

Chapter 11

Industry

Key Issues

1. Where is industry distributed?
2. Why are situation factors important?
3. Where are site factors important?
4. Why are location factors changing?

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The title of this chapter, “Industry,” refers to the manufacturing of goods in a factory. The word is appropriate, because it also means persistence or diligence in creating value. Industry is much more highly clustered in *space* than is agriculture. Two connections are critical in determining the best location for a factory: *where* the markets for the product are located, and where the resources needed to make the product are located. A generation ago, industry was highly clustered in a handful of MDCs, but industry has diffused to LDCs. Geographers identify the *local diversity* in assets that enable some communities to compete successfully for industries, as well as handicaps that must be overcome to retain older companies.

Key Issue 1. Where Is Industry Distributed?

- **Origin of industry**
- **Industrial regions**

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Origin of Industry

The **Industrial Revolution** was a series of improvements in industrial technology that transformed the process of manufacturing goods. Prior to the Industrial Revolution, industry was geographically dispersed across the landscape, as people made tools and agricultural equipment in their homes or obtained them in the local village. Home-based manufacturing was known as the **cottage industry** system. The term *Industrial Revolution* is somewhat misleading, because it was far more than industrial, and it didn't happen overnight. The Industrial Revolution resulted in new social, economic, and political inventions, not just industrial ones. The root of the Industrial Revolution was technology, involving several inventions that transformed the way in which goods were manufactured and created an unprecedented expansion in productivity, resulting in substantially higher standards of living. The invention most important to the development of factories was the steam engine, patented in 1769 by James Watt. Watt's steam engine could power factories far more efficiently than the watermills, then common in use. Industries impacted by the Industrial Revolution include:

- **Iron:** The first industry to benefit from Watt's steam engine, as it provided a practical way to keep the ovens constantly heated.
- **Coal:** The source of energy to operate the ovens and the steam engine.
- **Transportation:** Critical for diffusing the Industrial Revolution.
- **Textiles:** Transformed from a dispersed cottage industry to a concentrated factory system during the late eighteenth century.

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- **Chemicals:** An industry created to bleach and dye cloth.
- **Food Processing:** Essential to feed the factory workers no longer living on farms.

Industrial Regions

Industry is concentrated in three of the nine world regions discussed in chapter 9: Europe, North America, and East Asia. Each of the three accounts for roughly one-fourth of the world's total industrial output. Outside these three regions, the leading industrial producers are Brazil and India.

Europe's Industrial Areas

Numerous industrial areas emerged in Europe, including several clustered in Western Europe centered on western Germany and extending north to the United Kingdom and south to Italy and Spain, and several in Eastern Europe, primarily in the former Soviet Union.

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United Kingdom: Dominated world production of steel and textiles during the nineteenth century. Britain was saddled with what became outmoded and deteriorating factories and support services. The United Kingdom expanded industrial production in the late twentieth century by attracting new high-tech industries that serve the European market. Japanese companies have built more factories in the United Kingdom than in any other European country.

Rhine–Ruhr Valley: Western Europe's most important and most centrally located industrial area. Within the region, industry is dispersed rather than concentrated in one or two cities. This location at the mouth of Europe's most important river has made Rotterdam the world's largest port. Iron and steel manufacturing has concentrated in the Rhine–Ruhr Valley because of proximity to large coalfields. Access to iron and steel production stimulated other heavy-metal industries, such as railroad, machinery, and armaments to locate in the area. The city of Rotterdam, the world's largest port, lies at the mouth of several branches of the Rhine River as it flows into the North Sea.

Mid-Rhine: Western Europe's second most important industrial area. The German portion of the Mid-Rhine region lacks abundant raw materials, but it lies at the center of Europe's most important consumer market. The French portion of the Mid-Rhine region — Alsace and Lorraine — contains Europe's largest iron-ore field and is the production center for two-thirds of France's steel. Tiny Luxembourg is also one of the world's leading steel producers, because the Lorraine iron-ore field extends into the southern part of the country.

