and as methods of assembly and products themselves change, production may be moved to take advantage of infrastructure, skilled labor, and accessible markets.

Geographically, the concept of time–space compression is the easiest way to capture the dramatic temporal and spatial changes taking place in the contemporary global economy. Time–space compression is based on the idea that developments in communication and transportation technologies have accelerated the speed with which things happen and made the distance between places less significant (see Chapter 4). David Harvey, who coined the term *time–space compression*, argues 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 affect New York just hours 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 not just close to raw materials, but close to the point of consumption. Thus, the major industrial belt in the United States was in the Northeast both because of readily available coal and other raw materials and because the major concentration of the North American population was there. With **just-in-time delivery** this has changed. 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. In turn, corporations can draw from labor around the globe for different components of production.

Advances in information technologies and shipping coupled with the global division of labor enable companies to move production from one site to another based on calculations of the "new place-based cost advantages" in a decision process geographer David Harvey has called a **spatial fix** (Walcott 2011, 7). In choosing a production site, location is only one consideration. "Distance is neither determinate nor insignificant as a factor in production location decisions" today (Walcott 2011, 9).

Major global economic players, including General Motors, Philips, Union Carbide, and Exxon, take advantage of low transportation costs, favorable governmental regulations, and expanding information technology 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, 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 that remains in the core is usually highly mechanized. Technologically sophisticated manufacturing also tends to be sited in the core because both the expertise and the infrastructure are there.

Where to produce or assemble a good is only one small aspect of decisions made in a commodity chain (see Chapter 10) for any good produced in an economy based on flexible production. A large part of business decision making today focuses on sourcing, on where to get the component parts that are eventually assembled. Business magazines and textbooks discuss nimble sourcing decisions, proving that not only is production flexible, but the sourcing is too.

China and other lower wage countries are major recipients 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, which focus their production and offer cost savings. When outsourced work is located outside of the country, it is said that it takes place *offshore*.

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 (service) 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, consumption is still concentrated in the core and, increasingly, among the wealthy and middle classes of the semi-periphery. Newly industrializing countries of the semi-periphery send manufactured goods to the core. Trade flows among countries in the periphery are typically low because, for peripheral countries, the dominant flow of goods consists of exports to the core.

Made in America or Designed in America?

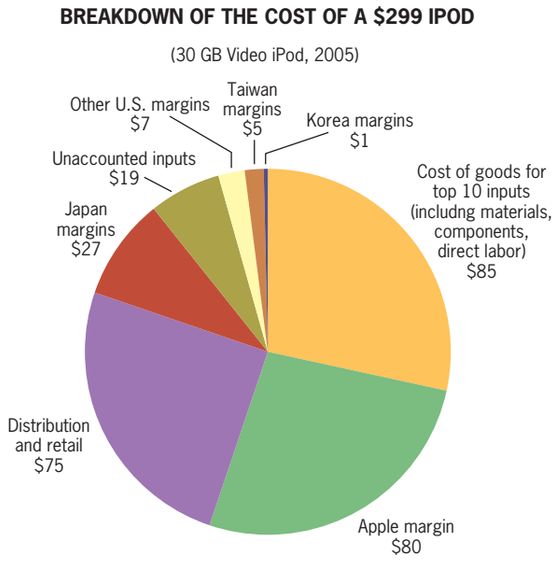
In 2011, ABC World News featured a segment called "Made in America," where journalists knocked on doors and challenged homeowners to look at every item in their home for the "made in" sticker. The news crew then helped families move all goods not "Made in America" onto the street so the family could visualize how much of what is in their home is made in the America and how much is made elsewhere in the world. The ABC World News crew then, according to their website, "took on the challenge of trying to fill three rooms in a home entirely with 100 percent American-made products."

Would an iPod get to stay in the house redesigned by ABC World News? When you open a new iPod or other Apple product, a sticker greets you that says "Designed in California." "Designed in" instead of "Made in?" The iPod would not pass the ABC "made in" test, but we should ask whether it is better for the American economy for a good to be made in or designed in America. Three authors asked this exact question in the journal *Communications of the ACM* in 2009. Linden et al. asked who captures the value in a $299 iPod touch.

Using published sources on computer machinery and component parts, the authors figured out the iPod supply chain and calculated the value added at each step in the commodity chain (Fig. 12.10). The components of an iPod are produced by companies in Japan, Korea, Taiwan, and China. The most expensive component in the iPod is the hard drive, which is produced and designed by Toshiba, a Japanese company. One component that sets the iPod apart from other MP3 players is the microchip that controls access to songs and movies on the iPod. The microchip is housed in a wheel on the iPod classic and iPod nano and is produced by PortalPlayer, a Californian company with offices in India.

Figure 12.10

Breakdown of the cost of a $299 iPod. *Courtesy of*: Greg Linden, Kenneth L. Kraemer, and Jason Dedrick. Who captures value in a global innovation network? The case of Apple's iPod. *Communications of the ACM*, March 2009, vol. 52, 3.



