

## KEY ISSUE 2

# Why Are Situation and Site Factors Important?

- **Situation Factors: Proximity to Inputs**
- **Situation Factors: Proximity to Markets**
- **Changing Situation Factors in Key Industries**
- **Site Factors**

### Learning Outcome 11.2.1

Identify the two types of situation factors and explain why some industries locate near inputs.

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 others. A company ordinarily faces two geographic 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 consumers.
- **Site factors** result from the unique characteristics of a location.

## Situation Factors: Proximity to Inputs

Manufacturers buy from companies and individuals who supply inputs, such as minerals, materials, energy, machinery, and supporting services. They sell to companies and individuals who purchase the product. The farther something is transported, the higher the cost, so a manufacturer tries to locate its factory as close as possible to its inputs and markets:

- **Proximity to inputs.** The optimal plant location is as close as possible to inputs if the cost of transporting raw materials to the factory is *greater than* the cost of transporting the product to consumers.
- **Proximity to markets.** The optimal plant location is as close as possible to the customer if the cost of transporting raw materials to the factory is *less than* the cost of transporting the product to consumers.

Every industry uses some inputs. The inputs may be resources from the physical environment, such as minerals,

or they may be parts or materials made by other companies. An industry in which the inputs weigh more than the final products is a **bulk-reducing industry**. To minimize transport costs, a bulk-reducing industry locates near its sources of inputs.

Minerals are especially important inputs for many industries. Earth has 92 natural elements, but about 99 percent of the crust is composed of 8 of them (Figure 11-6). The eight most common elements combine with thousands of rare ones to form approximately 3,000 different minerals, all with their own properties of hardness, color, and density, as well as spatial distribution. Many of these minerals have important industrial uses.

Like energy, mineral resources are not distributed uniformly across Earth. Countries with important mineral resources are shown in orange in Figure 11-7. Few important minerals are found in Europe, Central Asia, and Southwest Asia & North Africa.

## NONMETALLIC MINERALS

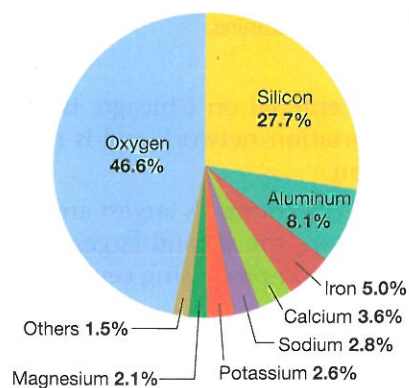
Minerals are either nonmetallic or metallic. In weight, more than 90 percent of the minerals that humans use are nonmetallic. Important nonmetallic minerals include building stones, gemstones such as diamonds, and minerals used in the manufacture of fertilizers such as nitrogen, phosphorus, potassium, calcium, and sulfur.

## METALLIC MINERALS

Metallic minerals have properties that are especially valuable for fashioning machinery, vehicles, and other essential elements of contemporary society. They are to varying degrees malleable (able to be hammered into thin plates) and ductile (able to be drawn into fine wire) and are good conductors of heat and electricity. Each metal possesses these qualities in different combinations and degrees and therefore has a distinctive set of uses.

Many metals are capable of combining with other metals to form alloys with distinctive properties important for industry. Alloys are known as ferrous or nonferrous.

**FERROUS ALLOYS.** A **ferrous** alloy contains iron, and a **nonferrous** one does not. The word *ferrous* comes from the



◀ **FIGURE 11-6 ELEMENTS IN EARTH'S CRUST** Oxygen, silicon, and aluminum are the most common elements in Earth's crust.



◀ **FIGURE 11-4 NORTH AMERICA'S INDUSTRIAL AREAS** Industry arrived a bit later in North America than in Europe, but it grew much faster in the nineteenth century. North America's manufacturing was traditionally highly concentrated in the northeastern United States and southeastern Canada. In recent years, manufacturing has relocated to the South, lured by lower wages and legislation that has made it difficult for unions to organize factory workers.

## ASIA'S INDUSTRIAL AREAS

Major industrial areas in Asia include:

- **Japan** became an industrial power in the 1950s and 1960s, initially by producing goods that could be sold in large quantity at cut-rate prices to consumers in other countries. Manufacturing is concentrated in the central region, between Tokyo and Nagasaki.
- **China** has the world's largest supply of low-cost labor and is the world's largest market for many consumer products. Manufacturers cluster in three areas along the east coast: near Guangdong and Hong Kong, in the Yangtze River valley between Shanghai and Wuhan, and along the Gulf of Bo Hai, from Tianjin and Beijing to Shenyang.
- **South Korea** followed Japan's lead in focusing on export-oriented manufacturers. The country is a leading producer of ocean-going ships. Manufacturing is centered along the rim of the country between the capital and largest city Seoul and Busan, the largest port.