Po Basin: Southern Europe's oldest and most important industrial area. The Po Valley contains about two-thirds of Italy's manufacturing in one-fifth of its land area. Modern industrial development in the Po Basin began with establishment of textile manufacturing during the nineteenth century because of two key assets: inexpensive hydroelectricity, and a large labor supply willing to work for relatively low wages.

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Northeastern Spain: Western Europe's fastest growing industrial area in the late twentieth century. Spain's leading industrial area, Catalonia, is centered on the city of Barcelona. The area is the center of Spain's textile industry and the location of its largest motor vehicle plant. Spain's motor-vehicle industry, while foreign-owned, is second largest in Europe, behind Germany's.

Moscow: Russia's oldest industrial area, centered around the country's capital and largest market. Moscow specializes in fabrics and products that require skilled labor.

St. Petersburg: Eastern Europe's second largest city, specializing in shipbuilding and other industries serving Russia's navy and ports in the Baltic Sea.

Volga: Russia's largest petroleum and natural gas fields. Also concentrated in this region are the motor vehicle, oil refining, chemical, and leather and fur industries.

Urals: Contains more than 1,000 types of minerals, the most varied collection found in any mining region in the world. Proximity to these inputs encouraged the Communists to locate iron and steel, chemicals, machinery, and metal fabricating in this area.

Kuznetsk: Russia's most important manufacturing district east of the Ural Mountains. Soviet planners took advantage of the area's coal and iron ore to invest in iron and steel factories there.

Donetsk: In Eastern Ukraine, an area of coal, iron ore, manganese, and natural gas. These assets make this region Eastern Europe's largest producer of iron and steel.

Silesia: Eastern Europe's leading industrial area outside the former Soviet Union. Silesia, which includes southern Poland and the northern Czech Republic, is an important steel production center, near coalfields.

North America's Industrial Areas

Industry arrived a bit later in the United States than in Europe, but it grew much faster. The first U.S. textile mill was opened in Pawtucket, Rhode Island, in 1791. The textile industry grew rapidly after 1808, when the U.S. government imposed an embargo on European trade to avoid entanglement in the Napoleonic Wars. The United States had become a major industrial nation by 1860, second only to the United Kingdom. Manufacturing in North America concentrated in the northeastern quadrant of the United States and in southeastern Canada. This manufacturing belt has achieved its dominance through a combination of historical and environmental factors. Early settlement gave eastern cities an advantage to become the country's dominant industrial center. The Northeast also had essential raw materials and good transportation. The Great Lakes and major rivers were supplemented in the 1800s by canals, railways, and highways. Within the North American manufacturing belt, several heavily industrialized areas developed:

New England: The oldest industrial area in the northeastern United States. It developed a textile industry in the early nineteenth century, importing cotton from southern states and shipping finished products to Europe.

Middle Atlantic: The largest U.S. market, it attracts industries that need proximity to a large number of consumers and that depend on foreign trade through one of this region's large ports.

Mohawk Valley: A linear industrial belt developed in upper New York State along the Hudson River and Erie Canal. Inexpensive, abundant electricity generated at nearby Niagara Falls has attracted aluminum, paper, and electrochemical industries to the region.

Pittsburgh-Lake Erie: The leading steel-producing area in the nineteenth century because of proximity to Appalachian coal and iron ore. Proximity to steelmakers attracted other manufacturers that made heavy use of steel in their own products.

Western Great Lakes: Centered on Chicago, the hub of the nation's transportation network, now the center of steel production. Automobile manufacturers and other industries locate in the western Great Lakes region to take advantage of this convergence of transportation routes.

Southern California: The leading industrial area outside of the Northeast. Los Angeles has become the country's largest area of clothing and textile production, the second-largest furniture producer, and a major food processing center. Immigrants from Latin America and Asia provide a large pool of low-wage workers.