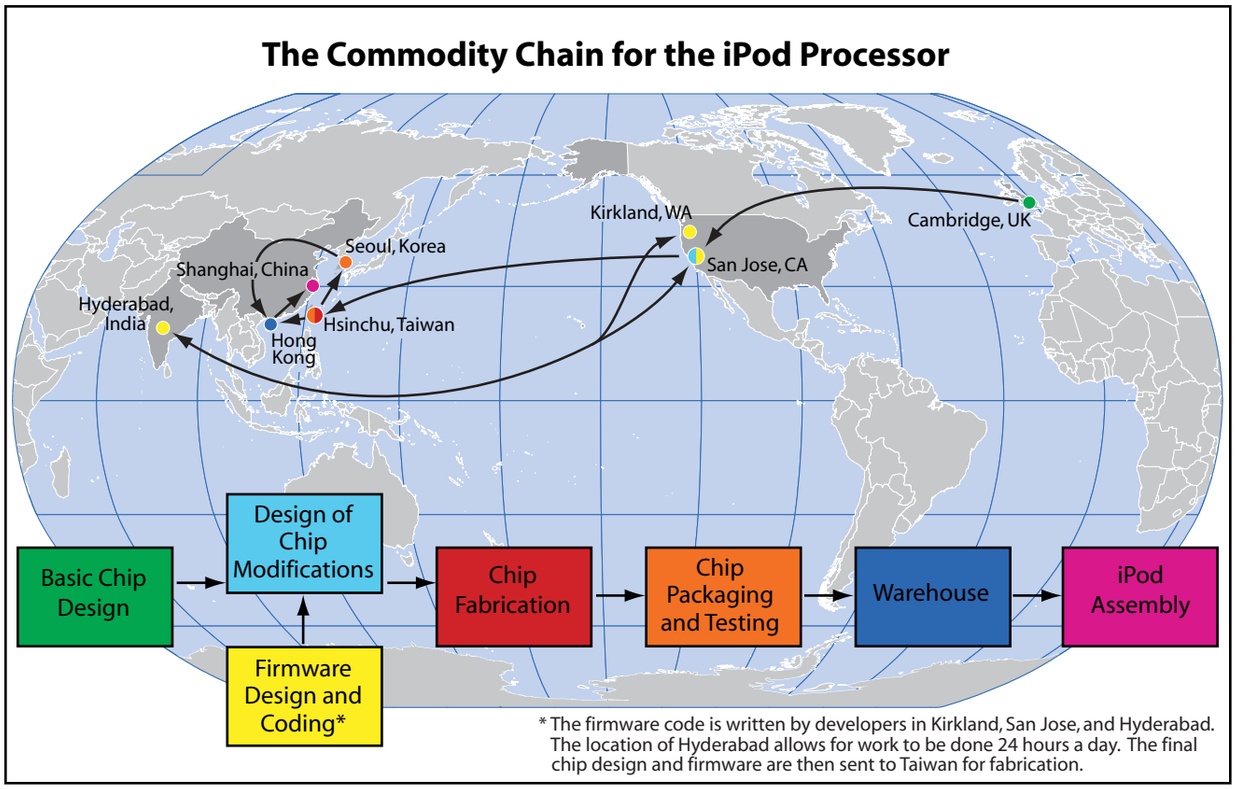


Figure 12.11
Inside an iPod: The PortalPlayer World. Map designed by Stephen P. Hanna, based on information from: Andrew Leonard, "The World in the iPod" Spiegel Online, August 8, 2005.

In his piece on PortalPlayer called "The World in an iPod," journalist Andrew Leonard explains that PortalPlayer has a 24-hour development cycle because engineers in California and in India can work around the clock (with time zones 12 hours apart) to design and redesign the microchip. The actual microchips are created in Taiwan. The commodity chain for PortalPlayer (Figure 12.11) reveals how people and places around the world interconnect to design and create the company's microchip.

Linden et al. estimate that the PortalPlayer component is a small fraction of the cost of an iPod but that the research and development that goes into PortalPlayer and other innovative components that differentiate the iPod from its competitors receive more value from the sale of one iPod than does Invotec, the company that actually assembles the iPod. Linden et al. concluded that "While the iPod is manufactured offshore and has a global roster of suppliers, the greatest benefits from this innovation go to Apple, an American company, with predominantly American employees and stockholders who reap the benefits" (2009, 143) and that the second greatest benefit goes to the two Japanese companies that produce components that help differentiate the iPod, the hard drive and the display screen.

The act of consumption is an end point of a commodity chain. It is also the beginning of the product's afterlife. What happens when you discard or donate the item? What are the costs or benefits created by the funds (whether funds for a charity or profits for a corporation) generated by your purchase? Corporations such as Apple, which sells the iPod, work to reduce consumer waste by recycling iPods and computers, and by offering discounts to consumers who recycle their old iPods. Nonetheless, in many global cities in poorer parts of the world, adults and children work in garbage dumps to recover valuable copper wire and other components of computers and related electronic devices made by Apple and its competitors.

Tracing the commodity chain of the iPod demonstrates that rarely does the consumption of a particular product have an unambiguous positive or negative consequence. In addition to the fact that components are made all over the world and assembly is only one small part of the commodity chain, we should consider the environmental consequences of steps in commodity chains. Jobs created by industry in one place can cause environmental damage in another. Consumption, or purchasing an item, is the end point in a commodity chain that affects places in a variety of

different ways. The importance of studying the geography of commodity chains is that such an undertaking sheds light on the origins of products and helps explain why production occurs where and how it does and how production affects places and peoples at each step in the chain.

Major Influences on the Contemporary Geography of Manufacturing

As the iPod example illustrates, multinational corporations frequently subcontracts many of the steps in the production and retailing process to outside companies or subsidiaries, including the extraction of raw materials, manufacturing, marketing, and distribution. As such, industrial location is not just influenced by wage rates. The other key variables include transportation costs and options, regulatory constraints, expertise, and access to energy.