▲ **FIGURE 11-5 EAST ASIA'S INDUSTRIAL AREAS** East Asia became an important industrial region in the second half of the twentieth century, beginning with Japan. Into the twenty-first century, China has emerged as the world's leading manufacturing country by most measures.

- The **Western Great Lakes**, centered on Chicago, is the hub of the nation's transportation network and is now the center of steel production.
- **Southern California** is now the country's largest area of clothing and textile production, the second-largest furniture producer, and a major food-processing center.
- **Southeastern Ontario**, Canada's most important industrial area, is central to the Canadian and U.S. markets and near the Great Lakes and Niagara Falls.

### CHECK-IN: KEY ISSUE 1

#### Where Is Industry Distributed?

- ✓ **The Industrial Revolution was a series of improvements that transformed manufacturing. Most of the improvements occurred first in the United Kingdom.**
- ✓ **The world's three principal industrial regions are Europe, North America, and East Asia.**

## Industrial Regions

### Learning Outcome 11.1.1

Describe the locations of the principal industrial regions.

Industry is concentrated in three of the nine world regions discussed in Chapter 9 regions of the world: Europe (Figure 11-3), North America (Figure 11-4), and East Asia (Figure 11-5). Each of the three regions 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

Major industrial areas in Europe include:

- The **United Kingdom** dominated world production of steel and textiles during the nineteenth century. These industries have declined, but the country has attracted international investment through new high-tech industries that serve the European market.
- The **Rhine-Ruhr Valley** has a concentration of iron and steel manufacturing because of proximity to large coalfields. Rotterdam, the world's largest port, lies at the mouth of several branches of the Rhine River as it flows into the North Sea.
- The **Mid-Rhine** is Europe's most centrally located industrial area. Frankfurt is a financial and commercial center and the hub of Germany's transport network. Stuttgart specializes in high-value goods that require skilled labor. Mannheim, an inland port along the Rhine, has a large chemical industry that manufactures synthetic fibers, dyes, and pharmaceuticals.



▲ **FIGURE 11-3 EUROPE'S INDUSTRIAL AREAS** Europe was the first region to industrialize during the nineteenth century. Numerous industrial centers emerged in Europe as countries competed with each other for supremacy.

- The **Po Basin** has attracted textiles and other industries because of two key assets, compared to Europe's other industrial regions: numerous workers willing to accept lower wages and inexpensive hydroelectricity from the nearby Alps.
- **Northeastern Spain** was Europe's fastest-growing manufacturing area during the late twentieth century. Spain's leading industrial area, Catalonia, centered on the city of Barcelona, is the center of Spain's textile industry and the country's largest motor-vehicle plant.
- **Moscow** is Russia's oldest industrial region, centered around the country's capital and largest city.
- **St. Petersburg**, Russia's second-largest city, specializes in shipbuilding and other industries serving Russia's navy and ports in the Baltic Sea.
- The **Urals**, contain the world's most varied collection of minerals. Proximity to these minerals has attracted iron and steel, chemicals, machinery, and metal fabricating plants.
- **Volga** is the region containing Russia's largest petroleum and natural gas fields. To the northeast, the Ural mountain range contains more than 1,000 types of minerals, the most varied collection found in any mining region in the world.
- **Kuznetsk** is Russia's most important manufacturing district east of the Ural Mountains, with the country's largest reserves of coal and an abundant supply of iron ore.
- **Donetsk**, in Eastern Ukraine, has one of the world's largest coal reserves.
- **Silesia**, Europe's most rapidly growing industrial area, takes advantage of a skilled but low-paid workforce and proximity to wealthy markets in Western Europe.

### NORTH AMERICA'S INDUSTRIAL AREAS

Major industrial areas in North America include:

- **New England** was a cotton textile center in the early nineteenth century. Cotton was imported from southern states, and finished cotton products were shipped to Europe.
- The **Middle Atlantic** is the largest U.S. market, so the region attracts industries that need proximity to a large number of consumers and depend on foreign trade through one of this region's large ports.
- The **Mohawk Valley**, a linear industrial belt in upper New York State, takes advantage of inexpensive electricity generated at nearby Niagara Falls.
- **Pittsburgh-Lake Erie** was the leading steel-producing area in the nineteenth century because of its proximity to Appalachian coal and iron ore.

## KEY ISSUE 1

# Where Is Industry Distributed?

- The Industrial Revolution
- Industrial Regions

The modern concept of industry—meaning the manufacturing of goods in a factory—originated in northern England and southern Scotland during the second half of the eighteenth century. From there, industry diffused to Europe and to North America in the nineteenth century and to other regions in the twentieth century.