Southeastern Ontario: Canada's most important industrial area, central to the Canadian and U.S. markets and near the Great Lakes and Niagara Falls. Inexpensive electricity has attracted aluminum manufacturing, paper making, flour mills, textile manufacturing, and sugar refining.

East Asia's Industrial Areas

Faced with isolation from world markets and a shortage of nearly all essential resources, East Asia has taken advantage of its most abundant resource: people. The region's two leading industrial countries — Japan and China — rank second and third in manufacturing value behind the United States.

Japan: Became an industrial power in the 1950s and 1960s, initially by producing goods in large quantity at cut-rate prices to consumers in other countries. Prices were kept low, despite high shipping costs, because workers received much lower wages than in Japan than in North America or Europe. Japan started training workers for highly skilled jobs, and "Made in Japan" now stands for high-quality motor vehicles, electronics, and precision instruments. Japan's manufacturing is concentrated in the central region between Tokyo and Nagasaki.

China: The world's largest supply of low-cost labor and the largest market for many consumer products. Policy changes in the 1990s opened China's market and labor force to transnational corporations. Rapid economic expansion put money in the pockets of enough of China's 1.3 billion people to encourage more manufacturing for domestic consumption. China's manufacturers have clustered in three areas along the east coast. Large and increasing gaps in wealth within China have been produced.

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Key Issue 2. Why Are Situation Factors Important?

- **Proximity to inputs**
- **Proximity to markets**
- **Ship, rail, truck, or air?**

Having looked at the "where" question for industrial location, we can next consider the "why" question: Why are industries located where they are? Geographers try to explain why one location may prove more profitable for a factory than other locations.

Industry seeks to maximize profits by minimizing production costs. A company ordinarily faces two geographical costs: situation and site. **Situation factors** involve transporting materials to and from a factory. A firm seeks a location that minimizes the cost of transporting inputs to the factory and finished goods to the consumers.

Proximity to Inputs

The farther something is transported, the higher the cost, so a manufacturer tries to locate its factory as close as possible to both buyers and sellers.

- The optimal plant location is as close as possible to inputs if the cost of transporting raw materials to the factory exceeds the cost of transporting the product to consumers.
- The optimal plant location is as close as possible to the customer if the cost of transporting the product exceeds the cost of transporting inputs.

Every industry uses inputs — resources from the environment or parts made by other companies. An industry in which the inputs weigh more than the final product is a **bulk-reducing industry**. To minimize transport costs, these industries need to locate near the sources of inputs.

Copper: A Bulk-Reducing Industry

Copper production involves several steps. The first three steps provide good examples of bulk-reducing activities. The fourth step is not bulk reducing, so does not need to be near inputs.

1. Mining. The heavy, bulky ore extracted from the mines is mostly waste. Copper ore mined in North America is especially low-grade, less than .07 copper.
2. Concentration. Concentration mills crush the ore into fine particles, mix them with water and chemicals, and filter and dry them to produce copper concentrate, which is 25 percent copper.
3. Smelting. Smelters remove more impurities to make the copper 60-99 percent pure and are built near the concentration mills.
4. Refining. Purified copper produced by smelters is treated at refineries to produce 99.99 percent pure copper. Little further weight loss occurs, so proximity to mines, mills, and smelters is a less critical factor in determining location.

In general, metal processors such as the copper industry also try to locate near economical electrical sources and to negotiate favorable rates from power companies. Two-thirds of U.S. copper is mined in Arizona, so the state has most of the concentration mills and smelters. Most foundries are located near markets on the east and west coasts.

Steel: Changing Importance of Inputs

Steel is an alloy of iron that is manufactured by removing impurities in iron, such as silicon, phosphorus, sulfur, and oxygen, and adding desirable elements, such as manganese and chromium.