Transportation

Relatively inexpensive transportation is one of the foundations on which the flexible production system rests. Whereas a century ago the cost of transportation accounted for half or more of the final price of many goods traveling over significant distances, that figure is now down to five percent or less. In an era of vastly improved infrastructure, relatively cheap oil, and container ships, spatially disaggregated production systems are cost effective.

Efficient transportation systems enable manufacturers to purchase raw materials from distant sources and to distribute finished products to a widely dispersed population of consumers. Cost is not the only issue. Manufacturers 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 semitrailer truck, on a barge, or on a railroad car. This innovation lowered costs and increased flexibility, permitting many manufacturers to pay less attention to transportation in their location decisions. Refrigerated containers also ease the shipment of perishable 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 no more than six hours by rail or truck from 85 percent of the population of western Europe.

The container system and the growth in shipping at Rotterdam and other Benelux ports have combined to foster the development 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. Over 50 percent of all goods entering the European Union pass through Rotterdam or Amsterdam (also in the Netherlands).

Regulatory Circumstances

Regional trade organizations such as the North American Free Trade Agreement (NAFTA) and the European Union (EU) have trade agreements that influence where imported goods (and components of goods) are produced. Similarly, governments have individual agreements with each other about production and imports, and most governments (153 as of 2011) 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 a 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 certain Chinese imports. These quotas buffered the impact of Chinese goods on domestic producers. But most of the quotas have now expired, paving the way for mass exports from China to the United States and Europe.

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 (see Chapter 8). 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.

Regulations at the state and local scales matter as well. Not infrequently, the location of industrial operations is influenced by a range of state and local regulations that influence the cost of production. These range from tax regulations to environmental and safety standards. In many cases, governments actively seek to recruit industry through incentives that include tax breaks, subsidies, and exemptions from particular bureaucratic requirements. Export processing zones such as the *maquiladoras* discussed in Chapter 10 provide a case in point. There are now many hundreds of such zones around the world, and they are shaping the global geography of industry.

Energy

During the mid-twentieth century, the use of coal as an energy source in industry increasingly gave way to 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 are far too limited to meet demand. 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. Earlier in the chapter, we explained that at the start of the Industrial Revolution manufacturing plants were often established on or near coal fields; today major industrial complexes are not confined to areas 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 energy costs were low. When the crisis waned, national energy-conservation goals were modified, and in the early 2000s the United States' reliance 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.

U.S. consumption of petroleum and natural gas today is about 20 percent of the annual world total. By 2007, the United States required more than 20.6 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 10 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. More so than many countries, the United States taps the oil that it has. In 2009 the country was the third largest oil producer in the world (Fig. 12. 12). Even with this level of production, the United States remains heavily dependent on foreign oil supplies, with all the uncertainties that involves. There is, consequently, a push for the United States to expand offshore drilling in the hope of expanding its production of oil. Many oppose the idea on environmental grounds, however, pointing to the major BP oil spill that occurred in the Gulf of Mexico in 2010 as an example of what can happen when offshore oil resources are exploited without careful safeguards.

The United States leads world demand and consumption not just in oil, but in natural gas as well. As Figure 12.8 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 2006, there were over 4 million kilometers (2.5 million miles) of pipelines, including parts of a new pipeline designed to carry Alaskan natural gas across Canada to the U.S. market.

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 countries 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 Southwest Asia, 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 set of circumstances has produced an uneasy relationship (at best) between countries in the oil producing region and the major industrial powers of the "West."

New Centers of Industrial Activity

As a result of advances in flexible production, over the last 30 years many older manufacturing regions have experienced **deindustrialization**, a process by which companies move industrial jobs to other regions, leaving the newly deindustrialized region to work through a period of high unemployment and, if possible, switch to a service economy (see the last major section of this chapter). 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) have become newly industrial regions. The new industrial regions emerge as shifts in politics, laws, capital flow, and labor availability occur.

East Asia has become a particularly important new region of industrialization. Some of the economic policies we discussed in Chapter 10, such as structural adjustments and import quotas, help encourage foreign direct investment, and many draw industrial developers seeking to take advantage of economic breaks and inexpensive labor. From Taiwan 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.

The Rise of East Asia

Throughout the better part of the twentieth century, Japan was the only global economic power in East Asia, and its regional dominance seemed beyond doubt. Other nodes of manufacturing existed, but these were no threat, and certainly no match, for Japan's industrial might. The picture began to change with the rise of the so-called Four Tigers of East and Southeast Asia: South Korea, Taiwan, Hong Kong, and Singapore in the 1960s and 1970s. Benefiting from the shift of labor-intensive industries to areas with lower labor costs, government efforts to protect developing industry, and government investment in education and training, the tigers emerged as the first **newly industrializing countries (NICs)**. South Korea developed significant manufacturing districts exporting products ranging from automobiles and grand pianos to calculators and computers. One of these districts is centered on the capital, Seoul (with 10 million inhabitants), and the two others lie at the southern end of the peninsula, anchored by Pusan and Kwangju, respectively. Taiwan's economic planners promoted high-technology industries, including personal computers, telecommunications equipment, precision electronic instruments, and other high-tech products. More recently the South Koreans have moved in a similar direction.