## The Industrial Revolution

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. People made household tools and agricultural equipment in their own homes or obtained them in the local village. Home-based manufacturing was known as the **cottage industry** system.

The catalyst of the Industrial Revolution was technology, with several inventions transforming the way in which goods were manufactured, beginning with the steam engine, an example of which is shown in Figure 11-1. The revolution in industrial technology created an unprecedented expansion in productivity, resulting in substantially higher standards of living. In Chapter 2, the Industrial Revolution was cited as a principal cause of population growth in stage 2 of the demographic transition.

The term *Industrial Revolution* is somewhat misleading:

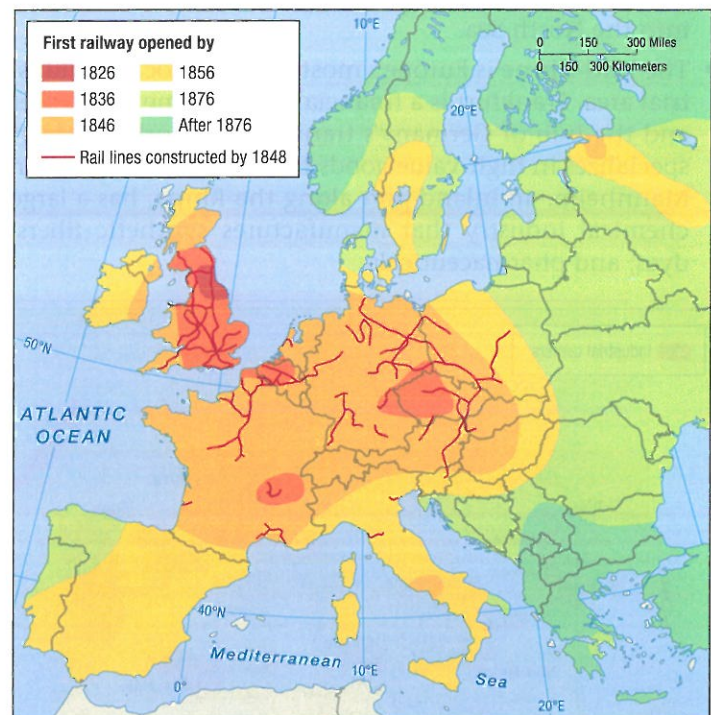
- The transformation was far more than industrial; it resulted in new social, economic, and political inventions, not just industrial ones.
- The changes involved a gradual diffusion of new ideas and techniques over decades rather than an instantaneous revolution.

Nonetheless, the term is commonly used to define the process that began in the United Kingdom in the late 1700s. Among the first industries impacted by the Industrial Revolution were:

- **Iron.** The first industry to benefit from Watt's steam engine was the iron tool industry. The usefulness of iron had been known for centuries, but it was difficult to produce because ovens had to be constantly heated, something the steam engine could do.
- **Coal.** Wood, the main energy source prior to the Industrial Revolution, was becoming scarce in England because it was in heavy demand for construction of

ships, buildings, and furniture, as well as for heat. Manufacturers turned to coal, which was then plentiful in England. It became the principal source of energy to operate the ovens and the steam engines.

- **Transportation.** First canals and then railroads enabled factories to attract large numbers of workers, bring in bulky raw materials such as iron ore and coal, and ship finished goods to consumers (Figure 11-2).
- **Textiles.** Textile production was transformed from a dispersed cottage industry to a concentrated factory system during the late eighteenth century. In 1768, Richard Arkwright, a barber and wigmaker in Preston, England, invented machines to untangle cotton prior to spinning. Too large to fit inside a cottage, spinning frames were placed inside factories near sources of rapidly flowing water, which supplied the power.
- **Chemicals.** The chemical industry was created to bleach and dye cloth. In 1746, John Roebuck and Samuel Garbett established a factory to bleach cotton with sulfuric acid obtained from burning coal. When combined with various metals, sulfuric acid produced another acid called vitriol, which was useful for dyeing clothing.
- **Food processing.** In 1810, French confectioner Nicolas Appert started canning food in glass bottles sterilized in boiling water. Canned food was essential to feed the factory workers who no longer lived on farms.



▲ **FIGURE 11-2 DIFFUSION OF THE INDUSTRIAL REVOLUTION** The construction of railroads in the United Kingdom and on the European continent reflects the diffusion of the Industrial Revolution. Europe's political problems impeded the diffusion of the railroad. Cooperation among small neighboring states was essential to build an efficient rail network and to raise money for constructing and operating the system. Because such cooperation could not be attained, railroads in some parts of Europe were delayed 50 years after their debut in Britain.