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The two principal inputs in steel production are iron ore and coal. Steelmaking is a bulk-reducing industry that has located to minimize the transporting of these inputs. Steelmaking demonstrates that when the source of inputs or the relative importance of inputs changes, the optimal location for the industry changes. In the U.S., the distribution of steel production has changed several times because of changing inputs.

- **Mid-nineteenth century:** The U.S. steel industry concentrated around Pittsburgh in southwestern Pennsylvania, where iron ore and coal were both mined.
- **Late-nineteenth century:** Steel mills were built around Lake Erie. The location shift was largely influenced by the discovery of rich iron ore in the Mesabi Range, in northern Minnesota. Ore was transported via the Great Lakes and coal was shipped from Appalachia by train.
- **Early-twentieth century:** Most new steel mills were located near the southern end of Lake Michigan — Gary, Indiana, Chicago, and other communities. Changes in steelmaking required more iron in proportion to coal, so mills were built closer to the Mesabi Range.

- **Mid-twentieth century:** Most new U.S. steel mills were located near the East and West coasts. Iron ore increasingly came from other countries. Further, scrap iron and steel — widely available in the large metropolitan areas of the East and West coasts — became an important input in the steel-production process.

- **Late-twentieth century:** Most steel mills in the U.S. closed. Most of the survivors were around southern Lake Michigan and along the East Coast.

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Proximity to Markets

The cost of transporting goods to consumers is a critical location factor for three types of industries: bulk-gaining, single-market, and perishable.

Bulk-Gaining Industries

A **bulk-gaining industry** makes something that gains volume or weight during production. To minimize transport costs, a bulk-gaining industry needs to locate near where the product is sold.

Fabricated Metals. A prominent example of a bulk-gaining industry is the fabrication of parts and machinery from steel and other metals.

Common fabricated products include televisions, refrigerators, and air conditioners. Machinery is fabricated for use in farms, factories, offices, and homes. Fabricators shape individual pieces of metal. Separate parts are joined together through welding, bonding, and fastening with bolts and rivets.

Because fabricated products typically occupy a larger volume than the sum of their individual parts, the cost of shipping the final product to consumers is usually the most critical factor.

Motor vehicles are fabricated in the U.S. at about 40 assembly plants from parts made at several thousand other plants. The critical location factor is minimizing transportation to the market.

Beverage Production. Beverage bottling is another good example of an industry that adds bulk. The principle input placed in a beverage container is water, which is relatively bulky, heavy, and expensive to transport. Because water is available where people live, bottlers can minimize costs by producing soft drinks near their consumers instead of shipping water (their heaviest input) long distances.

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Single-Market Manufacturers

Single-market manufacturers are specialized manufacturers with only one or two customers. The optimal location for these factories is often proximity to the customer. An example of a single-market manufacturer is a producer of parts for motor vehicles. Parts makers now ship most of their products directly to assembly plants clustered in "auto alley." Proximity to the assembly plant is increasingly important because of the adoption of "just-in-time" delivery, where parts are delivered just in time to be used, often within minutes, rather than weeks or months in advance. The seat, for example, is an especially large and bulky object, and carmakers do not want to waste valuable space in their assembly plants by piling up an inventory of them. On the other hand, many parts do not need to be manufactured close to the customer, and for them changing site factors are more important.

Perishable Products

To deliver their products to consumers as rapidly as possible, perishable product industries must be

located near their markets. Processors of fresh food into frozen, canned, and preserved products can locate far from their customers. The daily newspaper is an example of a product other than food that is highly perishable because it contains dated information. Newspaper publishers must locate near markets to minimize transportation cost.

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Difficulty with timely delivery is one of the main factors in the decline of newspapers. Electronic devices can deliver news more quickly than a newspaper.

Ship, Rail, Truck, or Air?

Firms seek the lowest-cost mode of transport, but the cheapest of the four alternatives changes with the distance that goods are being sent. The farther something is transported, the lower is the cost per kilometer (or mile). The cost per kilometer decreases at different rates for each of the four modes, because the loading and unloading expenses differ for each mode.