Just a trading colony five decades ago, Hong Kong exploded onto the world economic scene during the 1950s with textiles and light manufactures. The success of these industries, based on plentiful, cheap labor, was followed by growing production of electrical equipment, appliances, and other household products. Hong Kong's situational advantages contributed enormously to its economic fortunes. The colony became mainland China's gateway to the world, a bustling port, financial center, and **break-of-bulk point**, where goods are transferred from one mode of transport to another. In 1997 China took over the government of Hong Kong from the British, and a showplace of capitalism came under Chinese communist control. But the Chinese can ill afford to undercut Hong Kong's economic dynamism. Hence, Hong Kong has the status of a Special Administrative District in China, which gives it a high degree of autonomy from the mainland.

The industrial growth of Singapore also was influenced by its geographical setting and the changing global economic division of labor. Strategically located at the tip of the Malay Peninsula, Singapore is a small island inhabited by a little over 4 million people, mostly ethnic Chinese but with Malay and Indian minorities. Fifty years ago, Singapore was mainly an entrepôt (transshipment point) for such products as rubber, timber, and oil; today, the bulk of its foreign revenues come from exports of manufactured goods and, increasingly, high-technology products. Singapore is also a center for quaternary industries, selling services and expertise to a global market.

Rapid economic growth entails risks, and in 1997 risky lending practices and government investment decisions caused Thailand's currency to collapse, followed by its stock market; banks closed and bankruptcies abounded. Soon Malaysia and Indonesia were affected, and by early 1998 one of the Four Tigers, South Korea, required a massive infusion of dollars (provided by the International Monetary Fund, a Washington-based bank) to prevent economic chaos. But the reforms that allowed the region to overcome these economic troubles served to strengthen East and Southeast Asia's economies, and the Four Tigers continue to exert a powerful regional—and international—economic role.

The Chinese Juggernaut

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 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 as 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 industrial development. China was spatially constrained by the location of raw materials, the development that had taken place before the 1949 communist takeover, the pattern of long-term urbanization in the country, the existing transport network, and the location of the population, which was clustered mostly in the east of the country. Like their Soviet allies, China's rulers were determined to speed up the industrialization of the