- **Trucks.** Most often used for short-distance delivery.
- **Trains.** Often used to ship to destinations that take longer than a day to reach, such as between the east and west coasts of the United States.
- **Ships.** Attractive for very long distances because the cost per kilometer is very low.
- **Air.** Most expensive for all distances, so is usually reserved for speedy delivery of small-bulk, high-value packages.

Modes of delivery are often mixed. Containerization has facilitated transfer of all packages between modes. Regardless of transportation mode, cost rises each time that inputs or products are transferred from one mode to another. Many companies that use multiple transport modes locate at a **break-of-bulk point**, a location where transfer among transportation modes is possible. Important break-of-bulk points include seaports and airports.

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Key Issue 3. Why are Site Factors Important?

- **Labor**
- **Land**
- **Capital**

Labor

Worldwide, around one-half billion people are engaged in industry. China has around one-fourth of all the world's manufacturing workers, India around one-fifth, and all MDCs combined around one-fifth.

Labor-Intensive Industries

A **labor-intensive industry** is one in which wages and other compensation paid to an employee constitute a high percentage of expenses. The reverse case, an industry with a much lower than average percentage of expenditures on labor, is considered capital intensive. The average wage paid to manufacturing workers exceeds \$20 per hour in North America, Western Europe, and other MDCs and other benefits add substantially to the compensation. In LDCs, average wages are less than \$5 per hour and include limited additional benefits. A labor-intensive industry is not the same as a high-wage industry. "Labor-intensive" is measured as a percentage, whereas "high-wage" is measured in currencies.

particularly high demand for energy may select a location with lower electrical rates. The aluminum industry, for example, requires a large amount of electricity. Aluminum plants have been built near dams to take advantage of the large amount of cheap hydroelectricity. (361)

A subsidiary of Alcoa even owns dams that generate power along the Cheoah, Little Tennessee, and Yadkin rivers in eastern Tennessee and western North Carolina.

Capital

The U.S. motor vehicle industry concentrated in Michigan early in the twentieth century largely because this region's financial institutions were more willing than eastern banks to lend money to the industry's pioneers. The most important factor in the clustering of high-tech industries in California's Silicon Valley — even more important than proximity to skilled labor—was the availability of capital. One-fourth of all capital in the United States is spent on new industries in the Silicon Valley. Financial institutions in many LDCs are short of funds, so new industries must seek loans from banks in MDCs. But enterprises may not get loans if they are located in a country that is perceived to have an unstable political system, a high debt level, or ill-advised economic policies.

Key Issue 4. Why Are Location Factors Changing?

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

Changing site factors have been especially important in stimulating industrial growth in new regions, internationally and within MDCs. At the same time, some industries remain in the traditional industrial regions, primarily because of changing situation factors.

Attraction of New Industrial Regions

Labor is the site factor that is changing especially dramatically in the twenty-first century.

Changing Industrial Distribution within MDCs

In the United States, industry has shifted from the Northeast toward the south and west. In Europe, government policies have encouraged relocation toward economically distressed peripheral areas.

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Interregional Shift in the United States

The northeastern United States has lost 6 million jobs in manufacturing between 1950 and 2009. Meanwhile, 2 million manufacturing jobs were added in the South and West. Industrialization during the late nineteenth and early twentieth centuries largely bypassed the South, which had not recovered from losing the Civil War. As a result, the South was the poorest region of the United States. Industrial growth in the South since the 1930s has been stimulated in part by government policies to reduce historical disparities. The Tennessee Valley Authority brought electricity to much of the rural South.

Right-to-work Laws. The principal lure for many manufacturers was enactment by southern states of **right-to-work laws**. By enacting right-to-work laws, Southern states made it much more difficult for unions to organize factory workers, collect dues, and bargain with employers from a position of strength. Steel, textiles, tobacco products, and furniture industries have become dispersed through smaller communities in the South, many in search of a labor force willing to work for less money than in the North and willing to forgo joining a union.

Textile Production. The textile and apparel industry has been especially prominent in opening production in lower-wage locations while shutting production in higher-wage locations. The U.S. textile and apparel industry was heavily concentrated in the Northeast during the early twentieth century, then shifted to the South and West. Wage rates were much lower in the Southeast.

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Southeastern mills were able to reach markets easily after the opening of the interstate highway system beginning in the in the 1950s.

Interregional Shifts in Europe. Manufacturing has diffused from traditional industrial centers in northwestern Europe toward southern and eastern Europe. European government policies have explicitly encouraged the industrial relocation. The European Union provides assistance to what it calls convergence regions and competitive and employment regions:

- **Convergence Regions:** Primarily Eastern and Southern Europe, where incomes lag behind Europe's average.
- **Competitive and Employment Regions:** Primarily Western Europe's traditional core industrial areas, which have experienced substantial manufacturing job losses in recent years.

The Western European country with the most rapid manufacturing growth rate since the late twentieth century has been Spain, especially since its admission to the European Union in 1986. Poland, Czech Republic, and Hungary have had the most industrial development East of Germany and West of Russia, though other countries in the region have shared in the growth. The region prefers to be called Central Europe, to signify its more central location in Europe's changing economy. Central Europe offers manufacturers labor and market proximity. Central European workers are less skilled but much cheaper than in Western Europe, more expensive but much more skilled than in Asia and Latin America. The region offers closer proximity to the wealthy markets of Western Europe.

International Shifts in Industry

Increasingly important industrial areas outside of North America and Europe include:

- **East Asia.** Rapid industrial growth in China means East Asia likely will account for an increasing share in World industrial production. South Korea is the world's leading producer of large container ships. (364) South Korea is a leading producer of steel and fabricated metal products, including motor vehicles.
- **South Asia.** Led by India, one of the fastest growing economies among large countries. Textiles are the dominant industry but motor vehicle production is growing rapidly.
- **Latin America.** The nearest low-wage region to the United States. *Maquiladora* plants have located in Mexico's far north to be as close as possible to the United States. Brazil is the leading industrial country in Latin America, although its industries serve primarily the domestic market, the region's largest.

Changing Distributions. The shift to new industrial regions can be seen clearly in steel and clothing. In 1980, 80 percent of world steel was produced in MDCs, but by 2008 its share of production declined to 40 percent.

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China, now the world's largest steel producer, accounted for 38 percent of world steel output

in 2008, nearly as much as all MDCs combined. Labor-intensive industries have been especially attracted to LDCs. The number of apparel workers in the U.S. declined from 900,000 in 1990 to 150,000 in 2009. Mills in the Southeast have been unable to compete with manufacturers in countries paying less than \$1 per hour. European countries have been even harder hit by international competition, as manufacturing wages exceed \$30 per hour in much of Europe.

Outsourcing. Transnational corporations have been especially aggressive in using low-cost labor in LDCs. Despite greater transportation costs, transnational corporations can profitably transfer some work to LDCs, given the substantial difference in wages between LDCs and MDCs. Operations that require highly skilled workers remain in MDCs. This selective transfer of some jobs to LDCs is known as the **new international division of labor**. Transnational corporations allocate production to low-wage countries through **outsourcing**, which is turning over much of the responsibility for production to independent suppliers. Outsourcing contrasts with the approach typical of traditional mass production, called vertical integration, in which a company would control all phases of a highly complex production process.

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Outsourcing has had a major impact on the distribution of manufacturing, because each step in the production process is now scrutinized closely in order to determine the optimal location.

Renewed Attraction of Traditional Industrial Regions

Two location factors influence industries to remain in traditional regions — availability of skilled labor and rapid delivery to market.