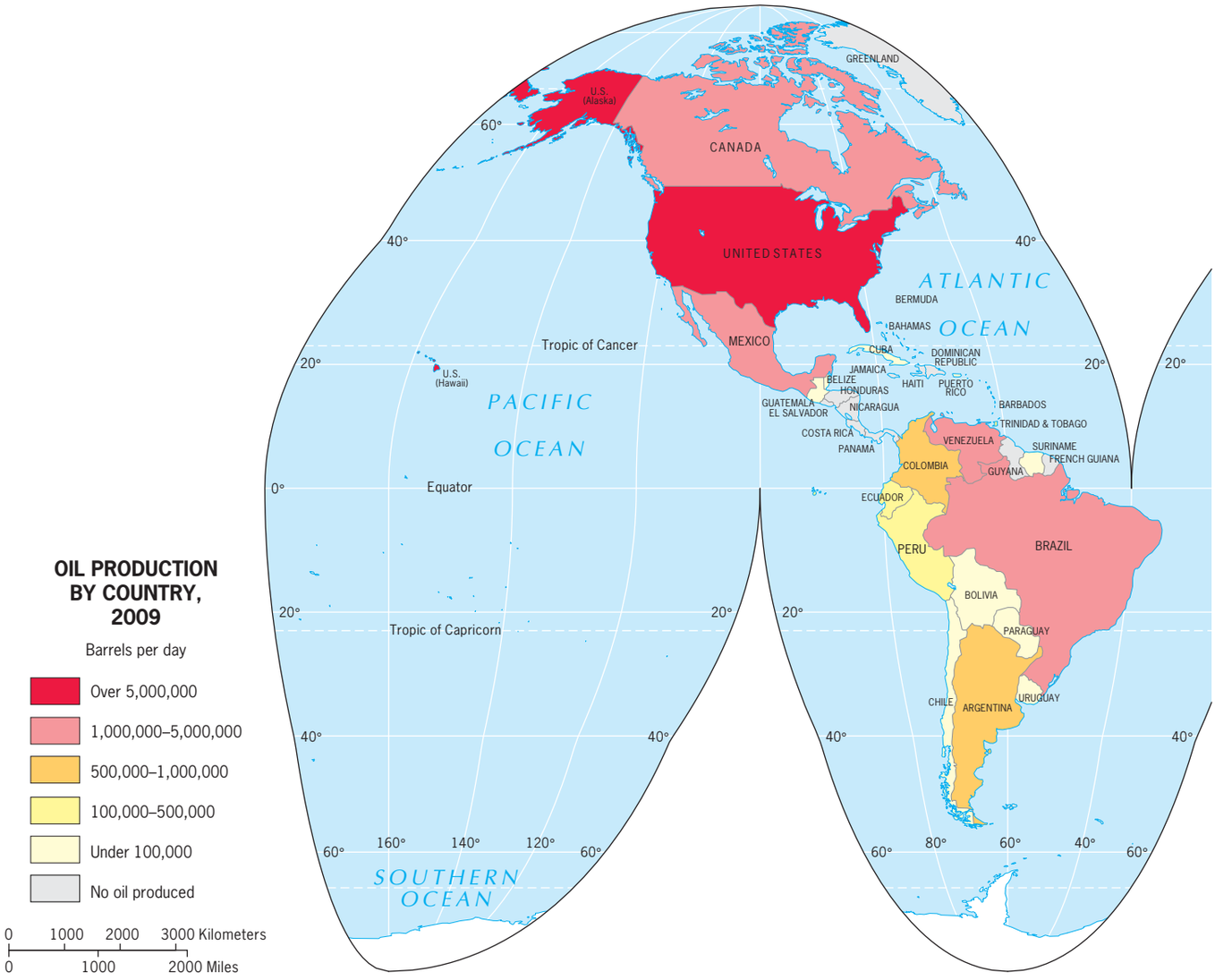
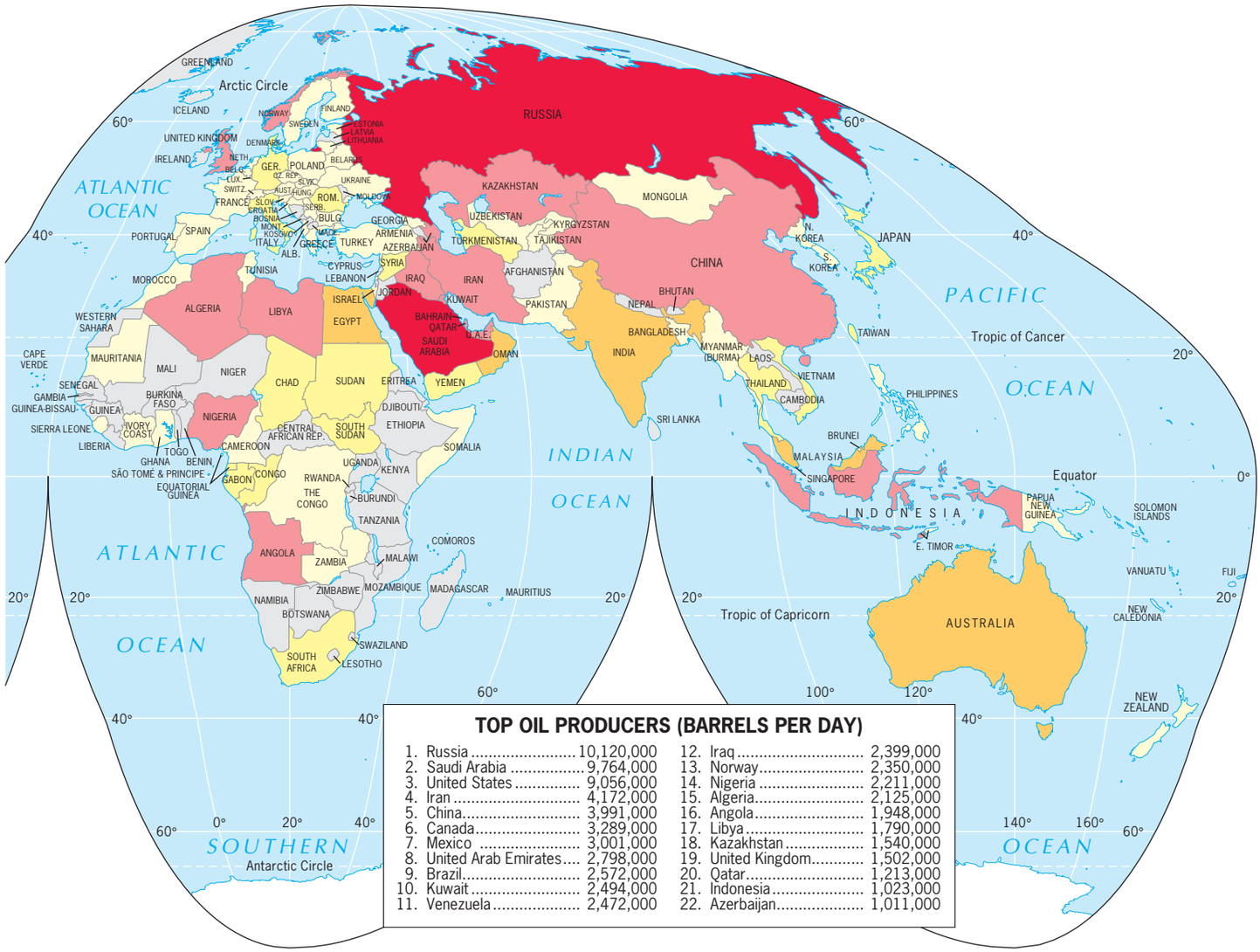


Figure 12.12
Oil production by country, 2009. Data from: United States Central Intelligence Agency, World Factbook, 2011.

economy, and their decisions created several major and lesser industrial districts.

Under state planning rules, the *Northeast district* (formerly known as Manchuria and now called Dongbei) 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 industries. 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 5.4 million inhabitants) produced textiles, farm equipment, and light manufactures of many kinds (Fig. 12.13).

The second largest industrial region in China, the *Shanghai and the Chang Jiang district*, developed in and around the country's biggest city, Shanghai. The Chang Jiang district, containing both Shanghai and Wuhan, rose to prominence and, by some measures, exceeded the Northeast as a contributor to the national economy. Another industrial complex that developed farther upstream, along the Chang Jiang River, focused on the



TOP OIL PRODUCERS (BARRELS PER DAY)

1. Russia	10,120,000	12. Iraq	2,399,000
2. Saudi Arabia	9,764,000	13. Norway	2,350,000
3. United States	9,056,000	14. Nigeria	2,211,000
4. Iran	4,172,000	15. Algeria	2,125,000
5. China	3,991,000	16. Angola	1,948,000
6. Canada	3,289,000	17. Libya	1,790,000
7. Mexico	3,001,000	18. Kazakhstan	1,540,000
8. United Arab Emirates	2,798,000	19. United Kingdom	1,502,000
9. Brazil	2,572,000	20. Qatar	1,213,000
10. Kuwait	2,494,000	21. Indonesia	1,023,000
11. Venezuela	2,472,000	22. Azerbaijan	1,011,000

city of Chongqing. The Chang Jiang district has become a pacesetter for Chinese industrial growth, if not in terms of iron and steel production, at least in terms of its diversified production and local specializations. Railroad cars, ships, books, foods, chemicals—an endless variety of products—come from the Chang Jiang district.

China's large labor force has attracted hundreds of international companies. In addition to the enormous labor force, wages are comparatively low, one factor in why firms have relocated their manufacturing to China. Rather than move entire companies, however, the production and sourcing of goods is typically outsourced to China, largely in order to lower the cost of production. China's special economic zones have transformed cities and towns in the region by attracting corporations seeking a favorable business climate.

In Chinese cities including Dalian, Shanghai, Zhuhai, Xiamen, and Shenzhen, pollution-belching smokestacks rise above the urban landscape. Streets are jammed with traffic ranging from animal-drawn carts and overloaded bicycles to trucks and buses. Bulldozers are sweeping away the 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 remnants of the old city stand amid the glass-encased towers that symbolize the new economic order. Modern skyscrapers now dominate the skyline of the cities at the top of the Chinese urban-economic and administrative hierarchy—including Beijing, Shanghai, and cities in SEZs. China's major cities now play host to gleaming new airports, daring architecture, spectacular public projects, and the terminuses of efficient high speed railroads.

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 stalled. Eventually, the Northeast is likely to recover because of its resources and its favorable geographic site, but under the state's new economic policies, the dynamic eastern and southern provinces have grown into major manufacturing belts and have changed the map of this part of the Pacific Rim.

Today, the Chinese government is pushing industrialization into the interior of the country, with new investment flowing into poorer parts of the central and western portions of the country. China is also looking to take advantage of its proximity to South and Southeast Asia through efforts to deepen transnational economic cooperation. From a global perspective, what is particularly striking is the magnitude and influence of the Chinese economic juggernaut. On August 15, 2010, China officially surpassed Japan as the world's second largest economy. China has become the world's largest exporter, and its energy and raw materials demands are now affecting the global supply of key resources. Today more passenger vehicles are purchased in China each year than in the United States, and China invests more domestically than any other country in the world.

None of the foregoing means that China will inevitably become the dominant power of the twenty-first century. China's economy still depends heavily on exports and foreign investment, and China's GDP per capita, while on the rise, is 10 times smaller than Japan's and 12.5 times smaller than that of the United States. Moreover, there are potentially destabilizing social and environmental costs to China's rapid rise, and with labor costs growing in China relative to Southeast Asia, China could be vulnerable to some of the very forces that gave it an advantage over other places not long ago.

The Wider World

Other newly industrializing countries have become increasingly significant global nodes of production. Over the past decade manufacturing has surged in South and Southeast Asia, in South Africa, and in parts of Central and South America. Brazil, Russia, India, China, and South Africa are increasingly grouped under the acronym

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 Figure 12.13 (top) was demolished to make room for what is going up in Figure 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.

Field Note

"Humen is one of the Pearl River Delta cities that has been transformed by the rise of China. The small textile factory I visited provided insights into the opportunities and challenges that are confronting China today. The 40 or so employees were mostly young, but there were a few older folks. They were making women's clothes for the French market. Most of them made the clothes from start to finish, although there were a few unskilled laborers who were ironing the fabric, cutting off loose ends of thread, and so on. Into each of the items of clothing was sewn a label with a fancy-sounding Italian name. The clothes are sold in Humen for the equivalent of $1.50–$2.50 each, but most of them were destined for France, where they would be sold for 20 times that amount. The employees work under a contract that stipulates a 9 hour day and a base wage of about $275/month plus basic room and board. They can work more hours, however, and are compensated based on how much they produce during the extra hours. Apparently, almost all employees choose to work extra hours—typically seven days a week, with breaks only on Sunday evenings and one day at the beginning of each month. If they work that hard, they can earn the equivalent of close to $500/month. The main workroom had decent lighting and ventilation (it was hot, of course). The manager told me there had been significant upward pressure on the wages of employees in the last few years, making it harder for him to earn much of a profit. He worried about factories relocating to lower-wage countries. In addition, he said that he was having an increasingly difficult time recruiting employees. He also noted with some mixture of amusement and annoyance that the people who had made out the best in his part of the city were the former farmers, who either had received substantial compensation (in the form of apartments) for being displaced or who were getting some share of rent for buildings constructed on the land they used to farm."

Figure 12.14
Humen, China. © Alexander B. Murphy

BRICS (each letter standing for one of these countries) because these are the countries that are evidence of a shift in global economic power away from the traditional economic core. As we have seen, China is currently leading the way, but India has recently become the world's sixth largest economy. Although industrial production in India is modest in the context of the country's huge size and enormous population, major industrial complexes have developed around Calcutta (the Eastern district, with engineering, chemical, cotton, and jute industries, plus iron and steel based on the Chota Nagpur reserves), Mumbai (the Western district, where cheap electricity helps the cotton and chemical industries), and Chennai (the Southern district, with an emphasis on light engineering and textiles) (Fig. 12.15).