Proximity to Skilled Labor

Henry Ford boasted that he could take people off the street and put them to work with only a few minutes of training. That has changed for many industries, which now want skilled workers. The search for skilled labor has important geographic implications because it is an asset found principally in the traditional industrial regions. Computer manufacturing is an example of an industry that has concentrated in relatively high-wage, high-skilled regions of the United States, especially near universities in the Bay Area of California and Austin, Texas. Even the clothing industry has not completely abandoned the Northeast. Dresses, woolens, and other “high-end” clothing products require more skill in cutting and assembling the material.

Traditionally, factories assigned each worker one specific task to perform repeatedly. Some geographers call this approach **Fordist** or mass production, because the Ford Motor Company was one of the first to organize its production this way. (368) The term **post-Fordist** production is sometimes used to describe lean or flexible production. Three types of work rules distinguish post-Fordist lean production: 1. Teams; 2. Problem Solving; and 3. Leveling.

Just-in-Time Delivery

Proximity to market has become even more important in recent years because of the rise of just-in-time delivery. Just-in-time delivery reduces the money that a manufacturer must tie up in inventory. Leading computer manufacturers have eliminated inventory altogether. In some cases, though, just-in-time delivery merely shifts the burden of maintaining inventory to suppliers.

Wal-Mart, for example, holds low inventories but tells its suppliers to hold high inventories.

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Just-in-time delivery means that producers have less inventory to cushion against disruptions in the arrival of needed parts.

Two kinds of disruptions can result from reliance on just-in-time delivery:

- **Labor unrest.** A strike at one supplier or in the logistics can shut down the entire production.
- **"Acts of God."** Most common are weather-related incidents, such as blizzards or floods.

Key Terms

Break-of-bulk point (p. 355)	Outsourcing (p. 365)
Bulk-gaining industry (p. 352)	Post-Fordist (p. 368)
Bulk-reducing industry (p. 350)	Right-to-work state (p. 362)
Cottage industry (p. 345)	Site factors (p. 356)
Fordist production (p. 368)	Situation factors (p. 350)
Industrial Revolution (p. 345)	Textile (p. 356)
Labor-intensive industry (p. 356)	
Maquiladora (p. 344)	
New international division of labor (p. 365)	

Test Prep Questions

- 1) What invention was most important for the development of factories?
A) the loom
B) the watermill
C) the incandescent light bulb
D) the steam engine
- 2) Which of the following was NOT an industry impacted in the early part of the Industrial Revolution?
A) plastics
B) transportation
C) textiles
D) coal
- 3) Which of the following is NOT one of the world regions where industry is concentrated?
A) Europe
B) North America
C) Latin America
D) East Asia
- 4) Which of the following is NOT one of Europe's main industrial regions?
A) Rhine-Ruhr Valley
B) France's Loire Valley
C) Italy's Po Basin
D) Moscow

- 5) Which step in copper production is NOT bulk-reducing?
A) mining
B) concentration
C) refining
D) smelting
- 6) What is a good example of a bulk-gaining industry?
A) beverage bottling
B) meat packing
C) advertising
D) trucking
- 7) What mode of transportation has the lowest cost per kilometer or mile?
A) ship
B) train
C) air
D) truck
- 8) Which of the following is NOT a traditional site factor?
A) capital
B) land
C) labor
D) language
- 9) Which site factor is most responsible for the dramatic change in industrial locations that has taken place in the twenty-first century?
A) capital
B) land
C) labor
D) language
- 10) Which of the following is NOT a work rule of post-Fordist production?
A) rigidity
B) teamwork
C) problem solving
D) leveling

Short Essay

- 1) Describe the geographic distribution of industrial regions across the Earth.

2) Identify the three types of industries for which proximity to markets is a critical locational factor, and give examples of each.

3) Contrast interregional shifts in location of industry between the United States and Europe in the late twentieth and early twenty-first centuries.