India has no major oil reserves, so it must spend heavily on oil energy. On the other hand, the country has a great deal of hydroelectric potential and access to ample coal. Its Bihar and Karnataka iron ore reserves may be among the largest in the world. With a large labor force, a growing middle class, and a location midway between Europe and the Pacific Rim, India's economic influence is clearly on the rise.

Where from Here?

The diffusion of manufacturing activity to the semi-periphery and periphery and the associated sensation of a shrinking world have led a few commentators to suggest 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 advanced a similar idea in *Global Financial Integration: The End of Geography* (1992) and Thomas Friedman suggested *The World Is Flat* (2005). Each author argues that a combination of technological changes and developments in the global economy have reduced the significance of location and made place differences increasingly insignificant.

Figure 12.15
Mumbai, India. The cotton industry has been a major part of Mumbai's economy since the first cotton mill in India was built in 1854 in the city.

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 a geographically undifferentiated world. Hence, what is needed is a greater understanding of how places have changed as a result of new production methods, new corporate structures, and new patterns of industry, as well as an examination of how the interplay between global processes and local places is creating opportunities and constraints for different parts of the planet.

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 where production of the good may shift to in the future and how long it might take for production costs (and the price of the product) to decrease substantially.

HOW HAVE DEINDUSTRIALIZATION AND THE RISE OF SERVICE INDUSTRIES ALTERED GLOBAL ECONOMIC ACTIVITY?

Service industries (tertiary industries) do not generate an actual, tangible product; instead, they encompass 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 quasi-domestic 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.

Figure 12.16
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.

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. Deindustrialization did little to change the basic disparities between core and periphery that have long characterized the global economy. Even in the manufacturing realm, the availability of capital, mechanization, and innovative production strategies 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 four 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 in relatively prosperous countries (Fig. 12.16). These are the result of large-scale deindustrialization. In the United Kingdom, the major industrial zones of Newcastle, 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 period, with steel manufacturing jobs moving 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 (Fig. 12.17). More recently, the global economic downturn that began in 2008 has resulted in devastating job losses in communities dependent on both secondary and tertiary industries. These examples serve to remind us that not all deindustrialized regions find their niche easily in the new service economy and that a tertiary economy, once established, does not necessarily buffer places from recessionary trends.

Nonetheless, some secondary industrial regions have made the transition to a viable service economy fairly successfully. The **Sun Belt** is the southern region of the United States, stretching through the Southeast to the Southwest. Both the population and economy of this region have grown over the last few decades, as service sector businesses have chosen to locate in areas such as Atlanta and Dallas where the climate is warm and the local laws welcome their presence. The eastern part of the Sun Belt served as an early 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 Sun Belt, 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 American Airlines Center in Dallas, Texs.

Figure 12.17

Major Manufacturing Regions of North America. North American manufacturing has dispersed to the Sun Belt, and deindustrialization has taken hold in much of the American Manufacturing Belt, now known as the Rust Belt.

New Patterns of Economic Activity

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

To understand the influences that shape 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.

Employing technologies such as Geographic Information Systems (GIS) (see Chapter 1), geographers can model the best locations for new businesses, office complexes, government centers, or transportation connections. Major retailers not only shape the landscapes of the places where they choose to put stores, but they also change the economic prospects and physical landscapes of the places where their headquarters are located. Wal-Mart's headquarters in Bentonville, Arkansas, provides a particularly striking example. If producers of consumer products want to sell their goods in Wal-Mart stores, they must travel to Bentonville, Arkansas, to negotiate deals with Wal-Mart. In order to provide low prices to consumers, Wal-Mart negotiates very low 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 of $405 billion in fiscal year 2010), a variety of companies have moved into

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 17 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 United States. 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 6000- square-foot "European" mansions.

Figure 12.18
Fayetteville, Arkansas.

Credit: Fiona M. Davidson, University of Arkansas

Arkansas (Fig. 12.18). Those companies, along with an array of other business supporting their activities (hotels, restaurants, copy centers, delivery services), have fundamentally transformed the city.

The locational 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 a particular 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 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, 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 education, 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 locational 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 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 Clusters

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 designers of computers, 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 high-technology businesses located in the Silicon Valley, others were drawn to the area as well. The area became what geographers call a **growth pole**, not just because other high-technolgy businesses came to Silicon Valley, but because the concentration of these businesses spurred economic development in the surrounding area. 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 Hutriyk 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 University 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 on 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 buildings housing the headquarters 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 such as Nortel and Ericsson have taken root, but so too have numerous high-technology companies that are not telecom related (Fig. 12.19). In each of these technopoloes, the presence of 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; 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. Bidding wars sometimes develop between localities seeking to attract such industries. Although high-technology industries often 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 impacts 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 the coming years.

Figure 12.19
Plano-Richardson, Texas. ThePlano-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. © EDS/AP/Wide World Photos.

Tourism Services

Every service industry has its own locational characteristics, but tourism is almost in a class by itself due to its geographical extent and economic significance. Once a relatively small activity confined to a set of specialized locations, tourism is now the world's largest service sector industry.

Tourism grew dramatically during the second half of the twentieth century. The tourism boom began in the global economic core as incomes and leisure time increased for a rapidly expanding segment of the population. Over the past three decades, the number of East and Southeast Asian tourists has risen much faster than the global average, reflecting the economic boom in many of the Pacific Rim countries. The combination of a weakening global economy and concerns over political stability caused noticeable dips in travel at the beginning and end of the first decade of the twenty-first century, but absent a major economic or geopolitical crisis, tourism is likely to continue to expand.

In Chapter 10 we looked at some of the social and cultural impacts of tourism, but it is important to recognize that tourism is a major industry as well. Communities all over the world have worked hard to promote tourism, and many are now notably reliant on tourist receipts. The tourist industry has transformed downtowns, ports, hinterlands, parks, and waterfronts. High-rise, ultramodern hotels dominate urban skylines from Boston to Brisbane. The Port of Miami and Fort Lauderdale's Port Everglades have been reconstructed to serve the cruise industry, and many ports from Tokyo to Tampa have added cruise terminals complete with shopping malls and restaurants. Theme parks such as Disney's establishments near Orlando, Paris, Tokyo, and Los Angeles draw millions of visitors and directly and indirectly employ thousands of workers. Dubai has constructed an indoor ski run in the Mall of the Emirates in an effort to attract more visitors. Once-remote wildlife parks and nature reserves in East Africa and South Asia now receive thousands of visitors, requiring expanded facilities and sometimes causing ecological damage. Formerly isolated beaches are now lined by high-rise hotels and resorts; in the Caribbean and the Pacific, some entire islands have been taken over by tour operators.

The economic impacts of tourist-related development are far-reaching. The monetary value of goods and services associated with tourism is now conservatively estimated at more than $2 trillion—and if spillover effects are taken into consideration, the figure could be twice as large. With the growing middle class in China and India and with increases in average life expectancy, the figure is likely to continue to grow, affecting the prospects of places all over the world.

Place Vulnerabilities in a Service Economy

Every type of economy carries with it potential vulnerabilities. In the early stages of industrialization the economic destinies of places was tied to the manufacturing operations established in those places. As a result, such places were vulnerable to wrenching adjustments when demand shifted for the goods produced by local manufacturers or when the changing costs of transportation or labor lead business owners to downscale or shift production elsewhere. Many older industrial areas in the United States and Europe experienced such adjustments, and their best hope for rebuilding often lay in the service economy. Thus, in Duisburg—a city at the heart of

Figure 12.20
Duisburg, Germany. The old industrial canal corridor is being converted to a pedestrian district that local authorities hope will attract locals and tourists.

Germany's Ruhr Valley—abandoned steel mills were turned into tourist attractions and warehouses were converted into retail establishments, restaurants, and offices (Fig. 12.20).

Service economies have their own vulnerabilities. Tourism can fall off in the face of economic downturns or natural hazards, and office work can be outsourced to distant places. Mechanization can also have a negative impact. We usually think of manufacturing jobs being affected by mechanization, but service jobs are vulnerable as well. In recent decades countless jobs in the travel planning industry have been lost to the Internet, scanning machines in supermarkets have reduced the need for employees, and automated answering services have taken the place of live voices in many businesses. Changes of this sort can create the same sorts of hardships and pressures for economic readjustment that communities reliant on secondary industries face.

At a different spatial scale, the very geographical structure of large-scale service economies can affect the fortunes of places, regions, countries, and even the globe. Places dominated by the service sector cannot exist without extensive connections with other places because those living in such places still need food and material products, and they often need a large market to sustain their services. Hence, the dramatic shift away from the primary and secondary sectors that has taken place in some parts of the world is inextricably tied to economic globalization. But economic decision making in a globalized economy can easily become disconnected from the fate of individual places and regions.

The burgeoning financial service industry provides a case in point. That industry has grown explosively over the past few decades with the development of increasingly innovative products and arrangements. Some people made spectacular amounts of money in the process, but in recent decades key financial instruments and procedures were developed based on unrealistic assumptions about concrete circumstances. Banks made loans they should not have made, and mortgages were issued to people who were unlikely to be able to meet their payments. These practices helped to bring about the dramatic economic downturn that began in 2008, when a housing slump precipitated high levels of defaults on so-called subprime mortgages. A banking crisis ensued that rippled throughout the economy and, in our interconnected world, affected the fortunes and prospects of places near and far. The crisis serves as a reminder of the continuing vulnerabilities of places in a service economy, even in the absence of any direct challenge to the specific service industries on which particular local economies are based. It also raises a key question with a geographical foundation: what are the consequences of divorcing the development of wealth in a knowledge economy from the fate of individual places, regions, or countries?

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?

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 are thriving, having kept industry or having successfully developed a service economy. Still other places are redefining themselves. In the next chapter, we consider another lasting effect of industrialization and deindustrialization: environmental change.

Geographic Concepts

Industrial Revolution
globalization
Fordist
vertical integration
friction of distance
least cost theory
agglomeration
flexible production system
commodification
product life cycle
global division of labor
just-in-time delivery
spatial fix
outsourced
offshore
intermodal connections
deindustrialization
newly industrializing countries
break-of-bulk point
Rust Belt
Sun Belt
growth pole
technopole

Learn More Online

About the port of Rotterdam:
http://www.portofrotterdam.com

About Nike
http://www.nikebiz.com/company_overview

Watch It Online

About Wal-Mart's influence on Bentonville, Arkansas
http://www.pbs.org/wgbh/pages/frontline/shows/walmart